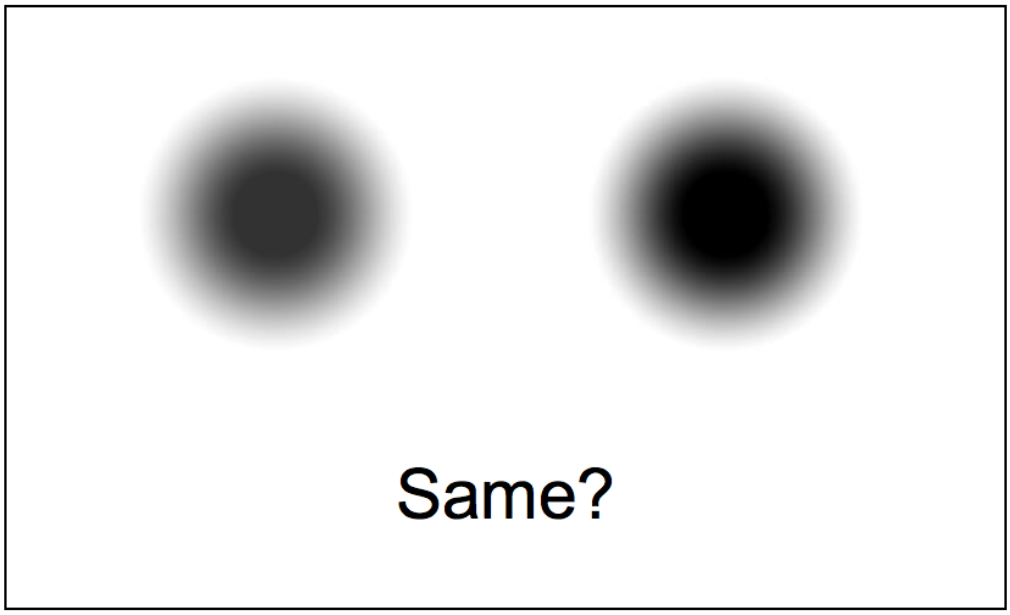
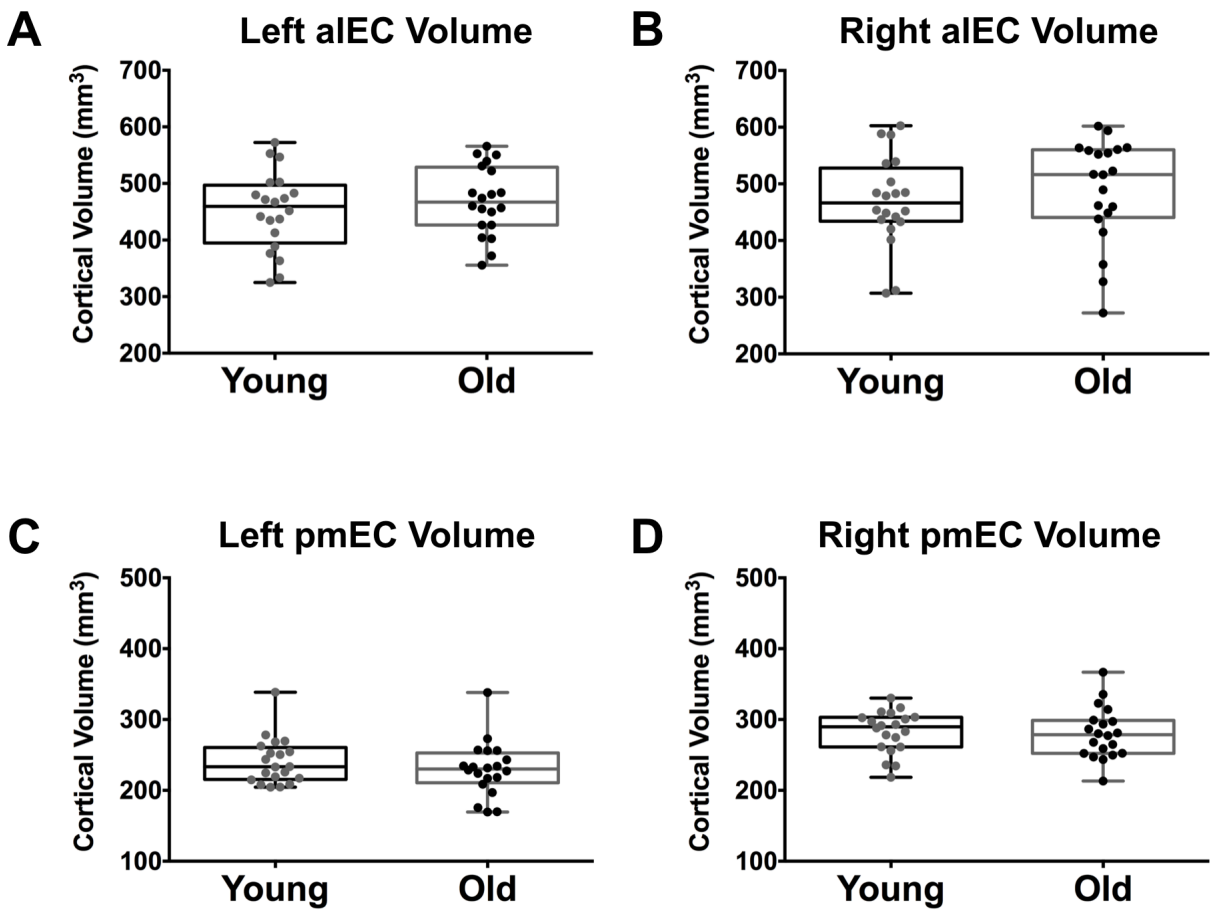
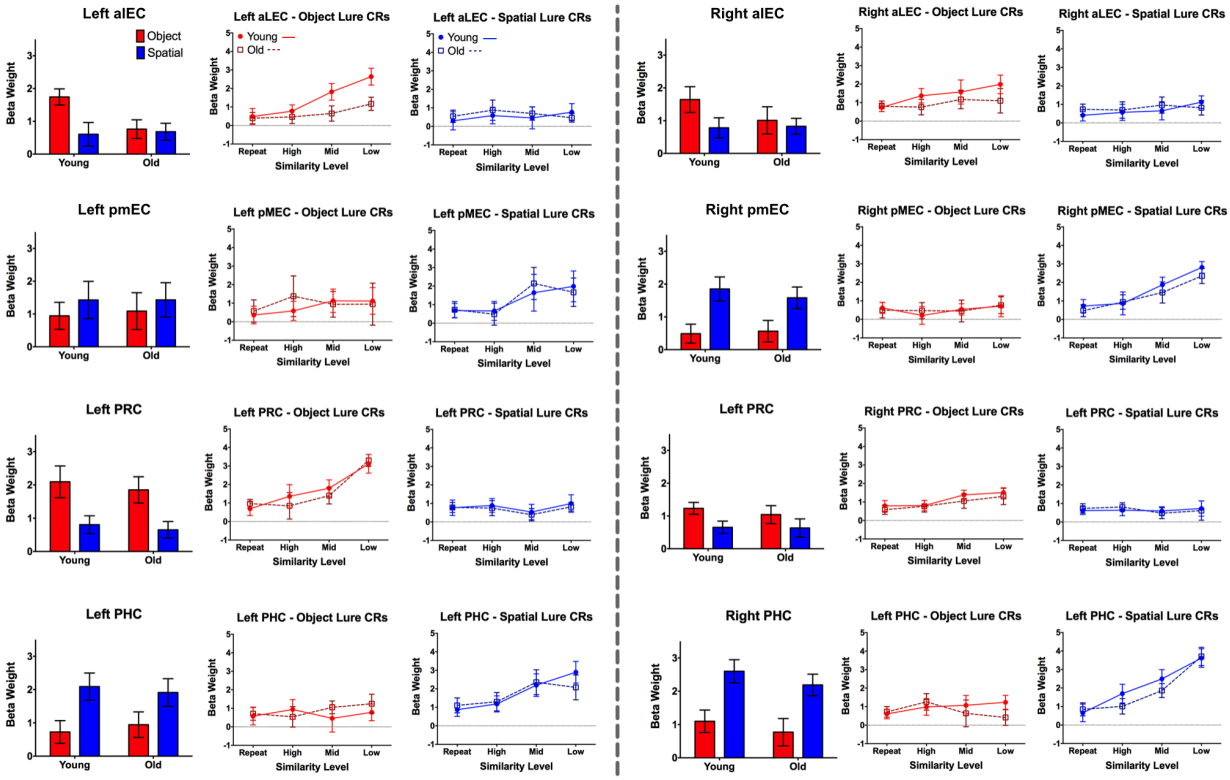
Supplementary Information for "Anterolateral entorhinal-hippocampal imbalance in older adults disrupts object pattern separation"



