Synaptic Correlates of Working Memory Capacity

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Psychological studies indicate that human ability to keep information in readily accessible working memory is limited to 4 items for most of the people. This extremely low capacity severely limits execution of many cognitive tasks, but its neuronal underpinnings remain unclear. Here we show that in the framework of synaptic theory of working memory, capacity can be analytically estimated to scale with characteristic time of short-term synaptic depression relative to synaptic current time constant. The number of items in working memory can be regulated by external excitation, enabling the system to be tuned to the desired load and to clear the working memory of currently held items to make room for new ones.