# Figure legends

**Figure 1.** Examples of stimulus condition trials in the fMRI experiment are represented schematically (conditions were presented in randomised order during scanning). Dotted lines represent the azimuthal plane. The spatial steps and musical notation shown here are purely for illustrative purposes; stimuli were based on smaller spatial steps and pitch values that do not correspond to intervals in traditional Western music.

**Figure 2.** Distribution of grey matter atrophy in the Alzheimer’s disease group. Statistical parametric maps of regional grey matter atrophy in the Alzheimer’s disease group compared to the healthy control group from the voxel-based morphometry analysis are shown. Maps are presented on a group mean T1-weighted MR image in MNI space, thresholded leniently for display purposes at p < 0.001 uncorrected for multiple voxel-wise comparisons over the whole brain. The colour side bar codes voxel-wise t-values of grey matter change. Planes of representative sections are indicated using the corresponding MNI coordinates (mm); the right hemisphere is shown on the right in the coronal section.

**Figure 3.** Functional neuroanatomical substrates for the analysis of spatial sounds and the effect of Alzheimer’s disease (AD).Statistical parametric maps show all significant regional brain activations identified within the healthy control group (far left panels), the AD group (middle left panels) and in group comparisons (middle right panels); maps have been rendered on representative axial (top left) and sagittal sections of the study-specific group mean T1-weighted structural MR image. The MNI coordinate of each section plane is indicated (the axial section is tilted to display auditory cortical areas in the superior temporal plane, STP; the right hemisphere is shown on the right). Maps have been thresholded at p < 0.001 uncorrected for multiple comparisons over the whole brain, showing clusters > 50 voxels, for display purposes; for healthy controls and group comparisons, clusters shown were also significant at threshold p < 0.05 after correction for multiple comparisons within pre-specified anatomical regions of interest (see also Table 2 and Table S3). Contrasts were composed as follows: pitch variation (pitch - magenta), [(PcSc + PcSf) – (PfSc + PfSf)]; spatial variation (space - cyan), [(PcSc + PfSc) – (PcSf + PfSf)] S)]; spatial – pitch interaction (interaction - red), [(PcSc – PcSf) – (PfSc – PfSf)]. Also shown (far right panels) are plots of beta weights (group mean ±1 standard error beta parameter estimates) at the peak voxel for the pitch variation contrast in the healthy control group (in anterior superior temporal cortex, top; not significant at the prescribed corrected threshold in the AD group), and for significant group comparisons in the spatial variation contrast (healthy control group greater than AD group in posterior cingulate cortex, middle) and the spatial – pitch interaction contrast (AD group greater than control group in posterior insula, below); PcSc, pitch changing, spatial location changing; PcSf, pitch changing, spatial location fixed; PfSc, pitch fixed, spatial location changing; PfSf, pitch fixed, spatial location fixed.