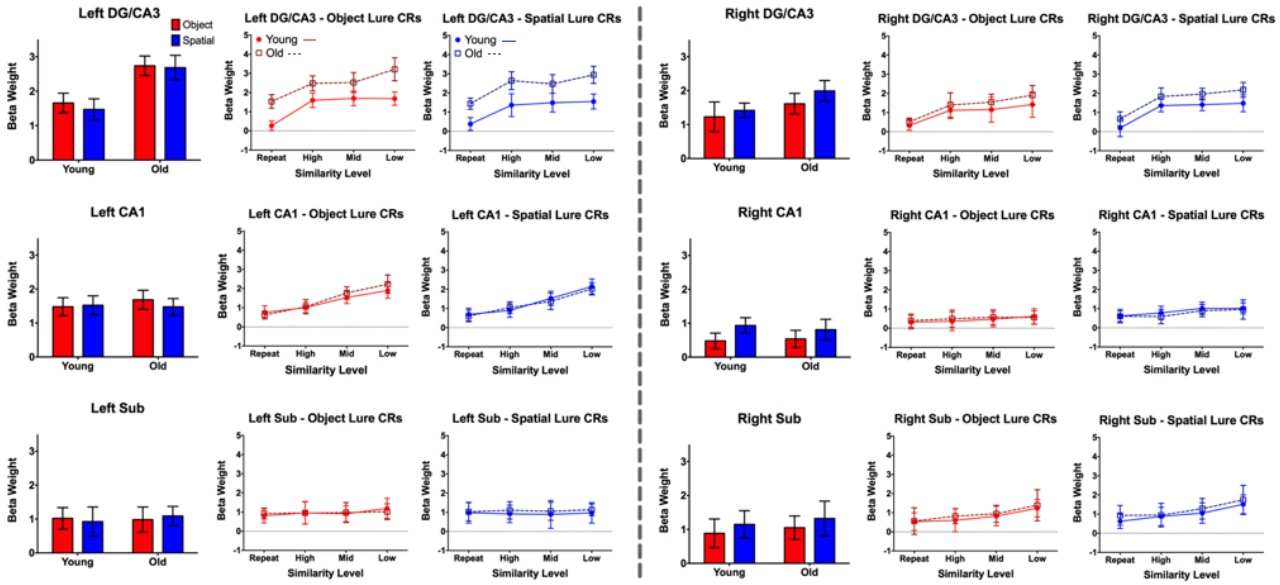
Supplementary Figure 1: Example of a perceptual matching trial, which served as a baseline in fMRI analyses. Participants had three seconds to look at the two blurred dots and indicate via button press whether the two were equally shaded.



