We are interested in understanding the microcircuit level mechanisms that produce feature selectivity as well as the processes that allow network representations to adapt to the environment as might occur during learning and memory formation. Recent evidence suggests that novel CA1 place fields can be rapidly formed anywhere in an environment when the initiation of long duration, dendritic Ca^{2+} plateau potentials drive an increase in the weights of excitatory synaptic inputs. Additional data reveal that while un-tuned inhibitory synaptic input enhances both rate and temporal coding of space by counteracting noise from broad out-of-field excitation it does not play a role in shaping the tuned firing of CA1 place fields. Here we explored the learning rule that underlies CA1 place field firing and found it to be starkly different than that expected from Hebbian-style plasticity.