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**Preparatory activity links frontal eye field activity with
small amplitude motor unit recruitment of neck muscles
during gaze planning**

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(SUPPLEMENTARY FIGURES AND LEGENDS)

SUPPLEMENTARY FIGURES AND LEGENDS

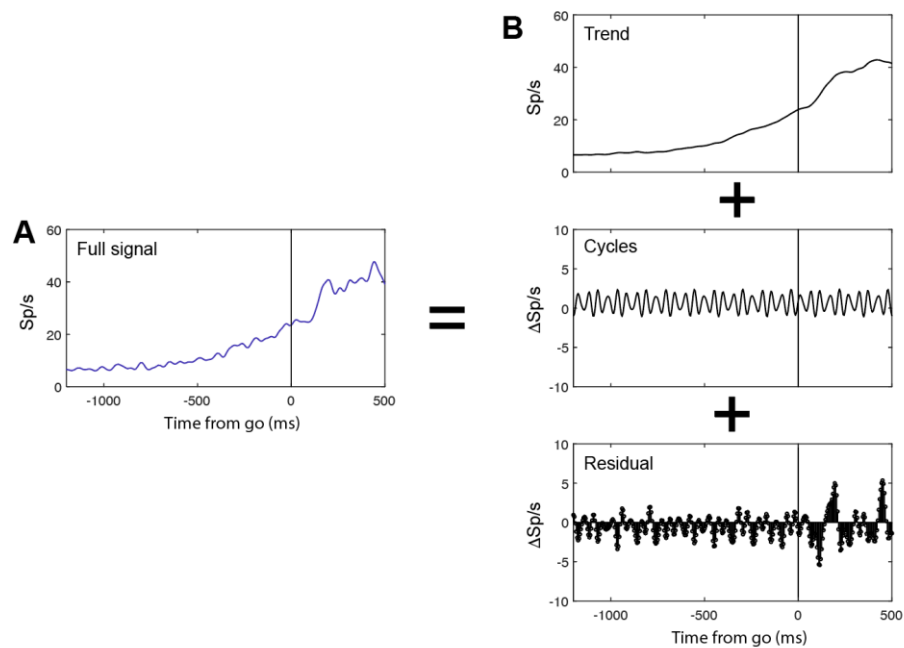


Figure S1: Trend, cycles and residual.

A. Single unit activity (blue) aligned on go cue, for an upcoming saccade towards in-RF, for a representative motor unit recorded from neck muscle.

B. Activity decomposed into individual components using an additive time series decomposition model - trend, cycles and residuals.