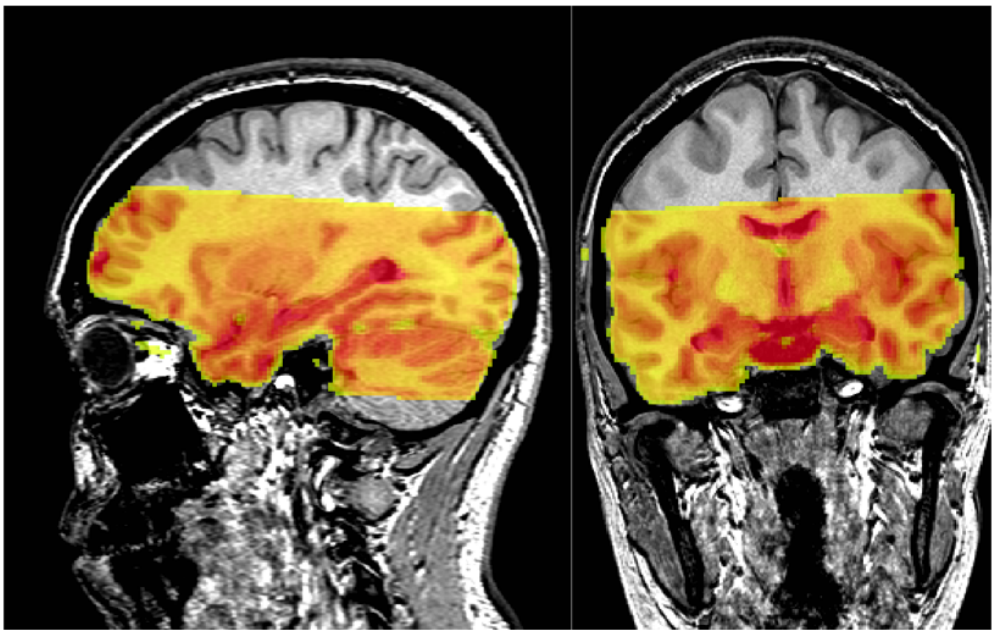
Supplementary Figure 2: Cortical volume measurements across young and old participants. Multi-atlas label fusion was used as a data-driven approach to labeling individual subjects' brains with our ROIs (see Methods for details), and estimates of volume for each ROI (in mm^3) were extracted. No group differences were observed in A) left aLEC, B) right aLEC, C) left pMEC, or D) right pMEC.



