

Chirp Stimulation

In audiology, a Chirp is a stimulus sound that increases or decreases in frequency over a short period of time. It normally starts at a low frequency and ends at a higher frequency value. A graphical representation of the narrowband 1000 Hz iChirp stimulus can be seen below. Note how the frequency increases from left to right.

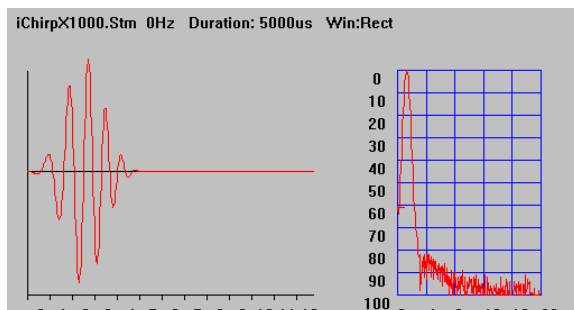


Fig.1 - Chirp in time and frequency domain

While the broadband chirp stimulus can be equated to stimulation by click stimuli, Narrowband Chirps can be equated to stimulation by tone burst. A Narrowband chirp will include sound energy concentrated around a particular frequency.

The SmartEP & SmartEP-ASSR iChirp stimulus are based on the model by Boer, E. (1980). "Auditory physics. Physical principles in hearing theory I." Physics Reports 62, 87-174.

iChirp Acquisition for SmartEP

Starter settings files are provided for general use. These can be loaded by clicking on the **[LOAD SETTINGS]** button in the SmartEP control panel. The settings files will load the following parameters:

- **Stimulus:** one of the following files
 - iChirp.STM,
 - iChirp500Hz.STM,
 - iChirp1000Hz.STM,
 - iChirp2000Hz.STM,
 - iChirp4000Hz.STM.
- **Masking:** none
- **Rate:** 19.3/sec for broadband chirps; 27.1/sec for frequency specific chirps.
- **Polarity:** Rarefaction for broadband chirps, Alternating for frequency specific chirps.
- **Transducers:** Insert earphones.

- **Intensity:** 80 dB HL down to 0 dB HL for threshold search.
- **Filters:** 100 Hz to 3000 Hz.
- **Notch Filter:** OFF. ON if there is excessive electrical line noise present.
- **Amplification (Gain):** 100x
- **Analysis Time Window:** 22 milliseconds
- **Sweeps:** 1024
- **Electrode Montage:** Ipsilateral array.

Waveform Analysis

The structure of the waveforms acquired using Chirp stimulation will appear very similar to ones acquired with standard click or tone stimulation. However, Chirp stimulation tends to elicit higher amplitude responses with a slightly delayed peak structure.

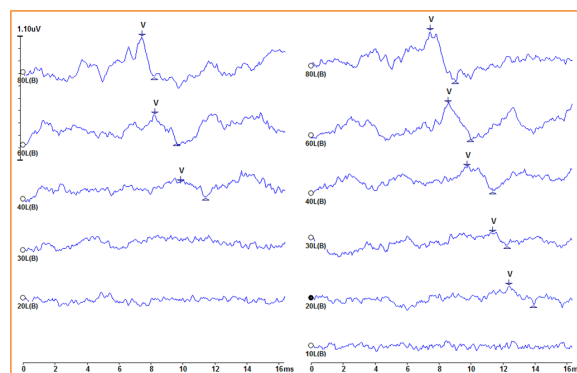


Fig.2 - 500 Hz Tone and iChirp responses compared

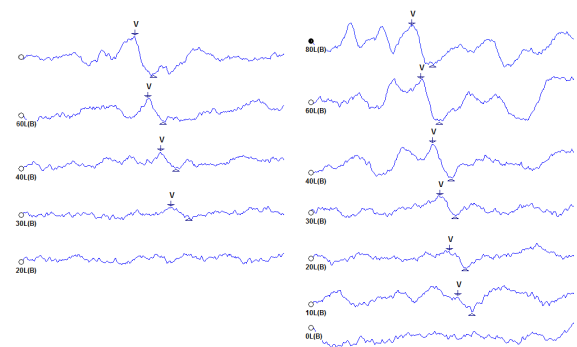


Fig.3 - 2000 Hz Tone and iChirp responses compared

iChirps for SmartEP-ASSR

Ready-to-use iChirp stimulus files can be loaded into Smart-ASSR by clicking on **[STIMULUS > RIGHT STIMULUS]** or **[STIMULUS > LEFT STIMULUS]** from the main menu. The following files are available in versions for the left ear:

- iChirpSS_MultL.STM
- iChirpSS_BrdBL.STM
- iChirpSS_500L.STM
- iChirpSS_1000L.STM
- iChirpSS_2000L.STM
- iChirpSS_4000L.STM

The following files are available in versions for the right ear:

- iChirpSS_MultR.STM
- iChirpSS_BrdBR.STM
- iChirpSS_500R.STM
- iChirpSS_1000R.STM
- iChirpSS_2000R.STM
- iChirpSS_4000R.STM

Note that the files labeled 'Mult' contain chirp components for all four audiometric frequencies (500, 1000, 2000, and 4000 Hz). The file labeled 'Brd' contains broadband chirp component. All others are single frequency component stimuli.

After loading them, simply start acquisition. Remember that when using files, these must be loaded, clicking on the stimulus panel options will revert your stimulus selection to standard click or tones. If you will be using these files repeatedly, you may want to consider saving a settings file using the options in the **[SYSTEM]** menu.