Supporting Information

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SI Text

The contextual retrieval maze arena was divided into relatively small grid units (5.6 cm^2) to ensure that relatively stereotyped behavior could be compared closely across memory conditions, whereas the random foraging arena was divided into larger (8.7 cm^2) grid units. To test if the different spatial scales influenced the results, we doubled the contextual retrieval grid unit size to 11.2 cm^2 and repeated the analyses. This transformation did not alter the results significantly and had only minor effects on the calculated distribution of population spatial correlations in the contextual retrieval task (r correlation, mode = 0; with negative skewness, KS test, $P = 0.02$) and the distributions of the r values remained significantly different between the 2 tasks (KS test; $D = 0.4259$, $P < 0.001$). Thus, the spatial resolution of the analyses grid sizes were irrelevant to the differential coding observed in the 2 tasks.

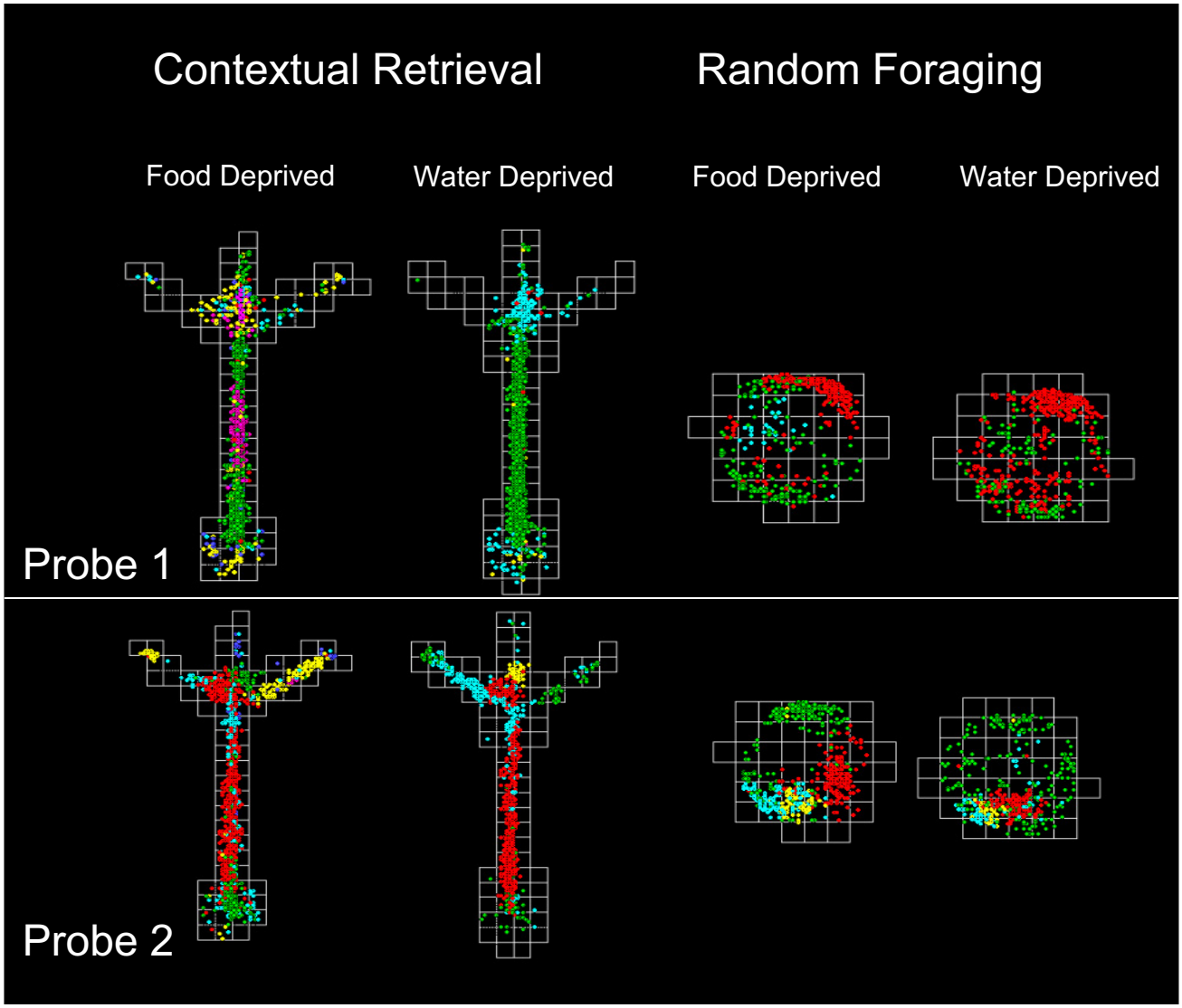

Fig. S1. Simultaneous recordings from 2 tetrodes over a complete experimental session. Spike plots show visited grid units with overlaid spiking activity (different units are shown in different colors). The same populations of hippocampal neurons fired in more discordant patterns across deprivation conditions in the contextual retrieval task (*Left*) than in the random foraging task (*Right*).

