Demonstrations for *Psychoacoustics Second Edition*
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Descriptions and Instructions for the demos of various psychoacoustic phenomena.

Table of Contents

Chapter 2
Demo 2.1 (Text)
RMS calculation
File: 2.1-RMS.pdf

Illustration of how to calculate the RMS of a pure tone

Pressure change to dB change
File: 2.2-PressureToDecibels.pdf

Illustration that a 10-fold increase in pressure equals a 20-dB increase in decibels.

Demo 2.3 (Audiovisual)
Yes/No Experiment
Files: 2.3-YesNoDemo.mp4; 2.3-YesNoDemoVisual.mp4

Movie that illustrates a set of trials for a yes/no detection experiment. A visual implementation of this illustration is also available.

Demo 2.4 (Audiovisual)
2IFC Experiment
Files: 2.4-2IFCDemo.mp4; 2.4-2IFCDemo.mp4

Movie that illustrates a set of trials for a 2IFC detection experiment. A visual implementation of this illustration is also available.

Demo 2.5 (Audio)
MAP
File: 2.5-MAP.wav

This is a demonstration of the effects of frequency on the ability to hear sound. You will hear sets of tone pulses in which the level of the tones decreases in 5 dB steps. Count the number of sets that you hear for each frequency. The more sets you can hear, the lower your threshold. Note for which frequencies you can hear the most sets.

Chapter 3
Demo 3.1 (Audio)
Filtered speech
File: 3.1-FilteredSpeechQuiet.wav

This is a demonstration of how low-pass filtering (such as that imposed by a hearing loss) influences the perception of speech in quiet. You will first hear an unfiltered version of a sentence spoken by a female talker, and then you will hear the same sentence but with more and more of the high frequencies removed. The demonstration is repeated a second time, but with a different sentence spoken by a male talker.

Demo 3.2 (Audio)
Filtered speech in quiet and in noise
File: 3.2-FilteredSpeechNoise.wav

This is a demonstration of how low-pass filtering (such as that imposed by a hearing loss) influences the perception of speech in quiet and in noise. You will first hear the sentences in quiet. The first sentence is an unfiltered version of a sentence spoken by a female talker, and then you will hear three versions of the same sentence but with a smaller and smaller bandwidth. The demonstration is repeated for the same sentence presented in train noise and then in babble noise. The full set (quiet, train noise, and babble noise) is then repeated for a different sentence spoken by a male talker.

Demo 3.3 (Audiovisual)
2IFC Simultaneous Masking Experiment
Files: 3.3-SimultaneousMasking.mp4; 3.3-SimultaneousMaskingVisual.mp4

Movie that illustrates a set of trials for a 2IFC simultaneous masking experiment. A visual implementation of this illustration is also available.

Demo 3.4 (Audio)
Notched noise Demo
File: 3.4-NotchedNoise.wav

This is a demonstration of the notched noise method. You will hear sets of 1000-Hz tone pulses in which the level of the tones decreases in 5 dB steps. These tone pulses are presented simultaneously with a noise with varied spectral notches. The first noise stimulus has no spectral notch, and the notch bandwidth is increased for each subsequent noise. Count the number of steps you can hear for each noise notch bandwidth. The more steps that you can count, the better your threshold. Notch widths are 0, 50, 100, 200, 400, and 800 Hz. You should notice that increasing the width of the notch is associated with a lower threshold.

Demo 3.5 (Audio)
Upward spread of masking.
File: 3.5-UpwardSpread.wav

This is a demonstration of upward spread of masking. A 1/3-octave band of noise centered at 1000 Hz is used to mask a 750- Hz and a 1250-Hz tone. You will hear sets of tone pulses at each frequency in which the level decreases in 5-dB steps. The more steps you hear, the better your threshold. You may notice that the low-frequency tone has a better threshold than the high-frequency tone when presented with the same masker.

Demo 3.6 (Audiovisual)
2IFC Forward Masking Experiment
Files: 3.6-ForwardMasking.mp4; 3.6-ForwardMaskingVisual.mp4

Movie that illustrates a set of trials for a 2IFC forward masking experiment. A visual implementation of this illustration is also available.

Demo 3.7 (Audio)
Forward masking Demo
File: 3.7-ForwardMasking.wav

This is a demonstration of forward masking. You will hear a brief, 10-ms tone added to a noise. It should sound like a short blip. The level of the tone will decrease in 5-dB steps. Count the number of steps that you hear to estimate your threshold. The more steps you hear, the better your threshold. At first, the tone will be presented without the noise. Then, the tone will be presented simultaneous with the noise. And finally, it will then be moved farther and farther in time from the noise: 10, 20, 30, 40, and 50 ms after the noise has stopped. You should notice that the tone gets easier to hear as it is moved farther in time from the noise. That is, you should be able to count more steps at the longer temporal spacings.

