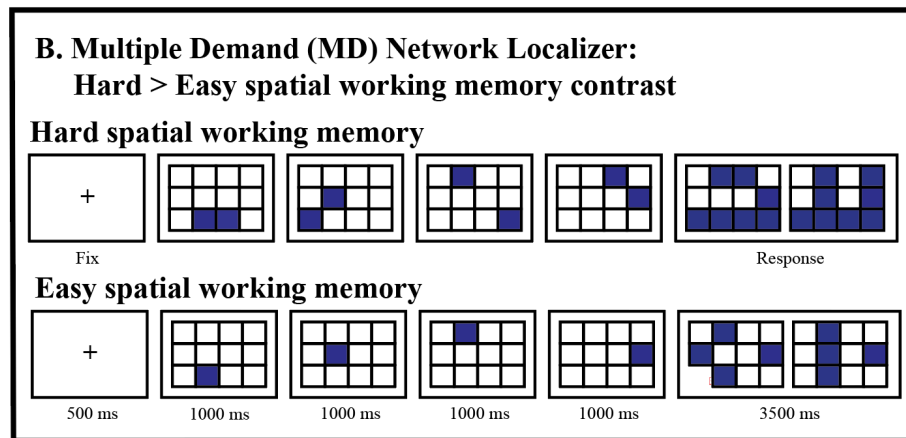
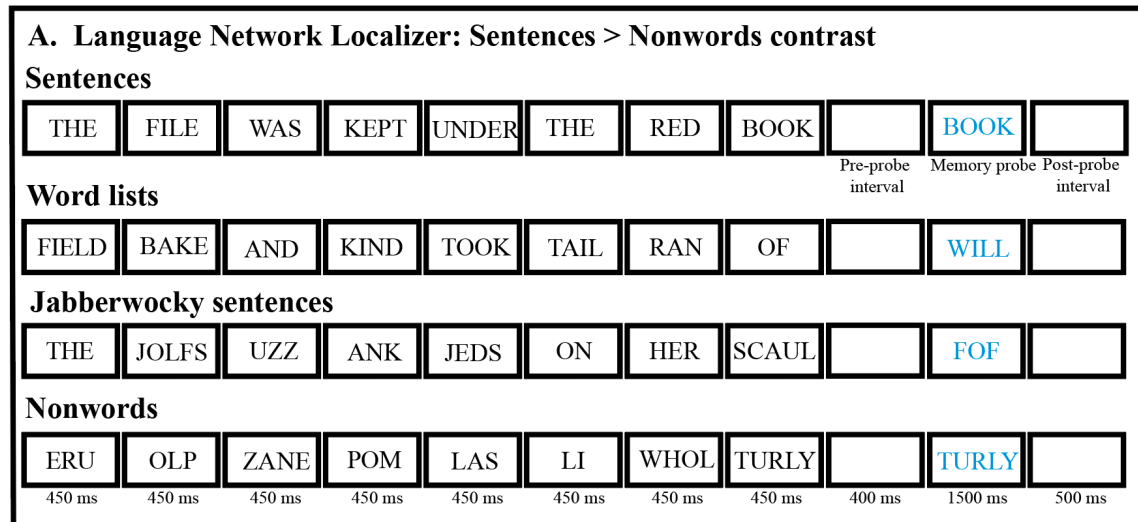