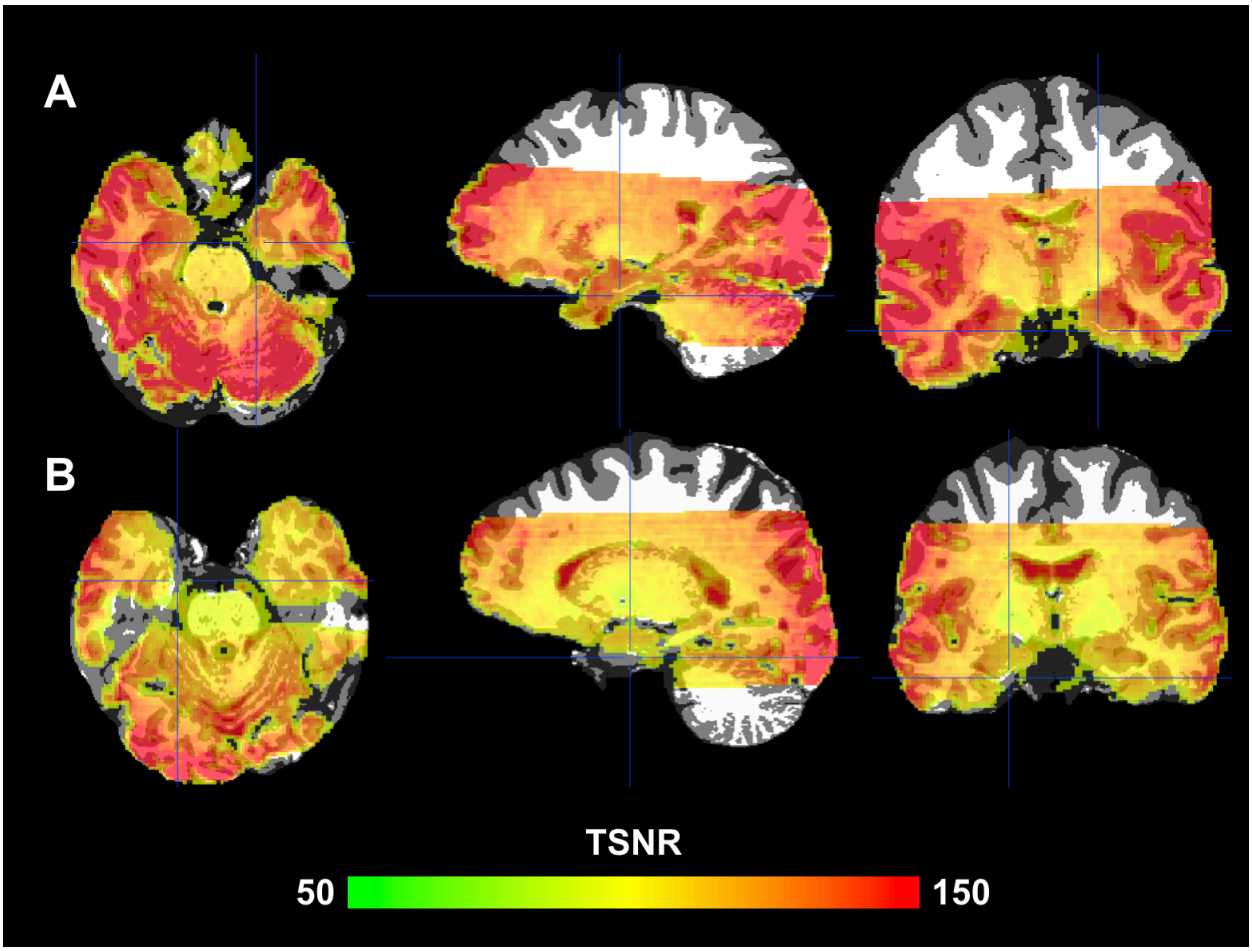
Supplementary Figure 3: All cortical ROIs (bilateral aLEC, pMEC, PRC, and PHC) as engaged by object and spatial discrimination in the task.