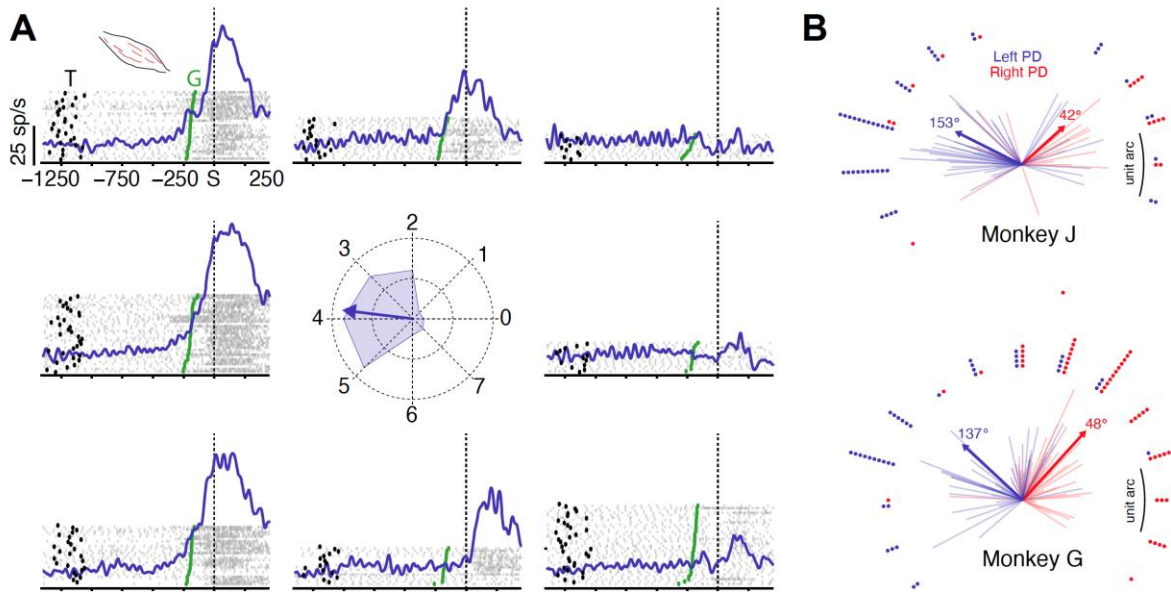


Figure S2: Motor units are spatially tuned.

A. EMG responses (blue) aligned on saccade onset, for eight different target locations, of a representative motor unit recorded from the neck muscle. Each gray marker represents a spike. Thick black markers are time of target onsets. Each spike train represents the response on a single trial and the trials were sorted on the time of go cue (green markers).

B. The plot at the center represents the preferred direction for the population (thick lines) and each motor unit (thin lines) that was recorded from left (blue) and right (red) neck muscles for monkey J (lighter shade) and monkey G (darker shade), respectively.

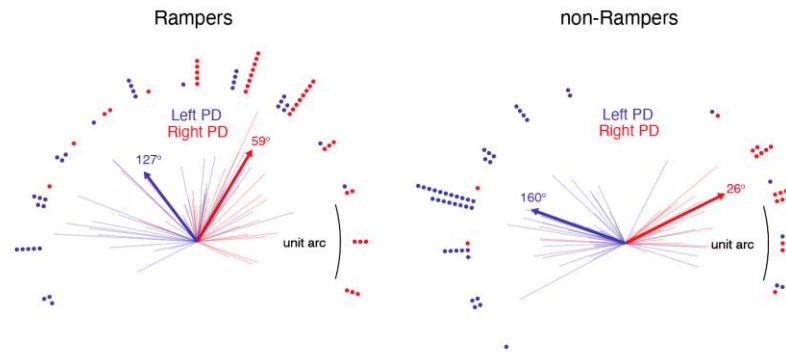
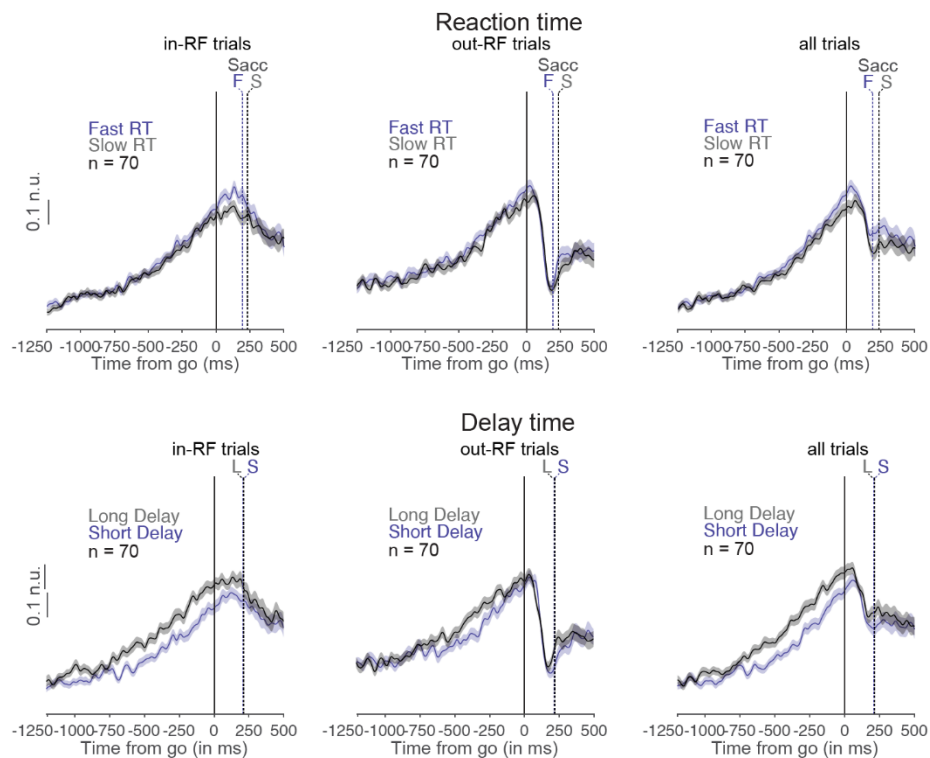


Figure S3: Preferred directions for ramper and non-ramper motor units.