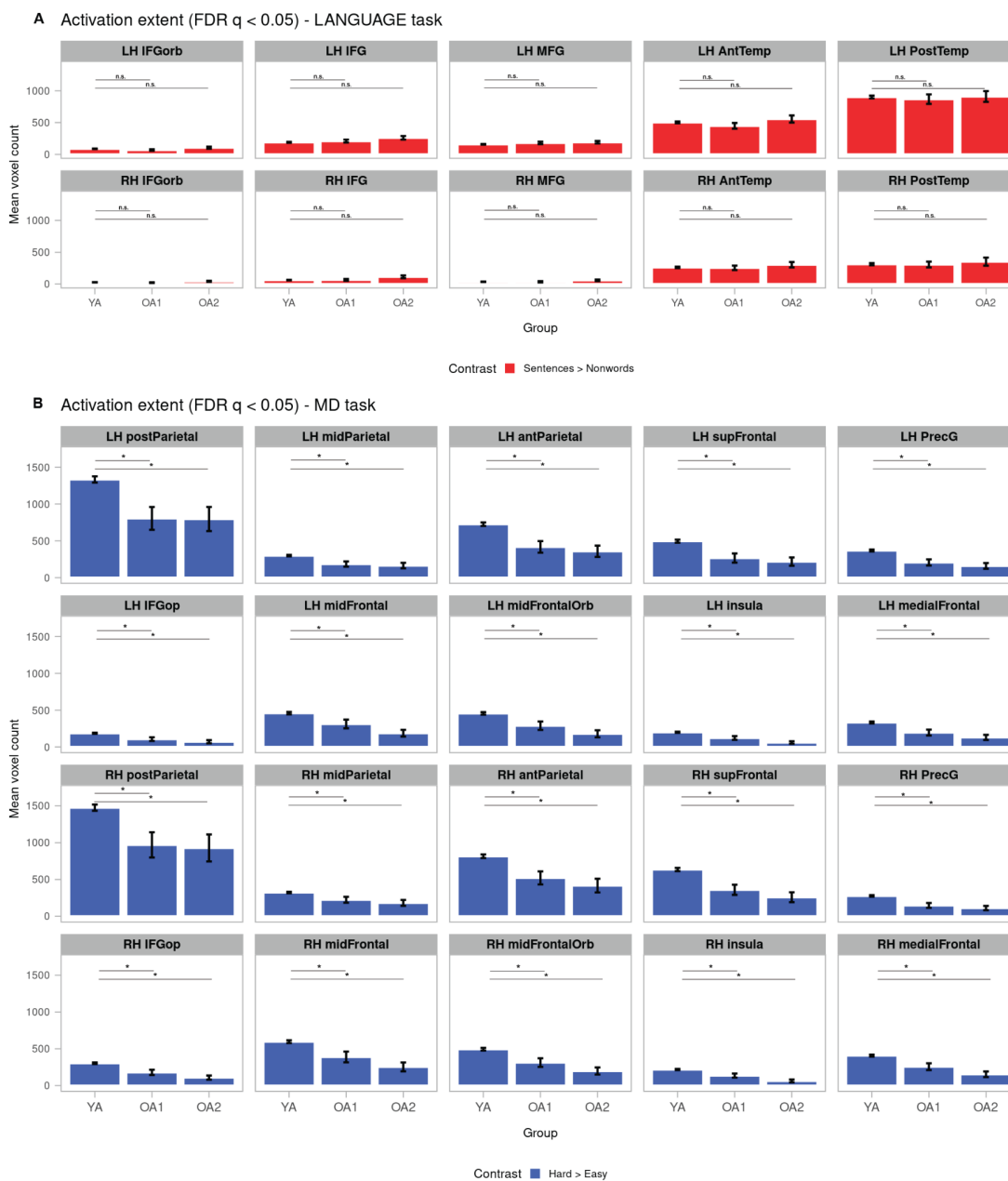
## Supplemental Figures



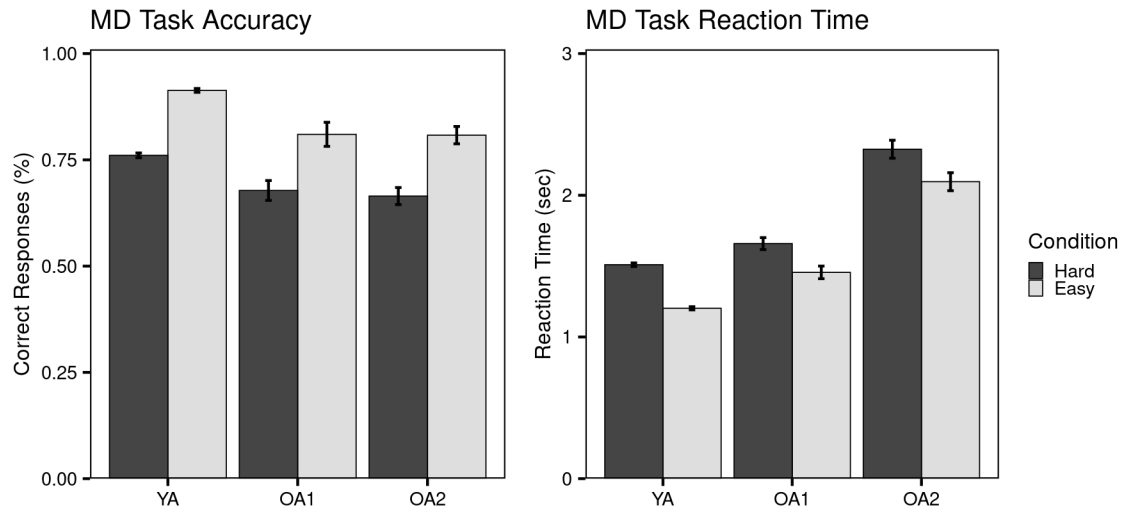
**Figure SI-1.** Alternative versions of the language and MD localizers, used for small subsets of participants (see Materials and Methods). A figure for the main versions is Figure 1 in the main paper.



