

Category: Uncategorized

Correlational Strength and Computational Algebra of Synaptic Connections Between Neurons

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Abstract:

Intracellular recordings in spinal cord motoneurons and cerebral cortex neurons have provided new evidence on the correlational strength of monosynaptic connections, and the relation between the shapes of postsynaptic potentials and the associated increased firing probability. In these cells, excitatory postsynaptic potentials (EPSPs) produce cross-correlogram peaks which resemble in large part the derivative of the EPSP. Additional synaptic noise broadens the peak, but the peak area -- i.e., the number of above-chance firings triggered per EPSP -- remains proportional to the EPSP amplitude. A typical EPSP of 100 μ V triggers about .01 firings per EPSP. The consequences of these data for information processing by polysynaptic connections is discussed. The effects of sequential polysynaptic links can be calculated by convolving the effects of the underlying monosynaptic connections. The net effect of parallel pathways is the sum of the individual contributions.