Demo 3.8 (Audio)
Fluctuating Masker Benefit
File: 3.8-FLM.wav

This is a demonstration of the fluctuating masker benefit. You will hear a series of tone pulses, decreasing in 2-dB steps. Count the number of steps that you hear to estimate your threshold. The more steps you hear, the better your threshold. In the first sequence, the tones are embedded in broadband noise, and in the second sequence, the tones are embedded in fluctuating noise. Each sequence will be presented twice.

Chapter 4
Demo 4.1 (Text)
dB IL= dB SPL
File: 4.1-dBILdBSPL.pdf

Calculations illustrating that dB IL = dB SPL for air.

Demo 4.2 (Audiovisual)
Magnitude Estimation of Loudness
Files: 4.2-MagEstimation.mp4; 3.5-ForwardMaskingVisual.mp4

Movie that illustrates how a magnitude estimation experiment might work. A visual implementation of this illustration is also available.

Demo 4.3 (Audiovisual)
Categorical Loudness Scaling
Files: 4.3-CatLoudness.mp4; 3.5-CatLoudnessVisual.mp4

Movie that provides an example of an implementation of categorical loudness measurement. A visual implementation of this illustration is also available.

Demo 4.4 (Audiovisual)
2IFC Intensity Discrimination Experiment
Files: 4.5-IntensityDiscrim.mp4; 4.5-IntensityDiscrimVisual.mp4

Movie that illustrates a set of trials for a 2IFC intensity discrimination experiment. A visual implementation of this illustration is also available.

Chapter 5
Demo 5.1 (Audiovisual)
2IFC Gap Detection Experiment
Files 5.1-GapDetect.mp4; 5.1-GapDetectVisual.mp4

Movie that illustrates a set of trials for a gap detection experiment.

Demo 5.2a (Audio)
Noise Bandwidth - Visualization
File: 5.2a-NoiseBandwidthVisual.pdf

This is a visual depiction of noises with different bandwidths.

Demo 5.2b (Audio)
Noise Bandwidth
File: 5.2b-NoiseBandwidth.wav

This is a demonstration of filtered noise. You will hear sequence of noise bands presented with progressively narrower bandwidths. The noise is always centered at 2500 Hz, with an initial bandwidth of 4000 Hz that is progressively decreased to 125 Hz. Notice the change in quality as the bandwidth becomes more narrow. Each sequence will be presented twice. Demo 5.2a provides a companion pdf file which provides a visual depiction of these stimulus waveforms.

Demo 5.3 (Audio)
Modulation Depth
File: 5.3-ModDepth.wav

This is a demonstration of modulated noise at different modulation depths. You will a sound sequence with noise samples with a modulation rate of 10 Hz. The noise will be initially unmodulated, and a sequence of sounds will have progressively increasing modulation depth: 10%, 20%, 40%, 70%, and 100% (fully modulated). Each sequence will be presented twice.

Demo 5.4 (Audio)
Modulation rates for SAM tones and noises
File: 5.4-ModRatesSAM.wav

This is a demonstration of modulated tones and noises at different modulation rates. The first sequence you will hear is a set of modulated noises at modulation rates of 5, 10, 20, 50, 100, 200, and 400 Hz. You then will hear a sequence of modulated tones at the same modulation rates. You may notice that the change in quality with increasing modulation rate is different from the noises compared to the tones – for the tones, the change may be a shift to the perception of a chord, rather than the perception of faster modulations. The two sequences will be presented twice.

Demo 5.5 (Audiovisual)
2IFC Amplitude Modulation Detection Experiment
File: 5.5-AMModDetect.mp4

Movie that illustrates a set of trials for a 2IFC Amplitude modulation detection experiment.

Demo 5.6 (Audio)
Modulation Depth - TMTF
File: 5.6-TMTF.wav

This is a demonstration of the TMTF. You will hear two sound sequences of noises presented at two different modulation rates: The first sequence will have a modulation rate of 20 Hz and the second will have a modulation rate of 300 Hz. The modulation depth is changed, starting at -40 dB and increasing in 5 dB steps to 0 dB. Count the number of steps needed to tell that the noise is modulated. Each sequence will be presented twice. The lower the count, the better the modulation detection threshold.

Demo 5.7 (Audiovisual)
2IFC Forward Masking Experiment
Files: 5.7-ForwardMasking.mp4; 5.7-ForwardMaskingVisual.mp4

Movie that illustrates a set of trials for a 2IFC forward masking experiment. A visual implementation of this illustration is also available.

