

Fluctuating Activity and Coding of Multiple Items

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Presentation Abstract Summary How the brain preserves information about multiple simultaneous items is poorly understood. We evaluated the hypothesis that the brain employs time-division multiplexing, or interleaving of different signals across time, to enable the coding of multiple items in a common neural population. We recorded single units in an auditory coding "bottleneck" (inferior colliculus) while monkeys reported the location(s) of 1-2 simultaneous sounds. We used novel statistical tests on whole trial spike counts as well as sub-trial 50 ms bins to assess whether activity on dual-sound trials fluctuated between the levels observed on the corresponding single sound trials. We found that some neurons fluctuated between firing rates observed for each single sound, either on a whole-trial or on a sub-trial timescale. Alternation between activity patterns corresponding to each of multiple items may be a general strategy to enhance the brain processing capacity, suggesting a potential connection between such disparate phenomena as variable neural firing, neural oscillations, and limits in attentional/memory capacity.

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