161.2

**QUANTAL ANALYSIS OF SUPERIMPOSED EXCITATORY POSTSYNAPTIC POTENTIALS FROM MULTIPLE SYNAPSES.** Paul C. Bush, Shaolin Li* and Terrence J. Sejnowski Salk Institute, La Jolla, CA 92138-9216 USA.

Extracellular stimulating electrodes in hippocampal slices typically activate multiple synaptic boutons, even at minimal levels of stimulation, each of which could have a different quantal size and release probability. The superposition of these EPSPs make conventional quantal analysis problematic. We have developed a method for analysing such data that is capable of separating a small number of release sites. This method relies on the differences in the time courses of EPSPs from different locations in the dendritic tree as measured at the soma.

Our method begins with an estimation of the attenuation factor of the dendritic tree for each synapse by applying a maximum likelihood estimator to the Fourier transform of individual EPSP traces. This produces a time integral of the voltage of the EPSP at the synapse. An inverse filter is then used to produce histograms of quantal amplitudes for each synapse. We have tested our method on randomly generated multiple-synaptic quantal amplitude histograms, generated from $\alpha$-function EPSPs with noise added at the level observed in microelectrode recording (approximately 3:1 signal:noise power ratio). The algorithm accurately recovered the individual quantal amplitude histograms, from which parameters for the appropriate statistical model are easy to extract.