SUPPLEMENTAL TABLES:

PFC	Df	SumSq	MeanSq	F	P	eta^2 partial
condition	3.00	0.04	0.01	0.56	0.64	
frequency	4.00	0.35	0.09	4.13	0.00	0.18
high gamma	*1.00*	*0.28*	*0.28*	*13.36*	*0.00*	
interaction	12.00	0.04	0.00	0.17	1.00	
Residuals	76.00	1.62	0.02			

STR	Df	SumSq	MeanSq	F	P	eta^2 partial
condition	3.00	0.03	0.01	0.36	0.79	
frequency	4.00	0.41	0.10	3.67	0.01	0.16
theta	*1.00*	*0.12*	*0.12*	*4.23*	*0.04*	
low gamma	*1.00*	*0.24*	*0.24*	*8.35*	*0.01*	
interaction	12.00	0.06	0.00	0.17	1.00	
Residuals	76.00	2.14	0.03			

VTA	Df	SumSq	MeanSq	F	P	eta^2 partial
condition	3.00	0.10	0.03	1.56	0.21	
frequency	4.00	1.47	0.37	17.55	0.00	0.48
delta	*1.00*	*1.42*	*1.42*	*67.55*	*0.00*	
interaction	12.00	0.14	0.01	0.54	0.88	
Residuals	76.00	1.59	0.02			

Supplemental Table 1. Cluster stability across conditions within frequency

PFC	Df	SumSq	MeanSq	F	P	eta^2 partial
condition	3.00	0.12	0.04	3.79	0.01	0.13
Object periods	*1.00*	*0.08*	*0.08*	*7.18*	*0.01*	
frequency	4.00	0.18	0.04	4.19	0.00	0.18
high gamma	*1.00*	*0.15*	*0.15*	*13.94*	*0.00*	
interaction	12.00	0.07	0.01	0.56	0.87	
Residuals	76.00	0.80	0.01			

STR	Df	SumSq	MeanSq	F	P	eta^2 partial
condition	3.00	0.09	0.03	2.13	0.10	
frequency	4.00	0.13	0.03	2.20	0.08	
interaction	12.00	0.05	0.00	0.28	0.99	
Residuals	76.00	1.12	0.01			

VTA	Df	SumSq	MeanSq	F	P	eta^2 partial
condition	3.00	0.27	0.09	9.48	0.00	0.27
Object periods	*1.00*	*0.23*	*0.23*	*24.57*	*0.00*	
frequency	4.00	0.40	0.10	10.62	0.00	0.36
delta	*1.00*	*0.13*	*0.13*	*13.98*	*0.00*	
beta/gamma	*1.00*	*0.05*	*0.05*	*5.07*	*0.03*	
high gamma	*1.00*	*0.22*	*0.22*	*23.40*	*0.00*	
interaction	12.00	0.16	0.01	1.42	0.18	
Residuals	76.00	0.72	0.01			

Supplemental Table 2. Cluster stability across frequency within condition

Baseline vs. Encoding	Df	SumSq	MeanSq	F	P	eta^2 partial
cond	1.00	4.52	4.52	114.26	0.00	0.29
freq	4.00	16.72	4.18	105.76	0.00	0.60
reg	2.00	0.30	0.15	3.82	0.02	0.03
cond:freq	4.00	2.05	0.51	12.96	0.00	0.16
cond:reg	2.00	0.16	0.08	1.99	0.14	
freq:reg	7.00	0.85	0.12	3.08	0.00	0.07
cond:freq:reg	7.00	0.24	0.03	0.86	0.54	
Residuals	288.00	13.04	0.05			

Supplemental Table 3. Strength changes baseline vs. encoding

Baseline vs. Consolidation	Df	SumSq	MeanSq	F	P	eta^2 partial
cond	1.00	0.00	0.00	0.06	0.81	
freq	4.00	25.56	6.39	141.14	0.00	0.66
reg	2.00	0.28	0.14	3.09	0.05	0.02
cond:freq	4.00	1.59	0.40	8.79	0.00	0.11
cond:reg	2.00	0.01	0.00	0.08	0.92	
freq:reg	7.00	1.78	0.25	5.62	0.00	0.12
cond:freq:reg	7.00	0.52	0.07	1.63	0.13	
Residuals	288.00	13.04	0.05			

Supplemental Table 4. Strength changes baseline vs. consolidation

Baseline vs. Retrieval	Df	SumSq	MeanSq	F	P	eta^2 partial
cond	1.00	4.22	4.22	121.23	0.00	0.30
freq	4.00	16.98	4.25	122.03	0.00	0.63
reg	2.00	0.11	0.05	1.54	0.22	
cond:freq	4.00	2.10	0.53	15.10	0.00	0.18
cond:reg	2.00	0.08	0.04	1.13	0.32	
freq:reg	7.00	1.05	0.15	4.31	0.00	0.10
cond:freq:reg	7.00	0.10	0.01	0.41	0.90	
Residuals	283.00	9.84	0.04			

