

ORAL PRESENTATION

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The modular cross-synaptic nature of LTP/LTD following on-going neural activity

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While synaptic efficacies are modified continuously by on-going spiking activity, it is yet unclear whether the underlying pre- and post-synaptic processes occur independently, or in accordance. To elucidate the effects of sustained spiking communication on synaptic properties, we patch-clamped paired pyramidal neurons in-vitro at both ends of 12h intervals of spontaneous or glutamateinduced spiking activity. We found that the synaptic efficacies either increased, or decreased, with the ratio between the second and first measurement ranging between 0.08-14. Using quantal and failure analyses we show that this slow form of long-term potentiation and depression is explained by changes in the estimated number of release sites, alongside overall post-synaptic changes that maintain the quantal size per release site. Our findings suggest that sustained neural activity results in matched pre- and post-synaptic modifications, in which elementary modules that span the synaptic cleft are added or subtracted as a function of experience.

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