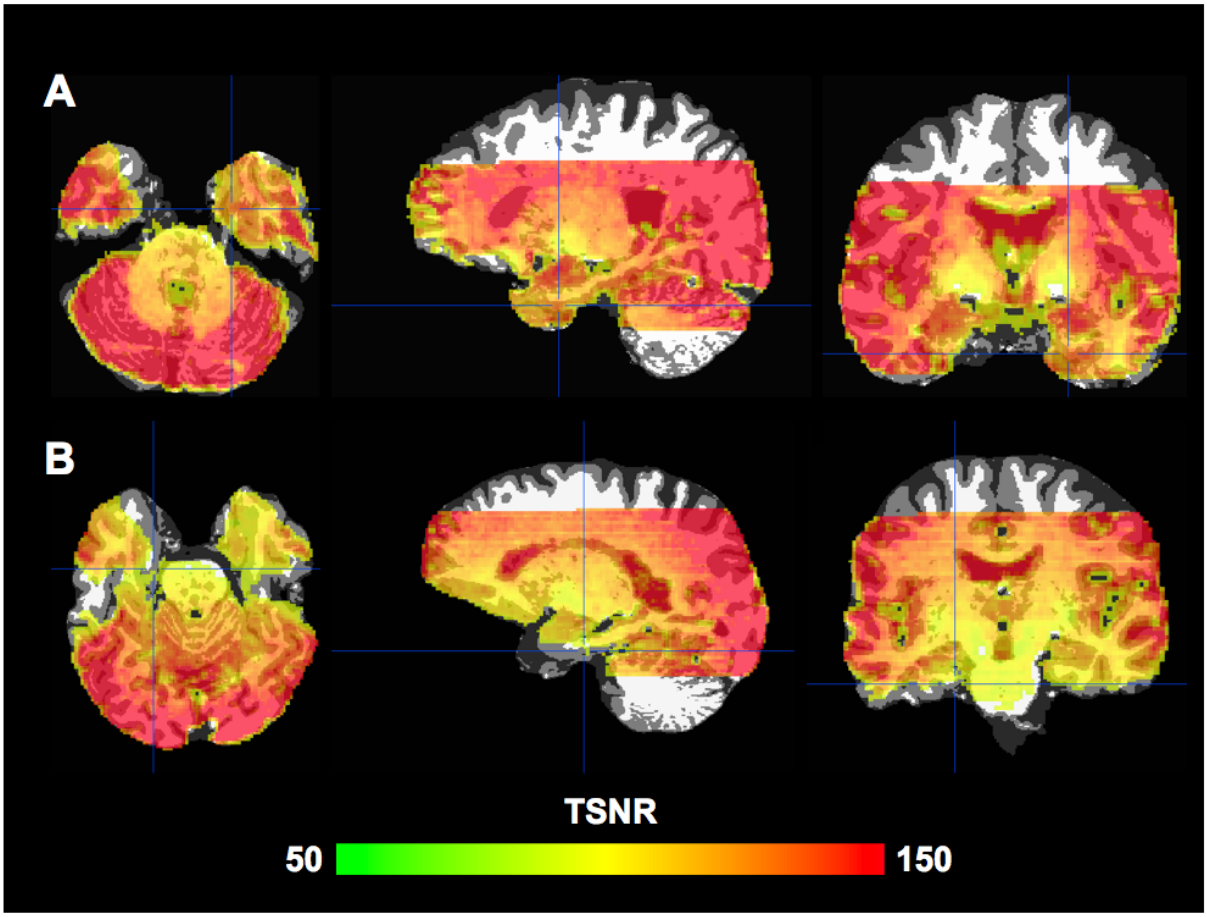
Supplementary Figure 4: All hippocampal ROIs (bilateral DG/CA3, CA1, and subiculum) as engaged by object and spatial discrimination in the task.



