Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Synchronized dynamics of cortical neurons with time-delay feedback[1] ALEXANDRA LANDSMAN, IRA SCHWARTZ, Naval Research Laboratory — The dynamics of three mutually delay coupled cortical neurons are explored. When coupled in a line, delays introduce correlations in the time series at the time-scale of the delay. The middle neuron leads the outer ones by the delay time, while the end neurons are synchronized with zero lag times. Synchronization is found to be highly dependent on the synaptic time constant, with faster synapses increasing both the degree of synchronization and the firing rate. Analysis shows that pre-synaptic input during the inter-spike interval stabilizes the synchronous state, even for arbitrarily weak coupling, and independent of the initial phase. The finding may be of significance to synchronization of large groups of cells in the cortex that are spatially distanced from each other.

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Date submitted: 21 Nov 2006 Electronic form version 1.4