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Joel H Spencer* (spencer@cims.nyu.edu), 251 Mercer St., New York, NY 11733. *Exciting Neurons.*

Imagine a large number n of neurons. Each has activity level 1 to k . A random neuron is promoted: its level goes up one. From level k it fires, all other neurons are promoted with independent probability $p = \beta/n$. Those neurons in turn will fire, if from level k , and there may and often is a big burst of firings. After the big burst all neurons that have fired return to the lowest level.

There are strong analogies to the Erdős-Rényi phase transition. There appear to be three ranges of β . For β small the bursts will be small. For $\beta > k$ there will be a stable periodic behavior consisting of a big burst followed by a recovery time back to nearly the same state. Intriguingly, for β slightly less than k there is both the above stable periodic behavior and a second stable periodic behavior in which the neurons are nearly uniformly divided in activity level. Further, the behavior just prior to a big bursts mirrors the critical window of the Erdős-Rényi phase transition. (Received July 20, 2007)