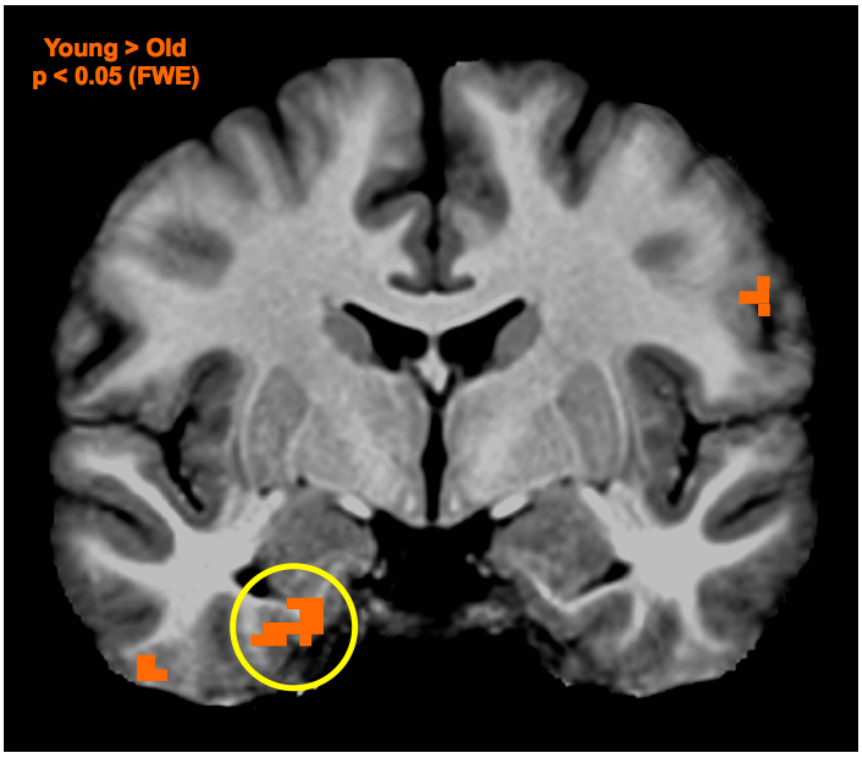
Supplementary Figure 5: Coverage of our 1.8 isotropic EPI volume in an example subject.



