Auditory learning involving complex sounds affects nonlinear integration within cortical responses - Supplementary Information

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Figure 1: Multilinear context model (Ahrens, Linden and Sahani, J. Neurosci. 28:1929, 2008). The diagram contains three main elements: a contextual reweighting field ($w^{\phi}$), a stimulus (a dynamic random chord, discretized in time and frequency), and a primary receptive field ($w^{rf}$; an STRF). The contextual reweighting field acts to multiplicatively modulate the effective sound level of each target tone within the stimulus (blue arrow) before the primary receptive field linearly transforms the effective sound levels (green arrow) to an estimate of firing rate in the form of a PSTH.

Figure 2: STRF modifications. STRF selectivity for upward moving frequency sweeps was assessed using the quadrant asymmetry index, a measure of power asymmetry in the modulation transfer function. Cumulative distribution functions for the population are shown. Trained animals exposed to the stimuli for an extended period of time show a clear increase in upsweep selectivity not present in either naïve animals, or trained animals exposed to the stimuli for a shorter period of time.
Figure 3: Contextual reweighting fields for naive and trained animals ($w^{\tau \phi}$). Top: extended exposure to stimuli. Bottom: less exposure to stimuli. $\tau$ indicates the time before stimulus onset (in 20ms bins), while $\phi$ indicates the deviation in frequency (in 1/12 octave steps) from the frequency of the modulated tone. The long distance asymmetries present in both groups of animals indicate changes in sensitivity to stimulus tones that are preceded by tones at slightly lower frequencies. The CRF asymmetries evident in both groups of trained animals are consistent with enhanced discrimination of fast and slow upward moving frequency sweeps.