**Figure Si-2.** Response Magnitude in younger (YA) and older adult (OA1 and OA2) cohorts in language fROIs (A) and Multiple Demand fROIs (B). Significant effects between task conditions (FDR-corrected  $q < .05$ ) are marked with an asterisk, significant cohort differences in the preferred task domains (FDR-corrected  $q < .05$ ) are marked with an asterisk above a bar. LH: left-hemispheric fROIs. RH: right-hemispheric fROIs. IFG: inferior frontal gyrus; IFGorb: IFG pars orbitalis; MFG: middle frontal gyrus; AntTemp: anterior temporal cortex; PostTemp: posterior temporal cortex; postParietal: posterior parietal cortex; midParietal: middle parietal cortex; antParietal: anterior parietal cortex; supFrontal: superior frontal gyrus; PrecG: precentral gyrus; IFGop: IFG pars opercularis; MidFront: middle frontal gyrus; MidFrontOrb: Middle frontal gyrus, orbital part; medialFront: medial frontal cortex.



**Figure SI-3.** Activation extent of the language (A) and the Multiple Demand (B) tasks in younger (YA) and older adult (OA1 and OA2) cohorts at the anatomical parcel level. Significant cohort differences (FDR-corrected  $q < .05$ ) are marked with an asterisk above a bar. LH: left-hemispheric fROIs. RH: right-hemispheric fROIs. IFG: inferior frontal gyrus; IFGorb: IFG pars orbitalis; MFG: middle frontal gyrus; AntTemp: anterior temporal cortex; PostTemp: posterior temporal cortex; postParietal: posterior parietal cortex; midParietal: middle parietal cortex; antParietal: anterior parietal cortex; supFrontal: superior frontal gyrus; PrecG: precentral gyrus; IFGop: IFG pars opercularis; MidFront: middle frontal gyrus; MidFrontOrb: Middle frontal gyrus, orbital part; medialFront: medial frontal cortex.



**Figure SI-4.** Behavioral performance on the Multiple Demand spatial working memory task across cohorts. (Note that the reaction times are not directly comparable between YA and OA1, on the one hand, and OA2 on the other hand, given that the trials were structured differently. As a result, when discussing the behavioral data, we focus on the accuracies).

Version	Main	Alternate
Number of participants	470 (YA), 39 (OA1), 36 (OA2)	2 (OA2)
Task type	Button press	Memory probe
Words/ Nonwords per trial	12	8
Trial duration (ms)	6000	6000
Trial-initial interval (ms)	100	0
Stimulus (ms)	5400 (450/word)	3600 (450/word)
Pre-probe interval (ms)	0	400
Button icon/ Memory probe (ms)	400	1500
Trial-final interval (ms)	100	500
Trials per block	3	3
Block duration (s)	18	18
Blocks per condition per run	8	6
Conditions	Sentences, Nonwords	Sentences, Wordlists, Jabberwocky, Nonwords
Fixation block duration (s)	14	12
Fixation blocks per run	5	7
Total run time (s)	358	516

**Figure SI-5.** Details of language localizer tasks.

Version	Main	Alternate
Number of participants	470 (YA), 39 (OA1)	38 (OA2)
Trial-initial fixation (ms)	500	500
Stimulus (ms)	4000 (1000/square flash)	4000 (1000/square flash)
Time for choice condition	3000 (max, response triggers feedback)	3500
Feedback duration (ms)	250	0 (not provided)
Post-feedback fixation (ms)	3250 – Reaction Time	0
Trial length (s)	8	8
Trials per block	4	3
Block duration (s)	32	24
Blocks per condition per run	6	6
Conditions	Hard, Easy	Hard, Easy
Fixation block duration (s)	16	12
Fixation blocks per run	4	4
Total run time (s)	448	336

**Figure SI-6.** Details of multiple-demand localizer tasks.