SUPPLEMENTARY FIGURE LEGENDS.

Supplementary Audios 1-5. Animal vocalizations depicted in Fig. 1a.

Supplementary Audios 6-10. IRN stimuli depicted in Fig. 1b.

Supplementary Figure 1. Representative sample of constructed iterated rippled noises (IRN). HNR values of IRNs as a function of gain and number of iterations. IRNs were constructed so as to span HNR values from -6 to +25 dB HNR, being comparable to the observed range for animal vocalizations. Different gains had to be included (not shown) to construct a more complete set of IRNs with low HNR values. For comparison, the orange rectangles indicate the approximate range of IRNs reported by Griffiths et al., (1998), based on number of iterations.

Supplementary Figure 2. Cortical activation to 16,000 Hz pure tone stimuli versus silent events (red) was present in both hemispheres in three participants (**a**-**c**) tested with this high frequency. Subject #14 (panel **c**) had difficulty hearing the 16 kHz pure tone, especially in one ear, as assessed by audiometry prior to scanning. Interestingly, for this individual we had to lower the threshold setting to $p<0.0001$ to reveal activation for this PT frequency, yet activation was still present in both hemispheres. Most of the 16 kHz sensitive regions overlapped, or were in close proximity to the high frequency ranges within the outlined FDRRs from Figure 2 (black outlines). Note that the differences in activation in Figure 2 (red) were due to the presence of the 12 kHz stimulus not represented here.

Supplementary Figure 3. Pure tone tonotopy versus IRN-tonotopy. Colored cortex and FDRR outlines from Figure 2. Charts depict activation to pure tones (yellow and orange) and IRNs of the corresponding periodicity pitch (light and dark green). Note that many, but not all, of the

FDRR ROIs showed the same frequency-preference trend (e.g. in charts: orange > yellow and dark green > light green). The IRN pitch maps were not as evident as the tonotopic maps, presumably due to the fact that our IRNs contain power at all harmonics. This may also be due to not being able to use IRN pitches above roughly 5 kHz, they surpassed the psychophysical upper limit of musical pitch perception (Langner, 1992; Rosen, 1992), and they became distorted when presented through our sound delivery system.

Supplementary Figure 4. Sensitivity to IRN pitch. Within the IRN HNR-sensitive regions (green) there were no significant correlations in activation with the periodicity pitch of the IRN (charts). Also see Figure 1 for IRN pitch range.

Supplementary Figure 5. Intensity vs HNR-sensitivity to IRNs. In contrast to the PT and BPN stimuli, which could be equated for perceived loudness across individuals (e.g. **Fig. 1e**), the IRN stimuli proved to be more difficult to match perceptually. Thus, participants (n=4) were tested to directly assess the effects of parametric increases or decreases in IRN stimulus intensity. (**a**) Graphical depiction of the 60 IRN stimuli showing a forward- or reversed-bias with stimulus intensity (total RMS power). (**b**-**c**) Individual data sets (2 of 4 shown) illustrating activity under the two separate conditions performed during the same scanning session: dark green = HNR biased with loudness, light green = HNR biased against loudness. Both conditions revealed cortex sensitive to the HNR value of the IRNs.

Supplementary Figure 6. Response profiles (BOLD percent signal change) for regions showing HNR-sensitivity to animal vocalizations in 6 participants. Charts depict the sigmoid-response fit for the mSTG ROIs.