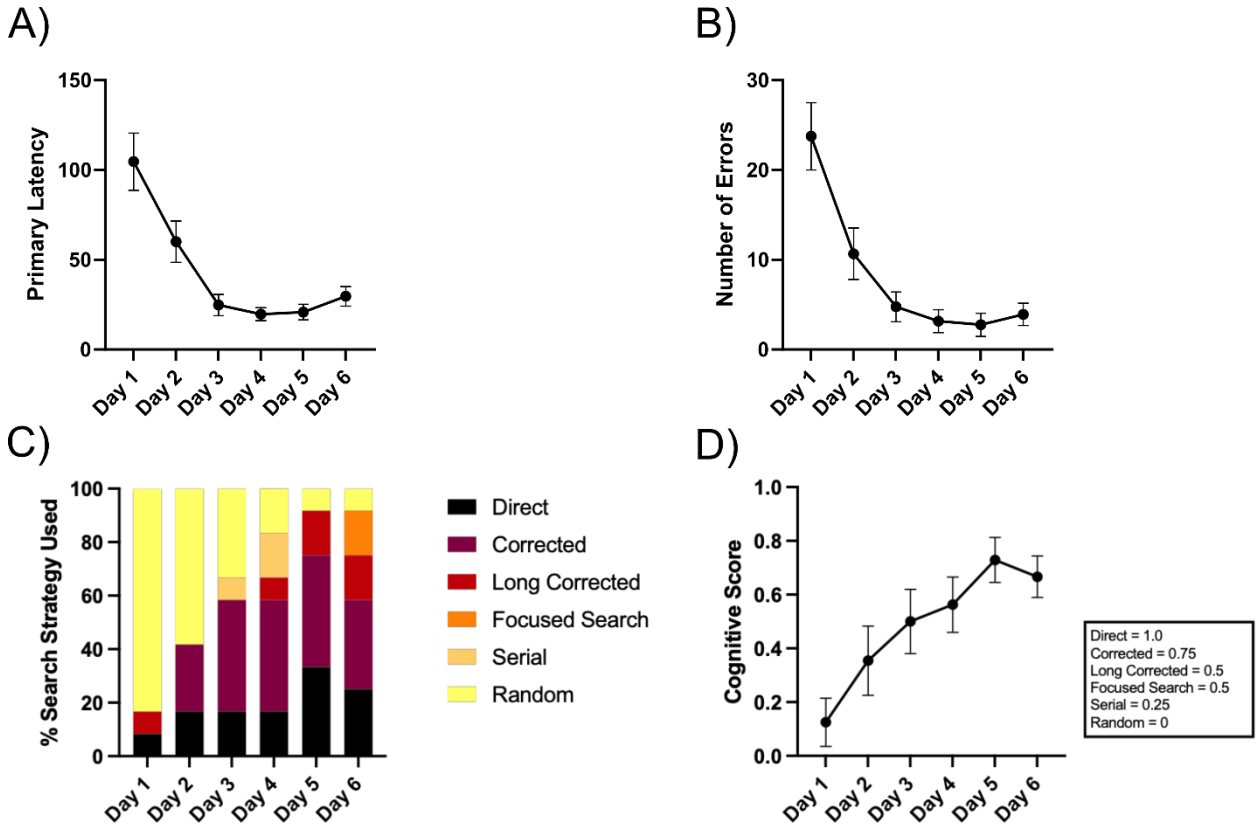
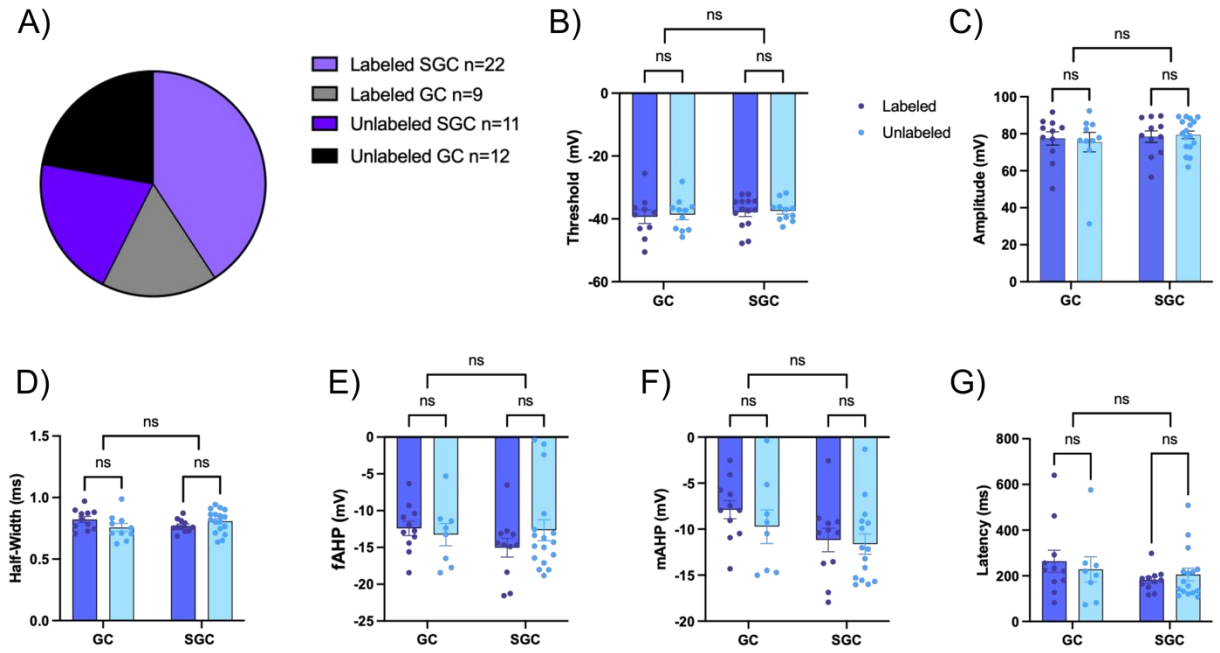
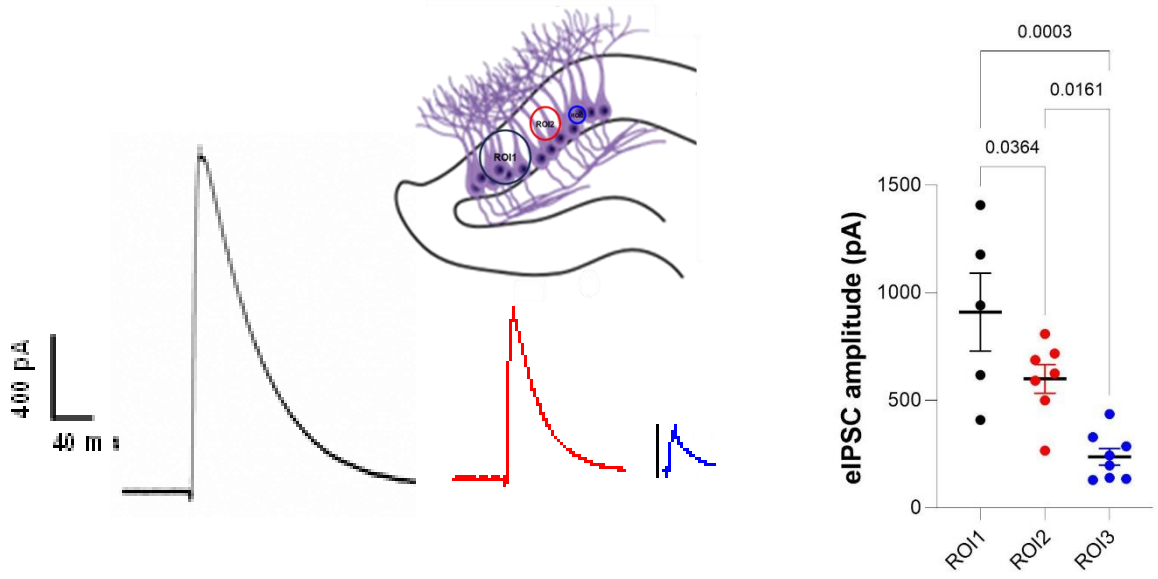
Dovek et al Supplemental Figures



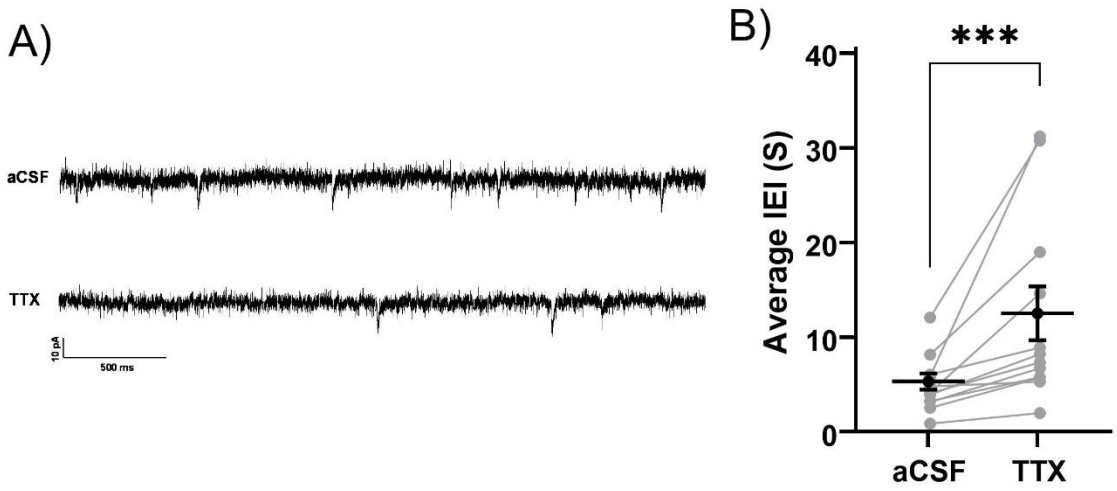
Supplemental Figure 1: Search strategies adopted in the Barnes maze task. *A-B) Plot of primary latency (A) and number of errors (B) to find the escape hole over training days. C)Visualization of search strategies used in the Barnes maze paradigm. D) Summary cognitive score based on search strategy.*



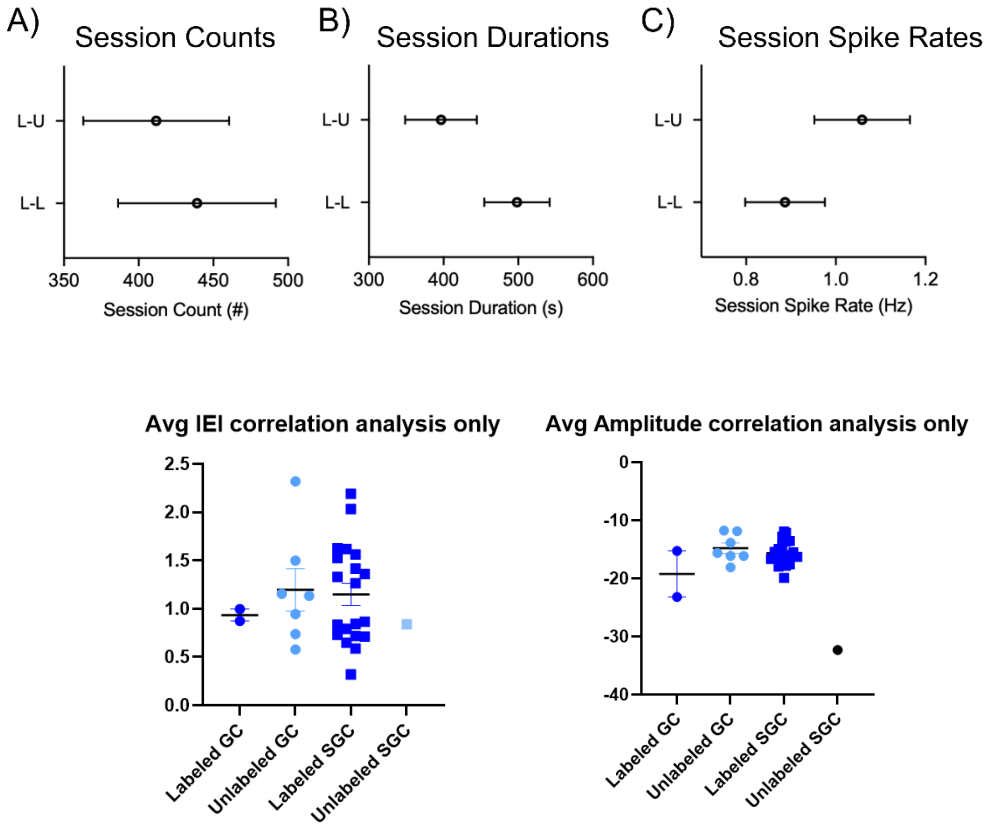
Supplemental Figure 2: Active properties of labeled and unlabeled GCs and SGCs. *A) Pie chart showing the proportion of labeled and unlabeled GCs and