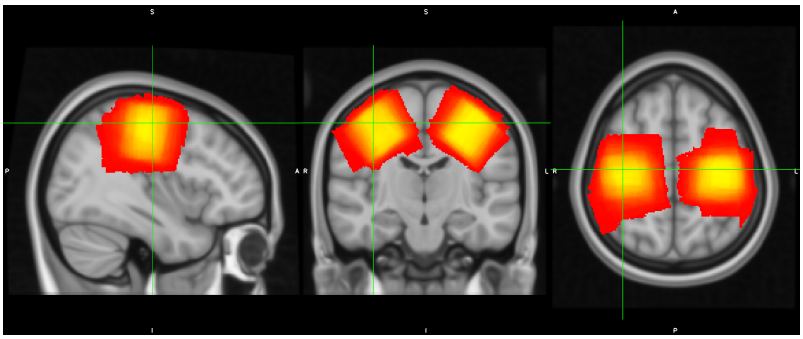
Supplementary Results

More than 95% of the participants had more than 1400 significantly activated vertices within the anatomical ROI. We therefore used 1400 vertices as a default ROI-size in many of the analyses. The 1 young and 1 older subject who had fewer than 1400 significantly activated vertices exhibited typical levels of neural distinctiveness (i.e. within one standard deviation of the average from all the subjects). Furthermore, the age effect on neural distinctiveness did not change when these subjects were excluded from the analysis ($t(33.97) = -2.182$, $p = 0.036$). Because these subjects did not exhibit any other differences from the rest of the participants, they were included in all the analyses.

Transverse temporal gyrus (Heschl's gyrus) is the site of primary auditory cortex and is presumably involved in low-level feature processing of all auditory information independent of its category. Speech and music obviously have differences in their spectral and temporal properties, so the distinctiveness measured within primary auditory cortex could reflect low-level feature differences between the two stimulus categories. We therefore computed distinctiveness after excluding Heschl's gyrus from the ROI. Distinctiveness computed in the two different ROIs (with and without Heschl's gyrus) were highly correlated ($r(41) = 0.99$, $p<2.2e-16$) and neural distinctiveness was still significantly reduced in the older vs. younger participants even when Heschl's gyrus was excluded ($t(36.6) = -2.11$, $p = 0.042$). Likewise, the relationship between GABA+ and neural distinctiveness in the older adults was still significant ($r(21) = 0.46$, $p = 0.026$).

(a)



(b)

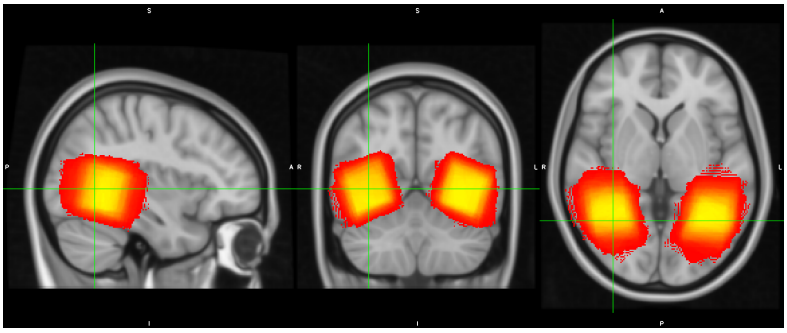


Fig. S1. MRS voxel placement in the (a) sensorimotor and (b) ventrovisual cortex. The color indicates the amount of overlap in the voxel placement across participants (yellow represents maximum overlap while red represents less overlap).

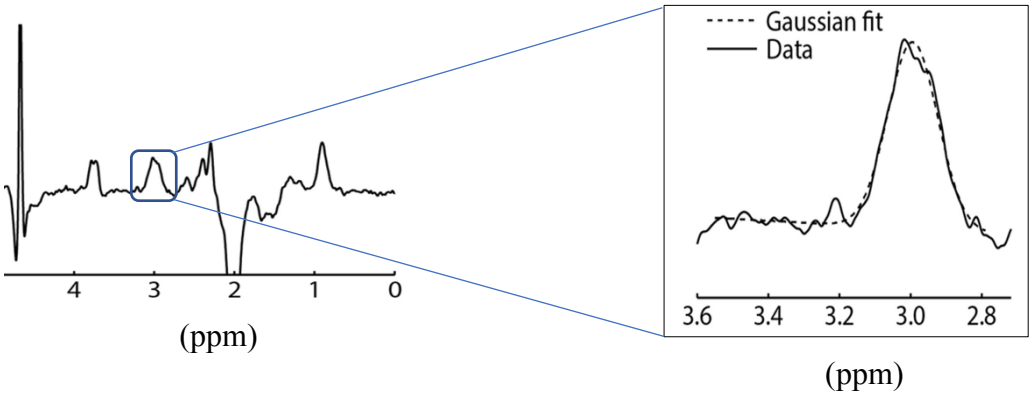
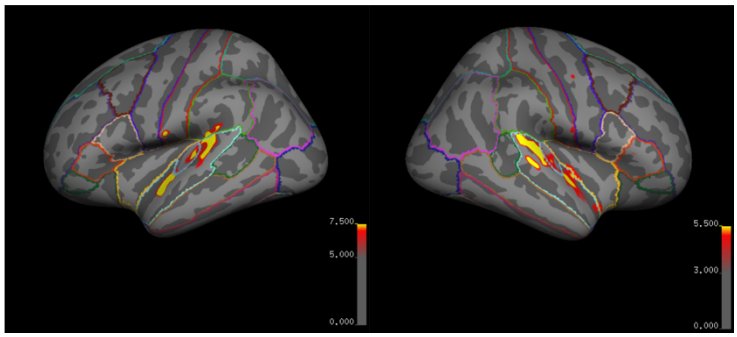


