Figures and figure supplements

Detecting and representing predictable structure during auditory scene analysis

Ediz Sohoglu and Maria Chait
Figure 1. Stimuli and behavior. (A) Examples of REG and RAND scenes. The plots represent ‘auditory’ spectrograms, equally spaced on a scale of ERB-rate (Moore and Glasberg, 1983). Channels are smoothed to obtain a temporal resolution similar to the Equivalent Rectangular Duration (Plack and Moore, 1990). Black arrows indicate appearing sources. In these examples, the appearing source is temporally regular. The stimulus set also included scenes in which the appearing source was temporally random (see Materials and methods). (B) Behavioral results (d’ and detection time) as a function of scene temporal structure (REG versus RAND). These are shown for each type of scene change (when the appearing source was temporally regular or when random). Error bars represent within-subject standard error of the mean (SEM; Loftus and Masson, 1994).

DOI: 10.7554/eLife.19113.003
Figure 2. RMS time-course of the scene-evoked response showing the main effect of scene temporal structure (REG versus RAND). Thick horizontal green lines indicate time points for which there were significant differences between REG and RAND conditions (p<0.05 FWE corrected at the cluster level). Thin light-green lines show uncorrected clusters. Purple lines indicate (jackknife-estimated) latencies of the onset of the REG versus RAND effect (horizontal and vertical portions indicate mean and jackknife-corrected standard error, respectively). Also shown are topographical patterns at the time of the sustained response (500–800 ms post scene onset), which are characterized by a dipole-like pattern over the temporal region in each hemisphere indicating downward flowing current in auditory cortex (red = source; blue = sink). DOI: 10.7554/eLife.19113.004
Figure 3. Appearance-evoked response. (A) RMS time-course of the appearance-evoked response showing the main effect of scene temporal structure (REG versus RAND). Thick horizontal green lines indicate time points for which there were significant differences in RMS between REG and RAND conditions (p<0.05 FWE corrected at the cluster level; Thin light-green lines show uncorrected clusters). Purple lines indicate (jackknife-estimated) latencies of the onset of the REG versus RAND effect (horizontal and vertical portions indicate mean and jackknife-corrected standard error, respectively). Also shown are topographical patterns at the time of the appearance-evoked M50 (72–112 ms), M100 (144–188 ms) and M200 (232–360 ms) components. (B) Mean RMS over the appearance-evoked M50 period (712–112 ms). Asterisk indicates the significant (p<0.05) interaction ([REG>RAND]>[Passive>Active]). Error bars represent within-subject standard error of the mean (computed separately for Passive and Active groups. (C) Same as panel A but showing main effect of appearing source structure (temporally regular versus random). See also Figure 3—figure supplement 1 for the MEG time-course averaged over selected sensors responsive to the appearance-evoked M50 component.

Figure 3 continued on next page
Figure 3—figure supplement 1. MEG time-course averaged over selected sensors responsive to the appearance-evoked M50 component. (A) MEG from sensors showing positive signal at the time of the appearance-evoked M50 component. Thick horizontal green lines indicate time points for which there were significant differences in MEG amplitude between REG and RAND conditions (p<0.05 FWE corrected at the cluster level; Thin light-green lines show uncorrected clusters). (B) MEG from sensors showing negative signal at the time of the appearance-evoked M50 component.

DOI: 10.7554/eLife.19113.006
Figure 4. Source reconstruction. (A) Main effect of scene temporal structure at the time of the sustained portion of the scene-evoked response (500–800 ms post scene onset). Statistical map is overlaid onto an MNI space template brain, viewed over the left and right hemispheres. Color-bar indicates statistical threshold. (B) [REG>RAND] > [Passive>Active] interaction at the time of the appearance-evoked M50 component (72–112 ms post appearance). DOI: 10.7554/eLife.19113.007