SGCs included for analysis of active membrane properties. Note the greater proportion of SGCs represented among labeled neurons. B-G) Summary histograms of threshold of action potential (B), amplitude (C), half-width (D), fast (E) and medium afterhyperpolarizations (F) and latency (G). Data are presented as mean ± SEM.*



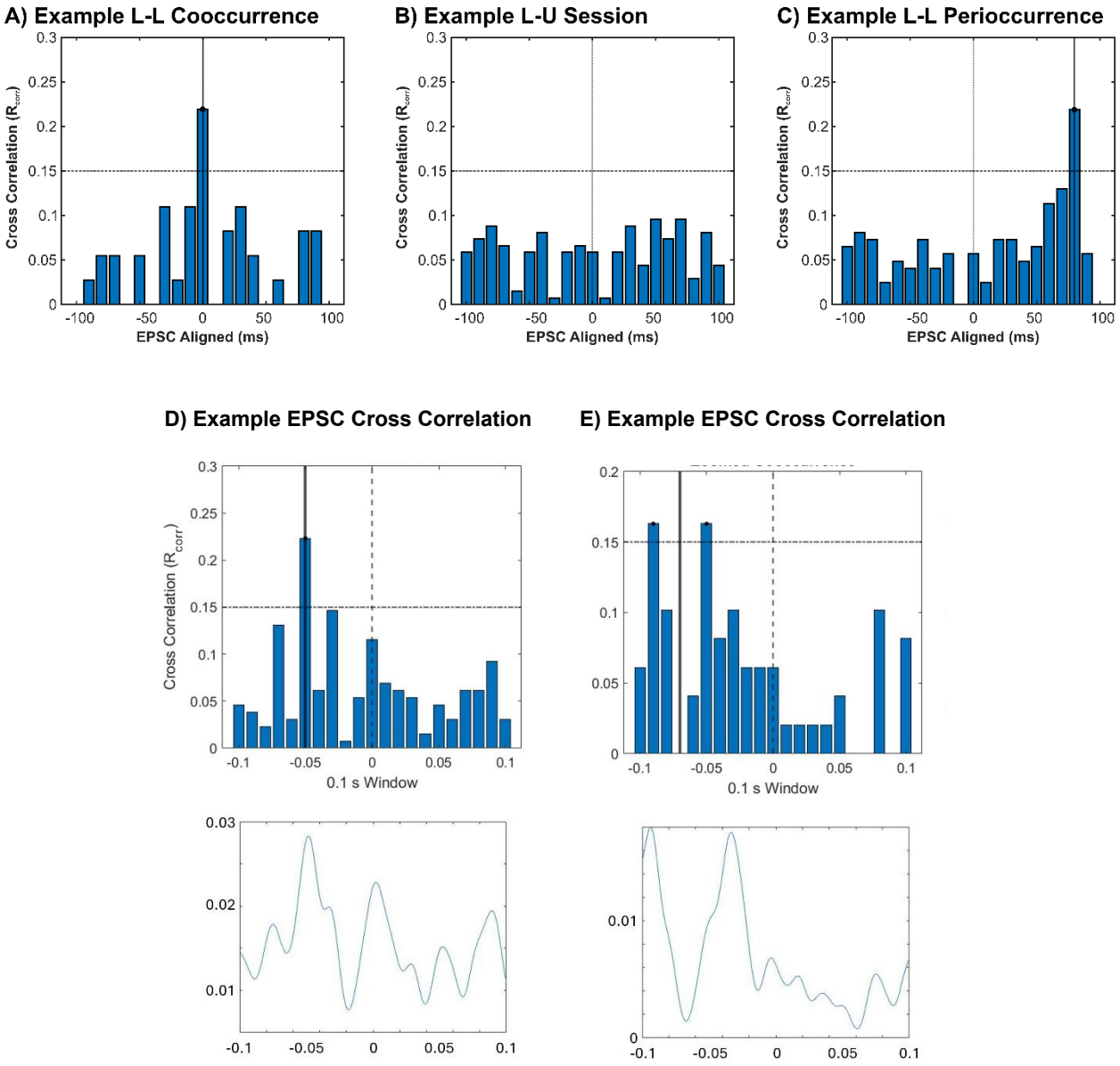
Supplemental Figure 3. *An AAV encoding CaMKII-ChR2 was bilaterally injected into the granule cell layer of the dentate gyrus (DG) at the following coordinates: AP -3.2 mm, ML ±2.6 mm, DV -2.8 mm. Four weeks post-injection, mice were sacrificed for electrophysiological recording. Horizontal hippocampal slices (350 µm thick) were