Demo 5.8 (Audio)
Forward masking.
File: 5.8-ForwardMasking.wav

This is a demonstration of forward masking. You will hear a brief, 10-ms tone added to a noise. It should sound like a short blip. The level of the tone will decrease in 5-dB steps. Count the number of steps that you hear to estimate your threshold. The more steps you hear, the better your threshold. At first, the tone will be presented without the noise. Then, the tone will be presented simultaneous with the noise. And finally, it will then be moved farther and farther in time from the noise: 10, 20, 30, 40, and 50 ms after the noise has stopped. You should notice that the tone gets easier to hear as it is moved farther in time from the noise. That is, you should be able to count more steps at the longer temporal spacings.

Demo 5.9 (Audio)
Temporal integration.
File: 5.9-TI.wav

This is a demonstration of temporal integration. You will hear noises of increasing duration presented in decreasing levels in 5 dB steps. Count the number of steps you can hear for each duration. The most steps that you can count, the better your threshold. The durations start at 5 ms and are doubled on each presentation, for durations of 5, 10, 20, 40, 80, 160, and 320 ms. You should notice that increasing the duration increases the number of steps that you can hear, up to a point, at which detecting the sound is at maximum.

Chapter 6
Demo 6.1 (Audiovisual)
Magnitude Production of Pitch
File: 6.1-MagProduction.mp4

Movie that simulates a magnitude production experiment for pitch.

Demo 6.2 (Audiovisual)
2IFC Frequency Discrimination Experiment
Files: 6.2-FreqDiscrim.mp4

Movie that illustrates a set of trials for a frequency discrimination experiment.

Demo 6.3 (Audio)
Pitch of the missing fundamental.
File: 6.3-Missingf0.wav

This is a demonstration of the pitch of the missing fundamental. You will hear a 200-Hz pure tone interleaved with a harmonic complex (f0=200 Hz) with the lowest harmonics progressively removed. Listen whether the pure tone and the complex tone have the same pitch as harmonics 1 through 10 are removed.

Demo 6.4 (Audio)
Pitch strength
File: 6.4-PitchStrength.wav

This is a demonstration of sounds with decreasing pitch strength. The sounds are a 250-Hz tone, a 250-Hz harmonic complex with harmonics 1-20, a 250-Hz harmonic complex with harmonics 5-15, a low-pass noise filtered at 250 Hz, and an amplitude modulated noise at 250 Hz. The sound sequence is presented twice.

Demo 6.5 (Audiovisual)
2IFC Fundamental Frequency Discrimination Experiment
Files: 6.5-F0Discrim.mp4

Movie that illustrates a set of trials for a fundamental frequency discrimination experiment.

Chapter 7
Demo 7.1 (Audiovisual)
2IFC IPD Discrimination Experiment
File: 7.1-IPDDiscrimi.mp4

Movie that illustrates a set of trials for an interaural phase detection experiment.

Demo 7.2 (Audiovisual)
2IFC ILD Discrimination Experiment
File: 7.2-ILDDiscrim.mp4

Movie that illustrates a set of trials for an interaural level detection experiment.

Demo 7.3 (Audio)
HRTF demo
File: 7.3-HRTF.wav

In this demonstration, a noise stimulus is passed through a head-related-transfer function that simulates different locations around the head. The initial stimulus is presented at 0 degrees azimuth, and subsequent stimuli are presented at 15 degree spatial locations to provide the sense that the noise is moving around the head. This demonstration only works over headphones.

Demo 7.4 (Audiovisual)
2IFC BMLD Experiment
File: 7.4-BMLDExperiment.mp4

Movie that illustrates a set of trials for BMLD experiment.

Demo 7.5 (Audio)
BMLD.
File: 7.5-BMLD.wav

This is the demonstration for the binaural masking level difference. Be sure to use headphones for this demonstration to be effective. You will hear four different sound tracks of 250-Hz tone pulses added to noise (each presented in sequency). The level of the tones will decrease in 5 dB steps. Count the number of sets of tone pulses you hear. The more sets you can hear, the lower your threshold. You should notice that you can hear more sets of tone pulses in tracks 2 and 4, as those conditions tap into binaural mechanisms that reduce the impact of noise on the threshold.
Track 1 is N_0S_0, where the noise and signal are identical at the two ears.
Track 2 is $N_0S\pi$, where the noise is identical at the two ears but the signal is inverted.
Track 3 is a monaural presentation where the noise and signal are presented only to the left ear.
Track 4 has the signal presented in the left ear only, but the noise is presented in both ears.