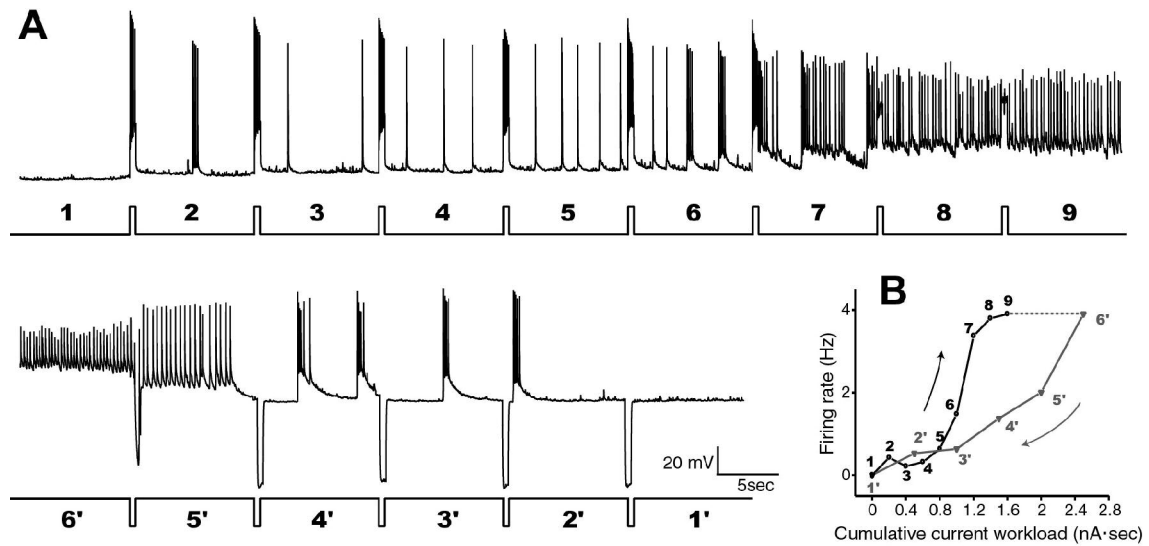


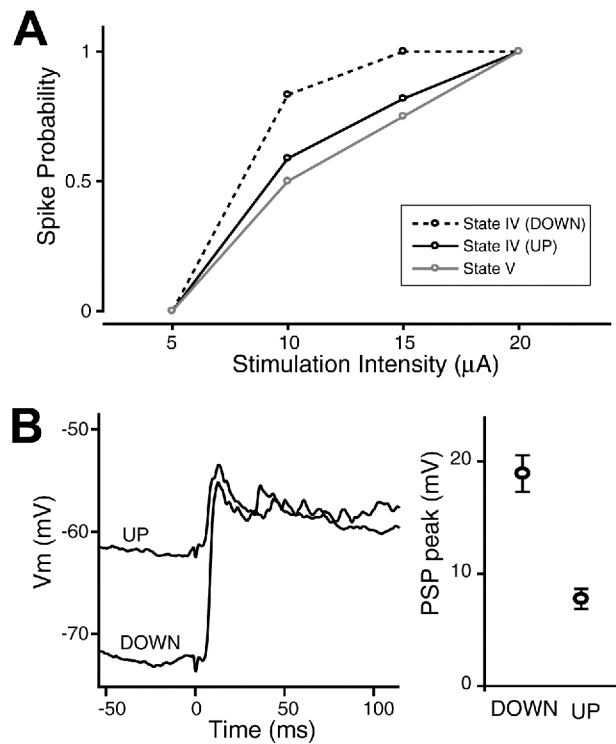
## Supplemental Figures

### Supplemental Figure1

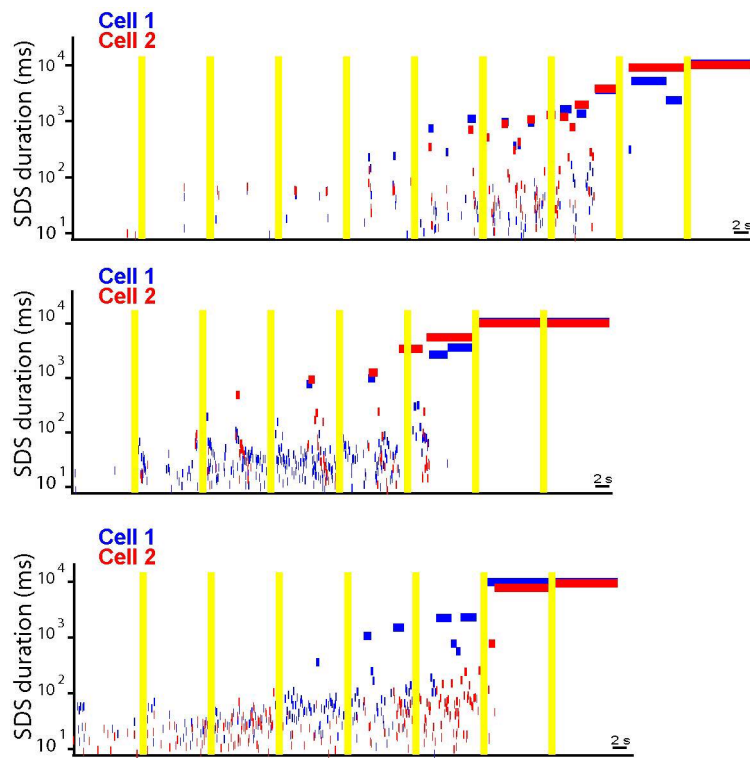


### Supplemental Figure 1 Bidirectional state transition in CA3 pyramidal cells

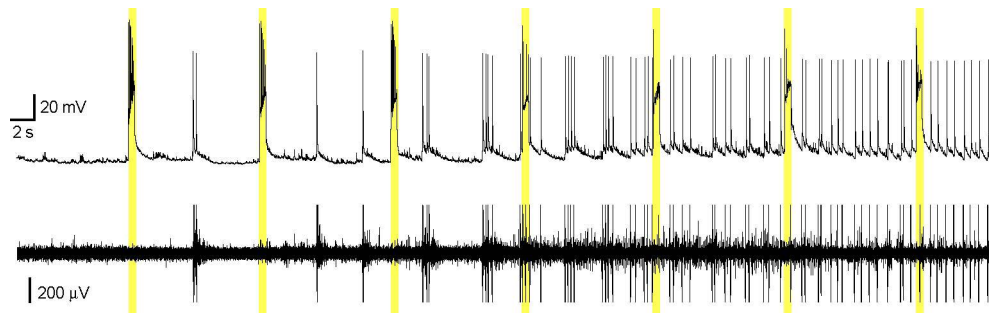
**A.** A current clamp trace of a CA3 pyramidal neuron membrane potential in the presence of 10  $\mu$ M carbachol. Repeated injections of brief polarizing currents (500 ms, 400 pA, every 10 sec) induced a gradual change in firing patterns, eventually leading to self-sustained tonic discharges (the same data shown in Fig. 2C). Hyperpolarizing current injections (500 ms, -1000 pA, every 10 sec) reversed this hyperactivity to the resting state. **B.** Firing rate for 10-second epochs between cumulative current injections. The numbers in this plot correspond to the epochs numbered below the trace.



**Supplemental Figure 2 The responsiveness to single mossy fiber inputs during UP and DOWN periods** **A.** The firing probability in response of a single mossy fiber stimulus in state IV (DOWN and UP periods) and state V. The probability of firing in DOWN was higher than in state IV UP or state V. **B.** The amplitude of EPSP in DOWN and UP periods in state IV. The EPSP amplitude in DOWN was also larger than that in UP.



**Supplemental Figure 3 Additional examples for single cell stimulation-induced state transitions of adjacent cells** Repetitive current injections into cell1 along induced the state transitions in both the pair-recorded neurons, i.e., cell1 and cell2. Data were obtained from three cell pairs of different slices. For details see the legend of figure 5B. Experiments were performed in the presence of 10  $\mu$ M carbachol.



**Supplemental Figure 4 Single cell activation entrains the state of the surrounding network** The extracellular multi-unit trace (bottom, high cut: 1 kHz) recorded simultaneously by whole-cell intracellular traces (top) revealed that current injections into a single cell (yellow) induced coherent activity in the local network. A glass recording microelectrode filled with 0.15 M NaCl (2M $\Omega$  resistance) was also positioned in the center of the CA3 stratum pyramidale (about 200  $\mu$ m from the stimulating electrode).