prepared, and various regions of interest (ROIs) were selected for optical stimulation, as shown in the figure. Light intensity was set at 2.6 mW. Inhibitory postsynaptic currents (IPSCs) were recorded from granule cells using a cesium-based internal solution while holding the membrane potential at 0 mV. IPSCs evoked from different ROIs were analyzed using one-way ANOVA, with a significance threshold set at $p < 0.05$. Recordings were obtained from 5-8 cells from 3 mice.*



Supplemental Figure 4: Spontaneous EPSCs in dentate GCs include action potential driven events. *A) Representative current traces from a GC illustrates spontaneous EPSCs (in aCSF, above) and miniature EPSCs (in TTX, below). B) Summary of EPSC interevent interval (IEI) in aCSF and after perfusion of TTX. Data presented as mean ± SEM. *** indicates p=0.0005 by paired t-test.*



Supplemental Figure 5: L-L and L-U Sessions do not differ in event rates. *A) sEPSC event counts (LL n=14, LU n=16), B) Recording durations(LL n=7, LU n=8) and C) event frequency (LL n=14, LU n=16) for data used in correlation analysis. Data presented as mean ± SEM. D-E) Distribution of average sEPSC inter-event interval (D) and amplitude (C) in labeled and unlabeled GCs and SGCs included among the LL and LU pairs.*



***Supplemental Figure 6**: **Example sEPSC cross correlation profiles.** A) Representative CCP for L-L dual recording session with maximum correlation in the center bin (cooccurrence). B) Representative CCP for L-U dual recording session with no maximum correlation within detection window (no coincidence, same session as in Fig 5C). C) Representative cross correlation profile (CCP) of sEPSCs for L-L dual recording session with maximum correlation within detection window (peri-occurrence, same session as in Fig 5B). D-E) Example EPSC Cross correlations histograms generated based using CCP (above) and using the convolution approach of* Bartho et al., 2004 (below).

Dovek et al Supplemental Table

Supplemental Table 1 Electrophysiological properties of labeled and unlabeled, SGCs and GCs.