Fig. S2. Example of an MRS spectrum. The peak around 3ppm is associated with GABA. The enlarged figure shows a Gaussian model fit (dotted line) using Gannet 3.0 to estimate the area under the curve i.e. GABA+ levels.

(a)



(b)

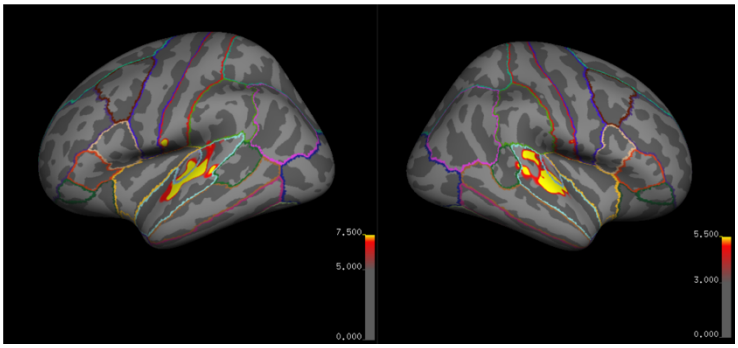


Fig. S3. Participant-specific functional ROIs for the computation of neural distinctiveness. (a) Heatmap of the significance of the music vs. fixation contrast. The scale is the negative log of the uncorrected significance value at each vertex (e.g. p=0.001 is displayed as 3 on the plot). The most significant areas are in yellow and less significant regions are in red. (b) Heatmap of the significance of the foreign speech vs. fixation contrast.

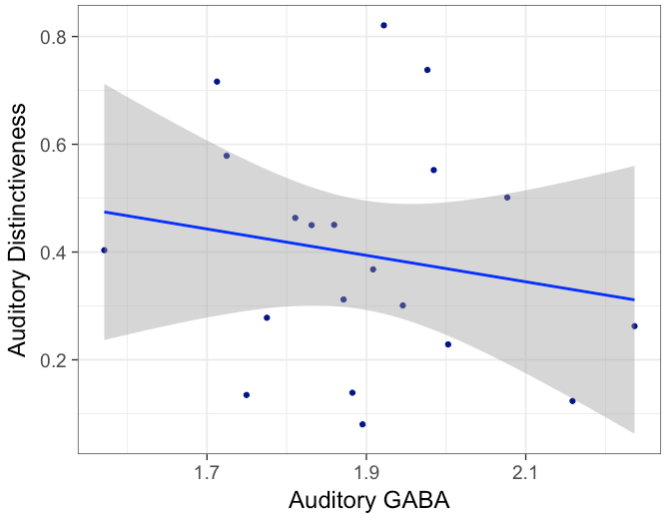


Fig. S4. The relationship between raw auditory GABA+ levels and auditory neural distinctiveness in younger adults. Individual differences in GABA+ were not significantly correlated with individual differences in neural distinctiveness in the younger adults. ($r(18) = -0.18$, $p = 0.45$)

Table S1. Neural distinctiveness in auditory cortex was reduced in older adults relative to younger adults independent of ROI size. Average distinctiveness also declined with increasing ROI size in both age groups.

ROI Size (vertices)	Mean (Older adults)	Mean (Young Adults)	Student's t-value	p-value
1000	0.28	0.401	-1.86	0.071#
1400	0.27	0.395	-2.045	0.047*
2000	0.26	0.386	-2.36	0.023*
5000	0.21	0.35	-3.11	0.003**
10000	0.16	0.245	-2.80	0.007**
Anatomical (~37000 vertices)	0.06	0.1	-2.18	0.035*