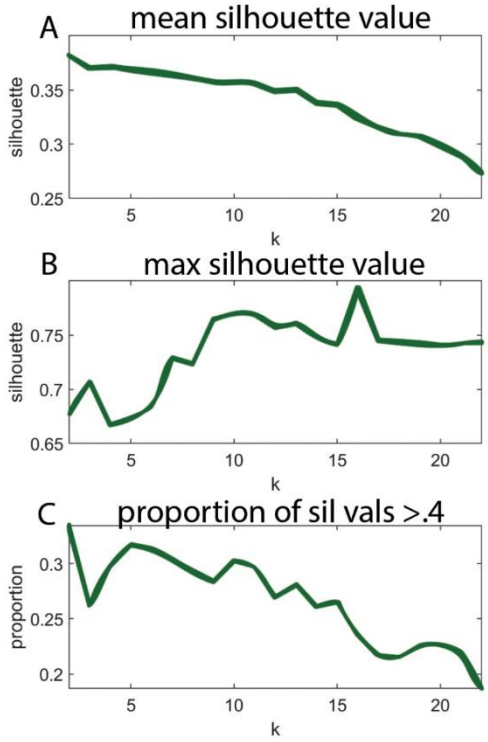
Supplemental Table 5. Strength changes baseline vs. retrieval

Fig. Supplement 1 Choosing k for DBscan. a the mean silhouette value (y-axis) of clustering schemes calculated for all rats, regions, conditions, and frequencies using different values of k (x-axis). b The maximum silhouette value (y-axis) of clustering schemes calculated for different values of k (x-axis). c The proportion of silhouette values greater than .4 (y-axis) for different values of k (x-axis).

Fig. Supplement 2 Network connections related to memory. For significant connections (main text Fig. 7a-d), we assessed the correlation between session connection strength and session memory. Memory was calculated as the proportion of time spent exploring the object during the encoding period minus the similar proportion for the retrieval period. There were two outlier sessions with memory <-.2 (main text Figure 1e), which were excluded from this analysis. a-d Network maps depicting connections that exhibited a significant correlation with memory strength. e-l Scatter plots depict the individual data points that went into all significant correlations. Before calculating correlations, each animal's mean connection strength across sessions and mean memory strength across sessions were calculated. These animal mean values were submitted to correlation analysis. This analysis was also done using data from individual sessions in the correlation analysis. In general, a similar set of significant correlations were discovered. Different colors/shapes of points indicate the individual sessions for different animals. The large black circles indicate animal means. The regression line of best fit is shown (all ps<.05).

Fig. Supplement 3 Network connections between clusters versus between regions. a-d Network maps are the same as panels a-d of Figure 7 (main text). e-h Network maps are calculated using all the same procedures as those in a-d, except each region was treated as a single cluster. Without considering the functional organization of signals within region (using clustering), many of the connections detected in panels a-d were missed in panels e-

h. This is particularly evident during the retrieval period (panel h) where all of the complex high frequency interactions between regions have been missed.



