Supplementary Figure legends

Supplementary Figure 1 Distribution of coefficient of variation (CV) values (log transformed) for the present sample of prefrontal cortex cells. Dark gray, future- and previous-goal cells; light gray, remaining cells. Means ± S.D. for Monkey 1 were 112.6 ± 91.6 (n=123) for future- and previous-goal cells and 147.1 ± 138.8 (n=619) for the other cells. For Monkey 2, means were 117.3 ± 104.2 (n=650) and 87.4 ± 46.1 (n=49), respectively. Mean CV values of two groups of cells differed significantly (Mann-Whitney U-test, α=0.05, two-tailed) in both monkeys (Monkey 1, n=123, m=619, U=37174.0, p=0.001; Monkey 2, n=49, m=650, U=13447.5, p=0.04). Arrows mark three outlier cells that were designated for elimination due to high trial-to-trial variability (see Methods).

Supplementary Figure 2 JPETHs using smaller bins. (**A**) The data presented in Figure 3A, with smaller (20 ms) bins. The time axis of the coincidence histogram and the traditional cross correlogram (upper, right) also have a bin width of 20 ms. (**B**) The data in Figure 5A with 20-ms bins.

Supplementary Figure 3 Removal of temporal variation in the delay period. The data in Figure 3A, without 1.0 and 1.5 s delays between cue onset and cue offset (the trigger signal). (**A**) JPETH constructed from 83 trials with a total of 12,731 spikes. Format as in Figure 3A. (**B**) Trial-by-trial activity for the histograms shown on JPETH's axes in **A.** Format as in Figure 3B. (**C**) Coincidence histograms. The red line shows the data without the shorter delay periods, equivalent to the coincidence histogram shown in A, and the gray line shows the data including all trials, from Figure 3C.

Supplementary Figure 4 Cross-correlations on different time scales. (**A**) Cross-correlogram on the millisecond order for the F–P pair illustrated in Figures 3 and 4 (bin width, 1 ms). (**B**) Cross-correlogram for the F–F pair illustrated in Figure 5, on the time scale of **A**. (**C**) Population cross-correlograms for neuron pairs with significant, positive correlations (n=11 for F–P pairs, n=10 for F–F pairs), also on the time scale of **A**. Background shading shows S.E.M. Neither the individual pairs (**A, B**) nor the populations (**C**) show sharp (narrow peaked) synchrony. (**D**) Population cross-correlogram for the population and in the format of **C**, except

on the time scale used in Figures 3–5 (bin width, 75 ms, smoothed by a 3-bin moving average). Both populations show broad peaks in the traditional cross correlations, on the order of hundreds of milliseconds.

Supplementary Figure 5 JPETHs on trials with saccades less than 4°. (**A**) The data presented in Figure 3A, without any large-saccade trials. (**B**) The data in Figure 5A without large-saccade trials.

Supplementary Figure 6 Basis for classifying the future-goal cell used for the abscissa of Figures 3–5. Cells with goal selectivity during the fixation period of second-chance trials (see Figure 1B) but not during the fixation period of current trials were classed as future-goal cells (Genovesio et al. 2006). (**A**) Second-chance trials sorted according to the future goal. Each raster and histogram shows activity on second-chance trials, aligned on cue onset. Note that this neuron showed future-goal selectivity during the fixation period (shading, ANOVA, α=0.05, n=61, $F_{2,58} = 69.08$, $p<<0.0001$), with a preference for the left future goal. Abbreviation: sp, spikes. (**B**) The same cell showed no significant goal selectivity for previous goals (n=143, $F_{2,140} = 0.52$, p=0.60).

Supplementary Figure 7 Basis for classifying the previous-goal cell used for the ordinate of Figures 3 and 4. Format as in Supplementary Figure 6. (**A**) This neuron represented the previous goal during the fixation period of the current trials (shading, ANOVA, α=0.05, n=143, $F_{2,140} = 14.09$, $p<<0.0001$), with a preference for the top goal. (**B**) The same cell showed no significant goal selectivity (n=61, $F_{2,58} = 0.02$, p=0.98) for future goals in second-chance trials (see Figure 1B).

Supplementary Figure 8 Basis for classifying the future-goal cell used for the ordinate of Figure 5, in the format of Supplementary Figure 6. (**A**) This neuron represented the future goal during the fixation period of the second-chance trials (shading, ANOVA, α=0.05, n=61, $F_{2,58} = 53.24$, $p<<0.0001$), with a preference for the left goal. (**B**) The same cell showed no significant goal selectivity for previous goals (n=143, $F_{2,140} = 2.90$, p=0.06).

Supplementary Figure 9 Population coincidence histograms, from different populations and analytical methods. (**A**) As in Figure 7C, but excluding pairs recorded from the same electrode (leaving n=9 F–P pairs and n=8 F–F pairs). (**B**) As in Figure 7C, but selecting components of the population based on the number of significant bins, rather than Bonferroni correction (n=16 F–P pairs, n=12 F–F pairs).

Supplementary Figure 10 Population analysis excluding second-chance trials. (**A**) Population JPETH of F–P pairs, as in Fig. 7A, except for the exclusion of second-chance trials from the average. (**B**) Population JPETH of F–F pairs, as in Fig. 7B. (**C**) Population coincidence histograms for **A** and **B** in the format of Fig. 7C.