Parameter (Unit)	Labeled GC (GC-L)	Unlabeled GC (GC-U)	Labeled SGC (SGC-L)	Unlabeled SGC (SGC-U)	F & P value	Multiple Comparisons
Threshold (mV)	-39.31 ±2.181	-38.69±1.552	-37.87 ±1.342	-37.47±0.9952	Interaction: F (1, 42) = 0.004967 P=0.9441	GC-L vs GC-U p=0.9978
					Cell Type: F (1, 42) = 0.7407 P=0.3943	SGC-L vs SGC-U p=0.9994
					Labeling: F (1, 42) = 0.1120 P=0.7395	GC-L vs SGC-L p=0.9412
					by Two way ANOVA	GC-U vs SGC-U p=0.9703
Amplitude (mV)	75.44±5.275	77.44±3.570	79.37±2.109	78.43±3.137	Interaction: F (1, 45) = 0.1842 P=0.6698	GC-L vs GC-U p=0.327
					Cell Type: F (1, 45) = 0.5138 P=0.4772	SGC-L vs SGC-U p=0.7098
					Labeling: F (1, 45) = 0.02396 P=0.8777	GC-L vs SGC-L p=0.4775
					by Two way ANOVA	GC-U vs SGC-U p=0.5133
Half-Width (ms)	0.7572±0.03330	0.8219±0.02489	0.8076±0.02261	0.7700±0.01597	Interaction: F (1, 45) = 4.130 P=0.0481	GC-L vs GC-U p=0.3227
					Cell Type: F (1, 45) = 0.0009773 P=0.9752	SGC-L vs SGC-U p=0.7098
					Labeling: F (1, 45) = 0.2903 P=0.5927	GC-L vs SGC-L p=0.4775
					by Two way ANOVA	GC-U vs SGC-U p=0.5133
fAHP (mV)	-13.26±1.519	-12.41±0.9795	-12.66±1.426	-15.04±1.272	Interaction: F (1, 43) = 1.269 P=0.2662	GC-L vs GC-U p=0.9919
					Cell Type: F (1, 43) = 0.5024 P=0.4823	SGC-L vs SGC-U p=0.5947
					Labeling: F (1, 43) = 0.2822 P=0.5980	GC-L vs SGC-L p=0.9972
					by Two way ANOVA	GC-U vs SGC-U p=0.5905
mAHP (mV)	-9.731±1.826	-7.885±0.9965	-10.06 ±1.447	-11.17 ±1.279	Interaction: F (1, 41) = 0.2897 P=0.5933	GC-L vs GC-U p=0.8233
					Cell Type: F (1, 41) = 4.049 P=0.0508	SGC-L vs SGC-U p=0.9979
					Labeling: F (1, 41) = 0.7999 P=0.3763	GC-L vs SGC-L p=0.7728
					by Two way ANOVA	GC-U vs SGC-U p=0.2675
Latency (ms)	228.2±55.35	262.9±47.98	205.5±27.86	181.2±14.79	Interaction:F (1, 42) = 0.6229 P=0.4344	GC-L vs GC-U p=0.9579
					Cell Type: F (1, 42) = 1.955 P=0.1694	SGC-L vs SGC-U p=0.9784
					Labeling: F (1, 42) = 0.01930 P=0.8902	GC-L vs SGC-L p=0.9883
					by Two way ANOVA	GC-U vs SGC-U p=0.4179
Spike Frequency Accommodation	0.3271±0.07460	0.2791±0.05569	0.7846±0.07658	0.45657±0.06271	Interaction: F (1, 41) = 3.477 P=0.0694	GC-L vs GC-U p=0.9876
					Cell Type: F (1, 41) = 19.66 P<0.0001	SGC-L vs SGC-U p=0.0064
					Labeling: F (1, 41) = 6.379 P=0.0155	GC-L vs SGC-L p=0.2611
					by Two way ANOVA	GC-U vs SGC-U p=0.0003
Input Resistance (MOhms)	143.8 ± 8.673	169±13.51	115±5.974	128.4±7.817	Interaction: F (1, 48) = 0.4385 P=0.5110	GC-L vs GC-U p=0.2365
					Cell Type: F (1, 48) = 14.98 P=0.0003	SGC-L vs SGC-U p=0.7091
					Labeling: F (1, 48) = 4.660 P=0.0359	GC-L vs SGC-L p=0.0760
					by Two way ANOVA	GC-U vs SGC-U p=0.0155