

Meeting: 1007, Santa Barbara, California, SS 1A, Special Session on Dynamical Systems in Neuroscience

1007-92-44 **Gabriele Scheler*** (scheler@stanford.edu), Ventura Hall 25, 200 Panama Street, Stanford, CA 94305. *Presynaptic switching: the dynamical neuromodulator-controlled synapse.*

Neuromodulatory (NM) receptors in presynaptic position have the ability to suppress synaptic transmission for seconds to minutes when fully engaged. This effectively alters the synaptic strength of a connection within short-term ranges. Much work on neuromodulation has rested on the assumption that these effects are uniform at every neuron, thus a global dampening of synaptic input is achieved. However, there is considerable evidence to suggest that presynaptic regulation may in fact be synapse-specific. During processing, phasic NM release will change the impact of selected neuronal connections - either locally within a network, or at the boundary between brain areas. For instance, the cortico-striatal synapse relays cortical pattern recognition (auditory, visual stimuli) to striatal motivational areas. Different NMs (like "colors") set differently "colored" tags at these synapses. Thus the initial input generated from a cortically processed stimulus will be superseded by a filtered variant of the stimulus, if it coincides with a strong phasic NM signal. If this NM signal does not occur, the initial, non-filtered variant of the stimulus will be processed. This observation is important for reward, motivational learning and the emergence of addictive behaviors. (Received January 02, 2005)