Abstract:

Many neurons in cortex have the property of a reduced or adapted response to a repeated stimulus, sometimes referred to as repetition suppression. With a simple model of mutually inhibitory neurons that show an adaptive response, we demonstrate that the output of the network mimics the behavioral reflexive attentional findings: namely, facilitation in responding to the target at short-cue-target intervals and inhibition of return (IOR) at longer cue-target intervals. We also demonstrate that the same simple model results in a passive maintained activity or short-term memory of specific events without need for an external or top-down modulatory signal. Further, we demonstrate that mutual inhibition and baseline activity differentially influence reflexive attention and memory, demonstrating independence and dissociability. In sum, this 4-cell model provides the first simple and unified physiologically plausible mechanism of reflexive spatial attention and passive short-term memory processes.