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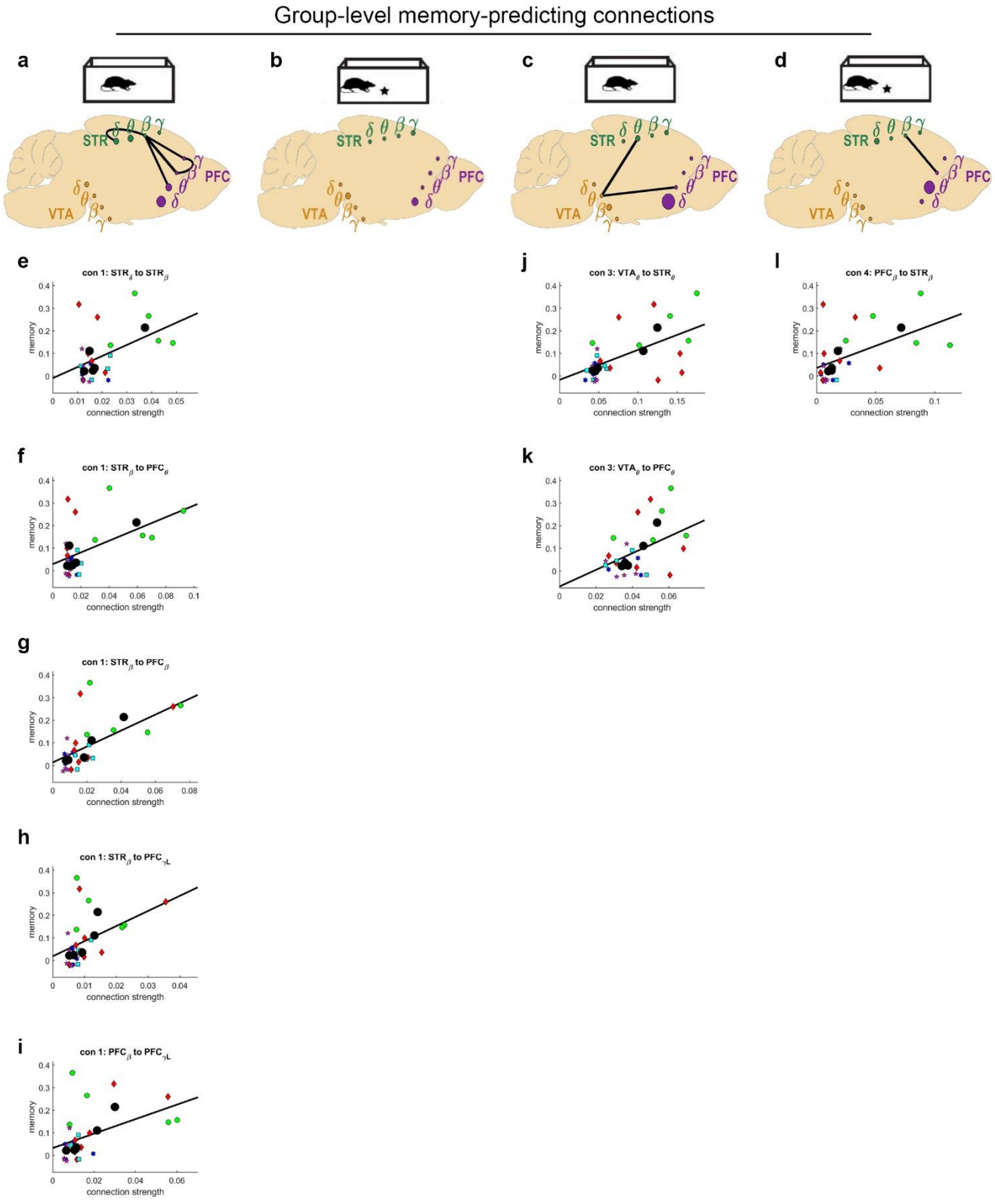

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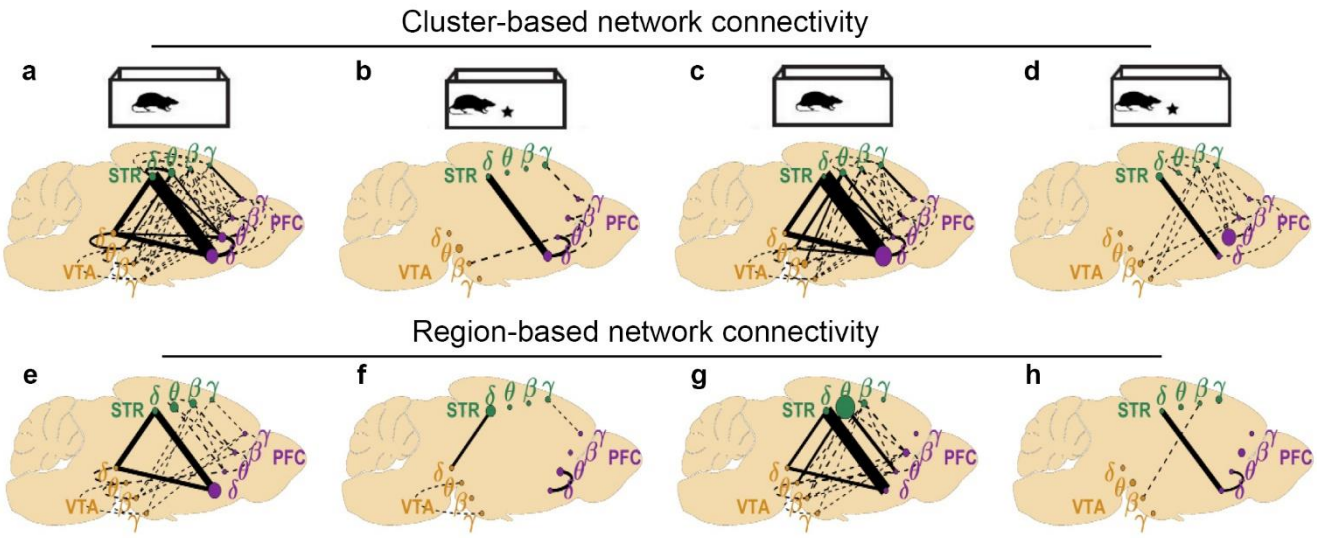

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