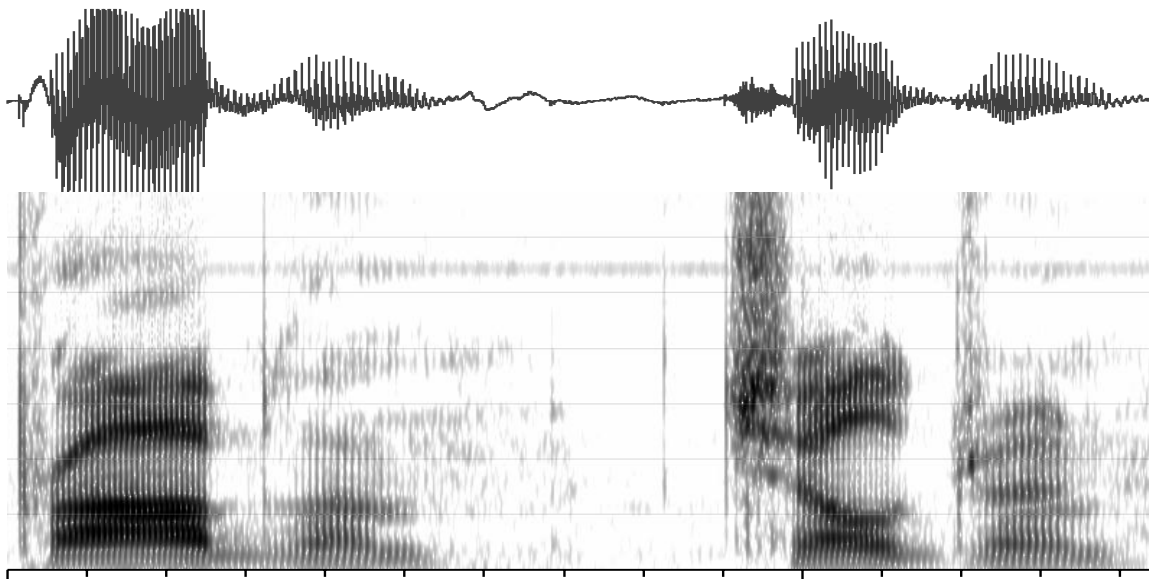




tf32 – Time-frequency spectrogram ¹

A program for display of speech or other audio waveform along with the grey-scale time-frequency spectrogram. Requires Windows 95/NT, requires a Windows sound card for audio playback. Commands are

Files Open Open a waveform file for display. Accepts these formats: CSpeech, NCVS92 (new CSpeech format), RIFF (Windows .WAV – 16 bit only), UW Microbeam Database compressed (.ACC), TIMIT Database (CMU and SPHERE) formats, Kay Elemetrics .NSP, ILS, Speech Station.

Files New Open a zero-valued waveform display.

Files Prev Open the waveform file for display that precedes the currently displayed waveform file in alphabetical order. This command searches all files in the same directory with the same extension. The **Prev** button does the same thing.

Files Next Open the waveform file for display that follows the currently displayed waveform file in alphabetical order. The **Next** button does the same thing.

Files Exit Exit the program.

Edit Copy Saves screen display (optionally the waveform, spectrogram, and text labels), adds a time axis marked in 100 ms intervals, and copies to the clipboard. Invoke **Edit Paste** from your word processing program to place in a document for printing.

View TimeFreqA Change BW (45 Hz for narrowband, 300 Hz for wideband, 450 Hz wideband for high F_0 speech), frequency range, dB floor, dB range, and waveform channel selection of the primary time-frequency spectrogram display. Press **Close TF** to remove the spectrogram display, reinvoke **Analysis TimeFreqA** and press **OK** to get it back.

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View TimeFreqB Display and set parameters for a second time-frequency spectrogram display.

View Waveform Toggle for hiding/making visible the waveform display. When you hide the waveform or remove the spectrogram, they do not show up in the graphics image saved with **Edit Copy**.

View Label Display text labels. If the label file you select does not yet exist, you will see a blank label display; **View Mark Label** will create this file when you mark the first label.

View Mark Label Marks a text label in the file selected and displayed by **View Label**.

View Spec Display a time-slice spectrum in a separate window. This analyses the waveform interval between cursors up to a maximum of 1024 samples. Dragging a cursor over the time-slice spectrum window also displays a pip in the time-frequency display indicating the time extent of the time-slice and the frequency of the cursor. Press the **Copy** button in this display to place the time-slice spectrum plot in the clipboard.

View Time Display the time to compute the time-frequency spectrogram. Useful for comparing processor speeds.

View XY Display the x-y articulatory plot (requires x-ray microbeam or other articulatory data in the .xyd file). Select the **Play** command to animate this display. The top row of buttons position the *play* cursor, the black cursor in the waveform display that indicates the articulatory position in the x-y display. The next row of buttons position the initial or final waveform cursors at the play cursor position. The **Copy** button in this display places the x-y articulatory plot in the clipboard.

Play Play the waveform interval between the cursors (if visible, otherwise the entire screen) through the sound card. The **Play** button performs the same command.

Filter HPF Filter the displayed waveform with a zero-phase high-pass filter.

Filter Sine Add a sine wave to the displayed waveform.

Filter New Performs the same filter operations, but places the output into a new waveform channel.

The placement of cursors on the waveform and time-frequency displays follows the pattern for CSpeech. The mouse can place left and right cursors over the waveform display. Drag the left mouse button and release to place the left cursor, drag the right mouse button and release to place the right cursor. Click on the up and down arrows that appear in the upper righthand corner to zoom out or zoom in to the waveform display. A horizontal scroll control appears after zooming in. Press the arrow buttons or drag the thumb button to scroll through the time-synchronized waveform and time-frequency spectrogram displays.

The time-slice spectrum window gives readouts (in order top to bottom) for frequency and dB of the spectrum sample, interpolated frequency and dB for the last spectrum peak you scanned the cursor across, and total dB of the signal under the spectrum window. Buttons control preemphasis and a selection between Hamming or rectangular window. The **M** button saves the current spectrum in memory and displays it in gray for comparison with a new spectrum. You can go back to the waveform window to move the waveform cursors, and the change appears in the time-slice spectrum window as a new spectrum. Selecting the **Copy** button places the time-slice spectrum in the clipboard, allowing pasting into word processor or other documents.