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Report

Posterior Cingulate Cortex Mediates

Outcome-Contingent Allocation of Behavior

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Supplemental Results

We have previously shown that CGp neurons exhibit broad spatial tuning (Dean et al, 2004) for saccadic endpoints following shifts in gaze. We therefore wondered how the outcome tuning we discuss here relates to this endpoint tuning. Overall, we found very weak effects of side in this dataset. This weakness in tuning may reflect in part the fact that we made no attempt to optimize our stimuli for the size of these effects, as we did previously. In general, more neurons were contraversively tuned than were ipsiversively tuned (67%, n=39/58 neurons). However, the average size of tuning for side was much weaker than the average tuning for outcome (average effect was 1.4% of baseline firing rate).

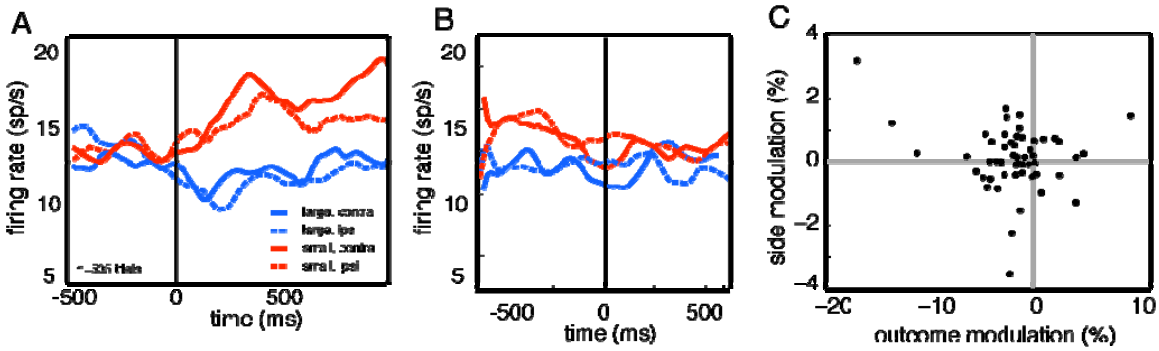

Figure S1. CGp Neurons Signal Reward Outcomes with Weak Lateralization

(A) PSTH for example neuron following reward delivery, aligned to reward offset. Responses were significantly greater following small reward than following large reward and were larger following contraversive saccades. This neuron exhibited stronger spatial tuning than most in the population (see panel C).

(B) Average responses of example neuron at the beginning of subsequent trial (the 500 ms before the fixation cue that began the trial, t=0) following a trial in which a small (red) or large (blue) reward was received. Responses are aligned to the beginning of the trial. Responses have weak dependence on which side was chosen (dashed vs. solid).

(C) Scatter plot showing the average firing rate modulation for size of gamble (large minus small, horizontal axis) and direction of saccade (contra minus ipsi). Data is from 1-sec epoch following saccade. Modulation was much stronger for outcome for outcome than for side.

Supplemental Experimental Procedures

Further Details on Regression Procedures

To determine the influence of recent outcomes on behavior, we performed a standard logistic regression using the Statistics Toolbox in Matlab (Mathworks, Natick, ME). We did this using a gradient descent-type fitting algorithm, we fit to the standard logistic function:

$$choice = \frac{1}{1 + e^{-rwd}}$$

Here, *choice* is defined as either safe or risky, and is set to 0 or 1 (for safe and risky respectively.) *rwd* is defined as either large or small outcome of gamble and was set to either 0 or 1 (for large and small outcomes respectively). Safe trials were excluded from the analysis. Initial parameters were all set to 0.1.

To determine the influence of recent outcomes on firing rates, we performed a linear regression using the Statistics Toolbox in Matlab. Like the logistic regression, this procedure uses a gradient descent method to fit values. In this case we regressed firing rates during the one-second post-reward epoch against outcomes."

Supplemental References

Dean, H.L., Crowley, J.C., and Platt, M.L. (2004). Visual and saccade-related activity in macaque posterior cingulate cortex. J. Neurophysiol. *92*, 3056–3068.