

Two types of memory in the monkey temporal lobe.

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Area TE and perirhinal cortex are two anterior temporal lobe brain areas involved in higher visual functions. Both have been implicated in memory. In recent work we have found that each area has mechanisms for memory that do not seem to operate in the other. Area TE neurons show correlation in the noise of their responses that is greater when a monkey is actively using working memory to remember a stimulus in a sequential match-to-sample task. We believe that this correlation is evidence suggesting that there is a type of working memory in area TE that has no ongoing or delay activity, but instead uses rapidly adapting synaptic weights to store short-term memories. In contrast there is no sign of that mechanism in perirhinal cortex, where the neurons show selectivity related to associations between visual stimuli and predicted workload. Using antisense DNA expression vectors we have shown that the associative learning required for the predictions of workload is disturbed when the D2 receptor is knocked down the vector in the perirhinal cortex showing that the learning depends on this receptor. It seems quite remarkable that two sequentially connected brain regions both participate in prominent memory functions of two different characters, and apparently rely on very different mechanisms to implement them.