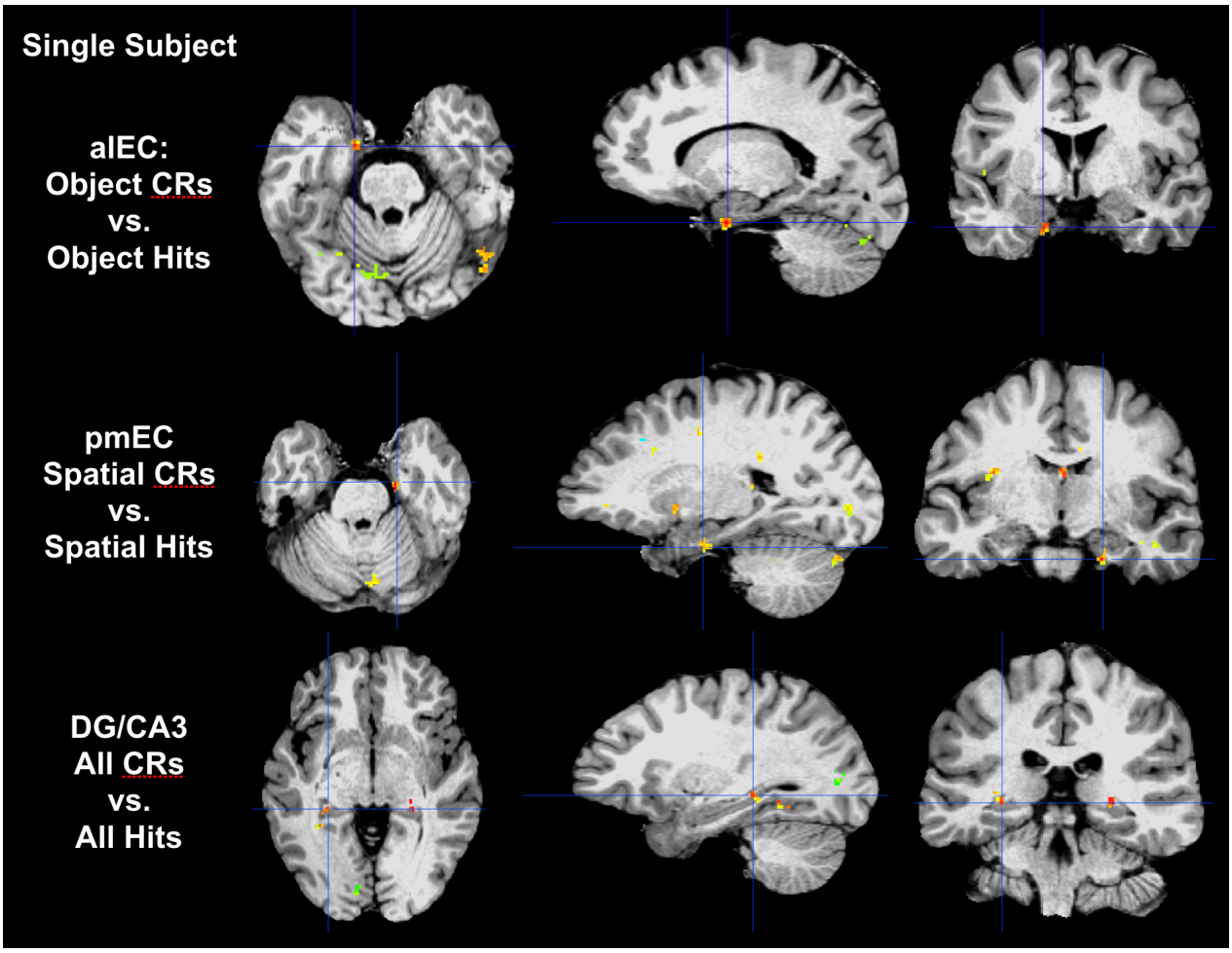
Supplementary Figure 6: Examples of TSNR maps obtained from two representative young subjects. Subjects with A) relatively good, and B) relatively poor TSNR in the MTL are shown. Note the “missing” voxels with TSNR < 50 in the EC, focused by the crosshairs.



Supplementary Figure 7: Examples of TSNR maps obtained from two representative older subjects. Subjects with A) relatively good, and B) relatively poor TSNR in the MTL are shown. Note the “missing” voxels with TSNR < 50 in the EC, focused by the crosshairs.



Supplementary Figure 8: Contrast (t-test) of voxels showing greater activity in young adults compared to older adults during object discrimination (collapsed across similarity). Data were corrected to control familywise error (FWE) at a level of $p < 0.05$. A significant cluster of voxels was observed spanning left aLEC and PRC.



Supplementary Figure 9: Example single-subject contrasts in three representative young participants. A) Contrasting object discrimination versus object recognition in a single subject at $p < 0.05$ corrected reveals a significant cluster in left aLEC. B) Contrasting spatial discrimination versus object recognition in a single subject at $p < 0.05$ corrected reveals a significant cluster in right pMEC. C) Contrasting discrimination versus recognition collapsed across test domains at $p < 0.05$ corrected reveals significant clusters bilaterally in DG/CA3. (CR = correct rejection; data were corrected for false discovery rate (FDR) at the level of single subject beta weight maps.)

Supplementary Table 1: Age and Domain Effects, Collapsed Across Similarity.