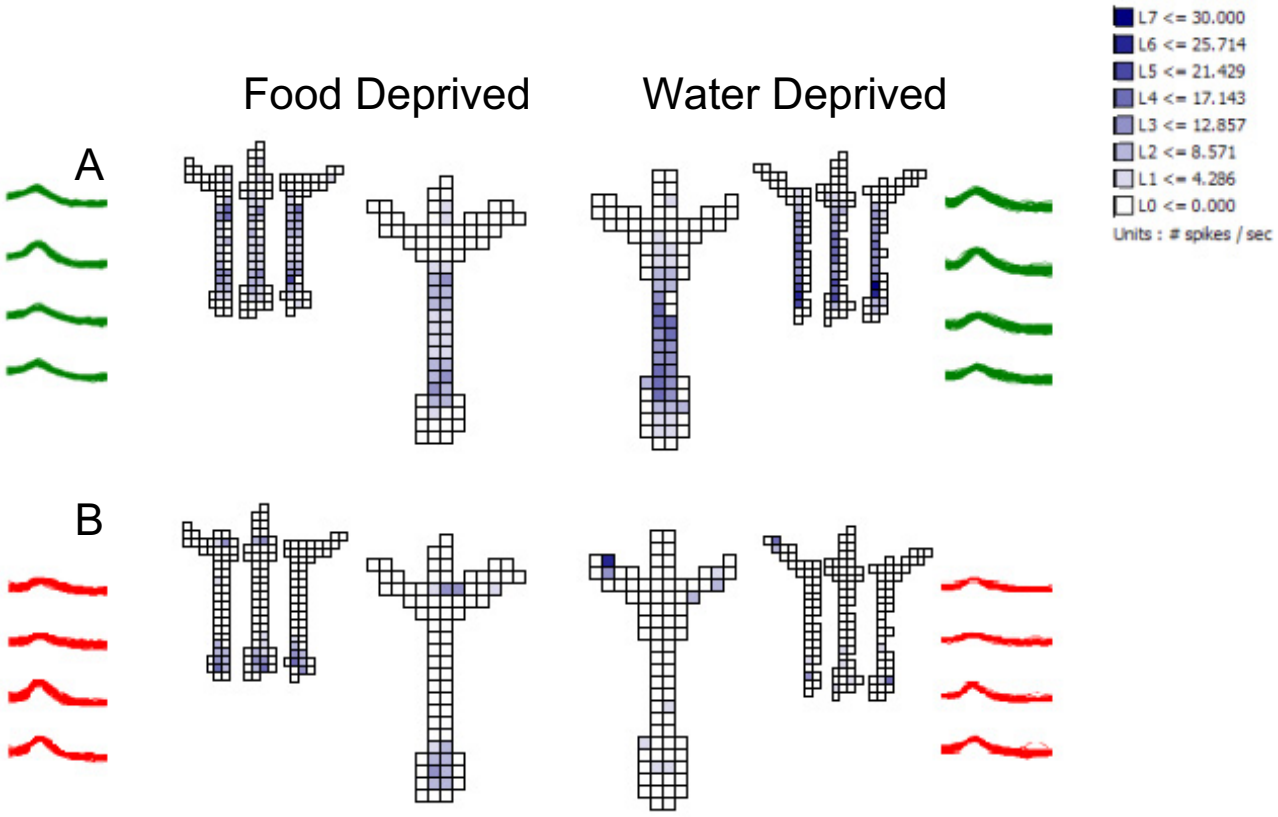

Fig. S2. Trajectory coding was absent in the CR task. Fields in the start arm were not affected by spatial trajectory in the CR task, whether or not they were sensitive to contextual memory retrieval conditions. Firing rate maps and waveforms for 2 simultaneously recorded neurons with (*A*) stable and (*B*) discordant activity across deprivation conditions are shown. Waveforms (max = 111 μV, green; 163 μV, red), whole session firing rate maps (innermost) and rate maps for trials parsed by left-, middle-, and right-going trajectories (flanking) are shown for the same 2 cells across food and water deprivation recording sessions in the contextual retrieval task. The legend shows firing rate in each pixel (spikes/s).