A. The plot shows the preferred direction for the population (thick lines) and each motor unit (thin lines) that was recorded from left (blue) and right (red) neck muscles for rampers (left panel) and non-rampers (right panel) from both the monkeys.



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48 **Figure S4: Accumulator models for ramper motor units across different spatial**
 49 **conditions.**

50 Top row: Reaction time. Population response of all motor units for in-RF trials (left; same as
 51 **Fig 5A right panel**) out-RF trials (middle) and all trials (right), aligned on the go cue for fast
 52 (purple) and slow (gray) reaction times. Vertical broken lines in the right panel denote the time
 53 of saccade. The solid line indicates the mean firing rate and the shading indicate mean \pm SEM

54 Bottom row: Delay time. Population response of all motor units for in-RF trials (left; same as
 55 **Fig 6A right panel**) out-RF trials (middle) and all trials (right), aligned on the go cue for short
 56 (purple) and long (gray) delay times. Vertical broken lines in the right panel denote the time of
 57 saccade. The solid line indicates the mean firing rate and the shading indicate mean \pm SEM

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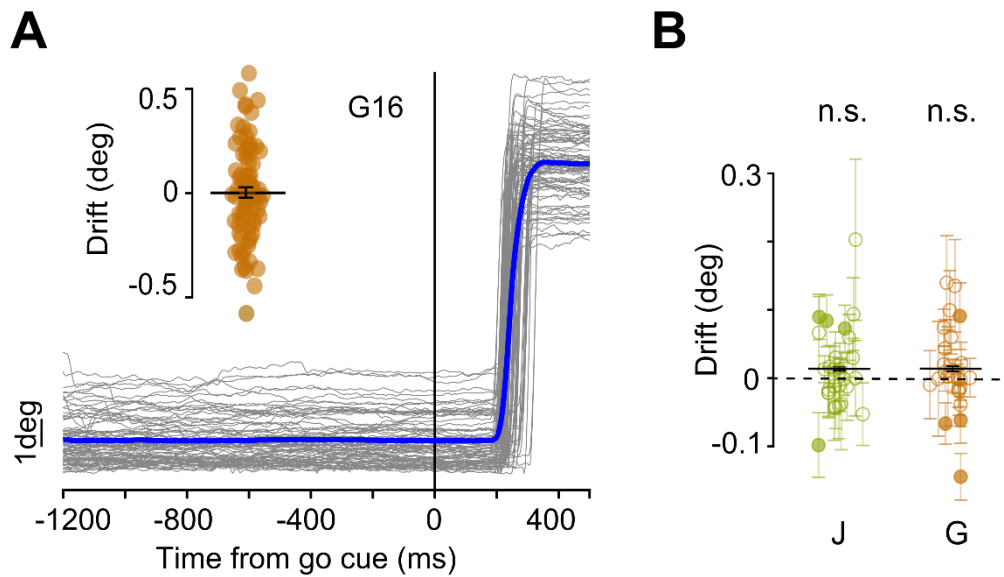
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Figure S5: Drifts in eye movement during delay time

72 A. A representative session showing eye position from fixation as a function of time. Lines in
 73 grey represent eye position for each trial and the thick line (in blue) indicates the average eye
 74 position across all trials. Inset shows a bee-swarm plot of the drift calculated for eye position
 75 from start to end of delay period for each trial. Error bars in black show the mean \pm SEM across
 76 all trials for the session.

77 B. Bee-swarm plot showing average drift in eye position during the delay period across
 78 different sessions for monkey J (green) and monkey G (brown). Filled circles represent sessions
 79 with significant but weak drift. Error bars in black show the mean \pm SEM across multiple
 80 sessions.

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