Region	Age		Test Domain		Interaction	
	F(1,38)	p	F(1,38)	p	F(1,38)	p
L aLEC	1.801	0.186	**6.683**	**0.014**	**5.071**	**0.031**
R aLEC	0.725	0.399	2.264	0.141	0.959	0.334
L pMEC	0.015	0.902	0.905	0.348	0.026	0.872
R pMEC	0.075	0.786	**15.22**	**<0.001**	0.317	0.577
L PRC	0.265	0.609	**14.29**	**<0.001**	0.018	0.894
R PRC	0.123	0.663	**4.624**	**0.038**	0.135	0.715
L PHC	0.002	0.966	**15.79**	**<0.001**	0.462	0.501
R PHC	0.744	0.394	**30.55**	**<0.001**	0.024	0.877
L DG/CA3	**10.89**	**0.002**	0.205	0.653	0.066	0.798
R DG/CA3	1.979	0.168	0.846	0.366	0.095	0.76
L CA1	0.061	0.806	0.177	0.677	0.418	0.522
R CA1	0.014	0.906	2.575	0.117	0.157	0.694
L Subiculum	0.031	0.862	<0.001	0.985	0.093	0.762
R Subiculum	0.155	0.696	0.412	0.525	<0.001	0.991

Regional effects, comparing test domains and collapsed across lure similarity. F-statistics and p-values are presented for two-way (Age x Test Domain) mixed ANOVAs across ROIs. Significant effects are bolded.

Supplementary Table 2: Age and Similarity Effects – Object Trials.

Region	Age		Object Similarity		Interaction	
	F(1,38)	p	F(3,114)	p	F(3,114)	p
L aLEC	**4.613**	**0.038**	**7.192**	**<0.001**	1.805	0.15
R aLEC	1.005	0.322	1.429	0.238	0.489	0.691
L pMEC	0.069	0.795	0.28	0.839	0.195	0.899
R pMEC	0.005	0.942	0.286	0.836	0.08	0.971
L PRC	0.051	0.822	**15.68**	**<0.001**	0.558	0.644
R PRC	0.447	0.508	**3.011**	**0.033**	0.092	0.965
L PHC	0.162	0.689	0.279	0.84	0.532	0.661
R PHC	0.224	0.639	0.523	0.668	0.91	0.439
L DG/CA3	**10.02**	**0.003**	**6.22**	**<0.001**	0.382	0.767
R DG/CA3	0.66	0.422	2.585	0.057	0.04	0.989
L CA1	0.132	0.718	**8.86**	**<0.001**	0.247	0.863
R CA1	0.039	0.844	0.153	0.928	0.025	0.995
L Subiculum	<0.001	0.999	0.1	0.96	0.038	0.999
R Subiculum	0.07	0.792	0.845	0.472	0.013	0.998

Regional effects during object trials, considering similarity levels of items at test. F-statistics and p-values are presented for two-way (Age x Similarity) mixed ANOVAs across ROIs. Significant effects are bolded.

Supplementary Table 3: Age and Similarity Effects – Spatial Trials.

Region	Age		Spatial Similarity		Interaction	
	F(1,38)	p	F(3,114)	p	F(3,114)	p
L aLEC	0.075	0.786	0.228	0.876	0.279	0.84
R aLEC	0.111	0.741	0.495	0.687	0.327	0.806
L pMEC	<0.001	0.984	2.519	0.062	0.161	0.922
R pMEC	0.372	0.546	**12.11**	**<0.001**	0.23	0.875
L PRC	0.121	0.73	0.644	0.588	0.033	0.992
R PRC	0.003	0.961	0.152	0.928	0.14	0.936
L PHC	0.024	0.877	**4.818**	**0.003**	0.538	0.657
R PHC	0.35	0.558	**21.46**	**<0.001**	0.727	0.538
L DG/CA3	**9.01**	**0.004**	**4.345**	**0.006**	0.111	0.954
R DG/CA3	2.871	0.098	**6.658**	**<0.001**	0.046	0.987
L CA1	0.026	0.872	**8.502**	**<0.001**	0.099	0.96
R CA1	0.072	0.79	0.84	0.475	0.036	0.991
L Subiculum	0.079	0.78	0.011	0.998	0.001	0.999
R Subiculum	0.12	0.731	1.745	0.162	0.033	0.992

Regional effects during spatial trials, considering similarity levels of items at test. F-statistics and p-values are presented for two-way (Age x Similarity) mixed ANOVAs across ROIs. Significant effects are bolded.