

ATTENTIONALLY MODULATED SYNCHRONY IN PRIMATE CORTEX

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We have investigated whether synchrony between neuronal spike trains is affected by the animal's attentional state. Cross-correlation functions between pairs of spike trains in the second somatosensory cortex (SII) of three macaque monkeys trained to switch attention between a visual task and a tactile task were computed. The majority of neuron pairs (66%) in SII cortex fired synchronously while the animal performed the tactile or visual tasks. Peak correlation typically occurred at a delay less than about 25ms; most commonly, there was no delay. Half-widths of the correlation peaks varied between a few milliseconds and hundreds of milliseconds with the majority lying below 100ms and the mode of the distribution around 20-30ms. In a subset of neuron pairs (average 17%), the degree of synchrony was affected by the animal's attentional state. In the animal performing the most demanding task (in which the target changed randomly after every correct response), the degree of synchrony in 35% of neuron pairs with significant synchrony changed as the animal switched tasks. This was significantly greater than the percentages (16% and 10%) obtained from the two other monkeys whose targets changed in a more stereotypical manner. On average, synchrony between SII neurons increased in 80% of neuron pairs when attention was directed to the tactile task. In the majority of cases, synchrony increased during the time period when the tactile stimuli were presented, and not during the anticipatory period.