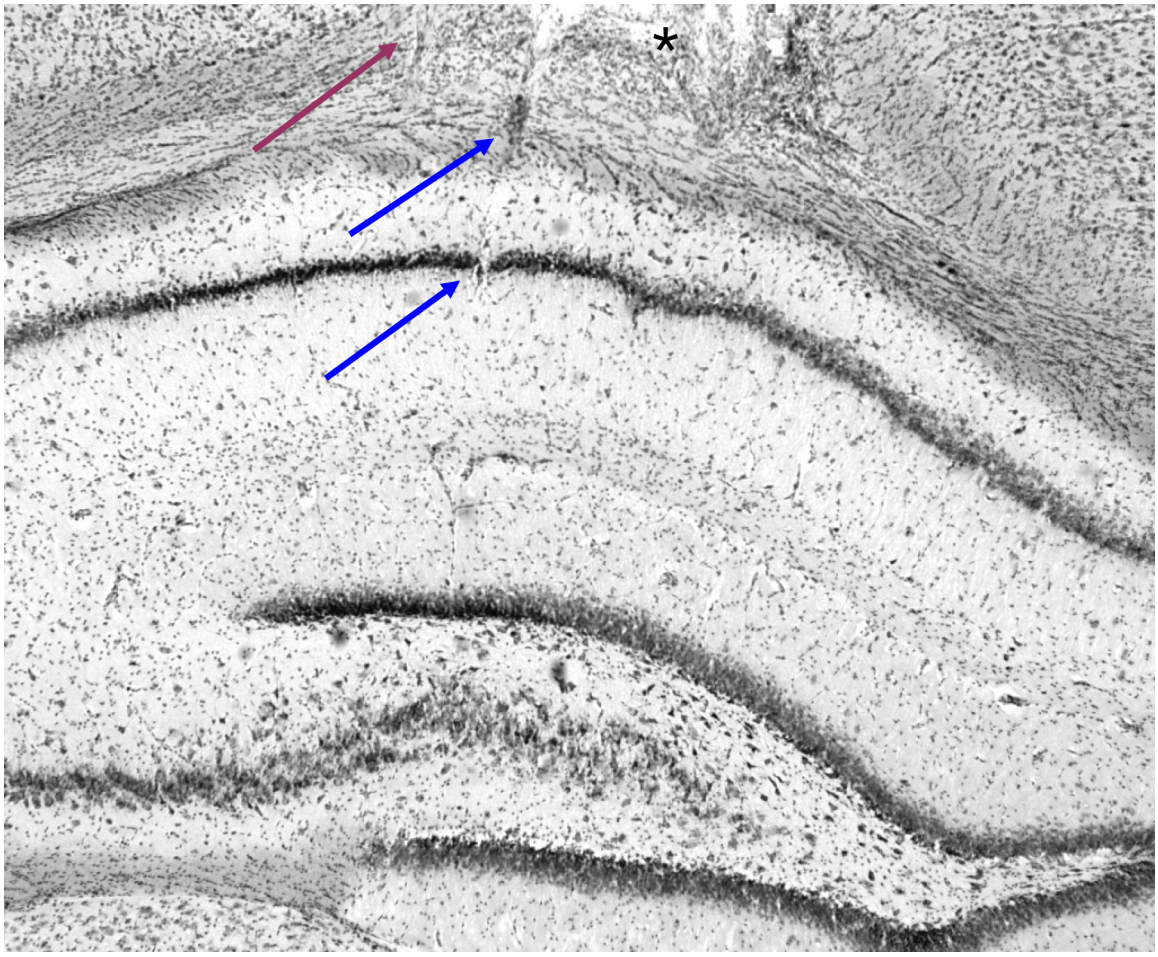

Fig. S3. A coronal section through the hippocampus showing electrode tracks entering CA1. The blue arrows indicate one electrode passing through the alveus and pyramidal layer; the purple arrow shows a second electrode track entering the corpus callosum. The asterisk at the top of the photo shows the most ventral extent of the cannula bundle in the corpus callosum. The firing fields shown in Fig. S1 were recorded from this animal.

Table S1. Stability and remapping across deprivation conditions in simultaneously recorded neuronal ensembles

	Contextual retrieval			Random foraging		
Ensemble	Stable	Remap	Binary	Stable	Remap	Binary
1		8 (53%)	7 (47%)	4 (50%)	4 (50%)	
2		4 (66%)	1 (17%)	2 (100%)		
3		4 (80%)	1 (20%)	3 (60%)	1 (20%)	1 (20%)
4	1 (33%)	1 (33%)	1 (33%)	1 (25%)	3 (75%)	
5	1 (17%)	4 (66%)	1 (17%)	3 (60%)	2 (40%)	
6		4 (100%)				
7	1 (33%)	2 (67%)				
8	2 (20%)	8 (80%)				