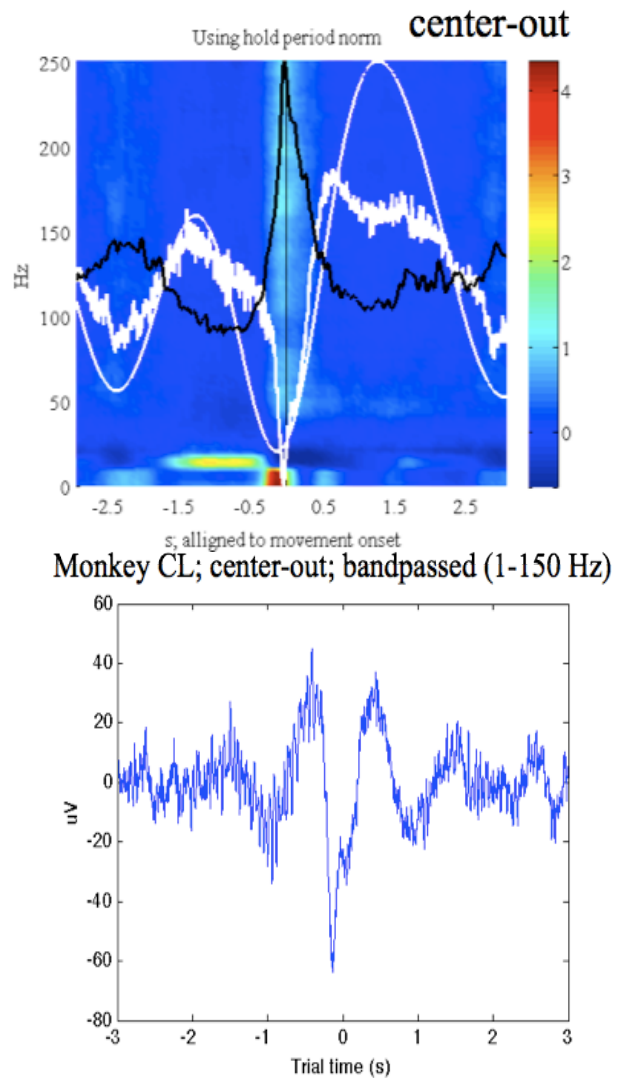


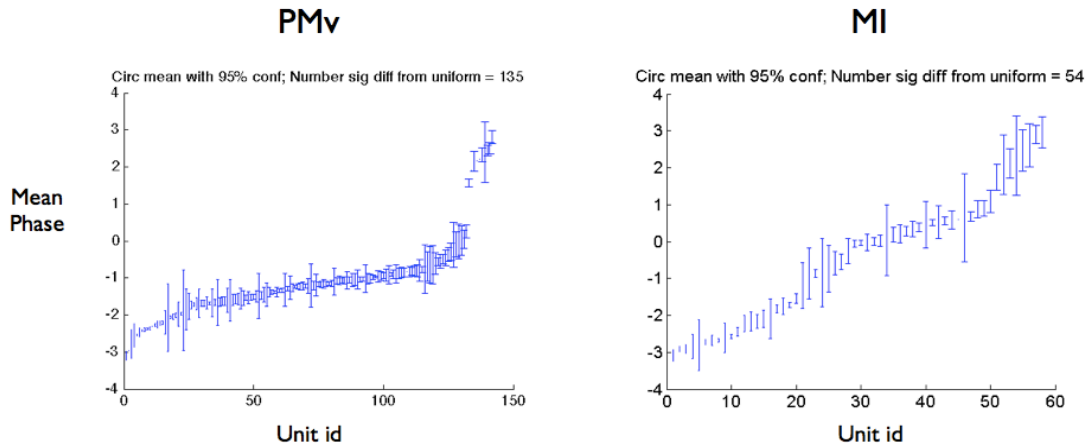
### Supplementary Figure 5a

- Photograph of PMv and MI array implant locations in Monkey G
- Trial timeline of the turntable task; colors of vertical event markers corresponding to events in (c)
- LFP (0.3-500 Hz) recorded during 4 trials of the turntable task in Monkey G in PMv and MI
- Mean of the slow-wave filtered signal (0.3-1Hz) from each area across 54 trials (rectified for MI to have same shape as PMv).

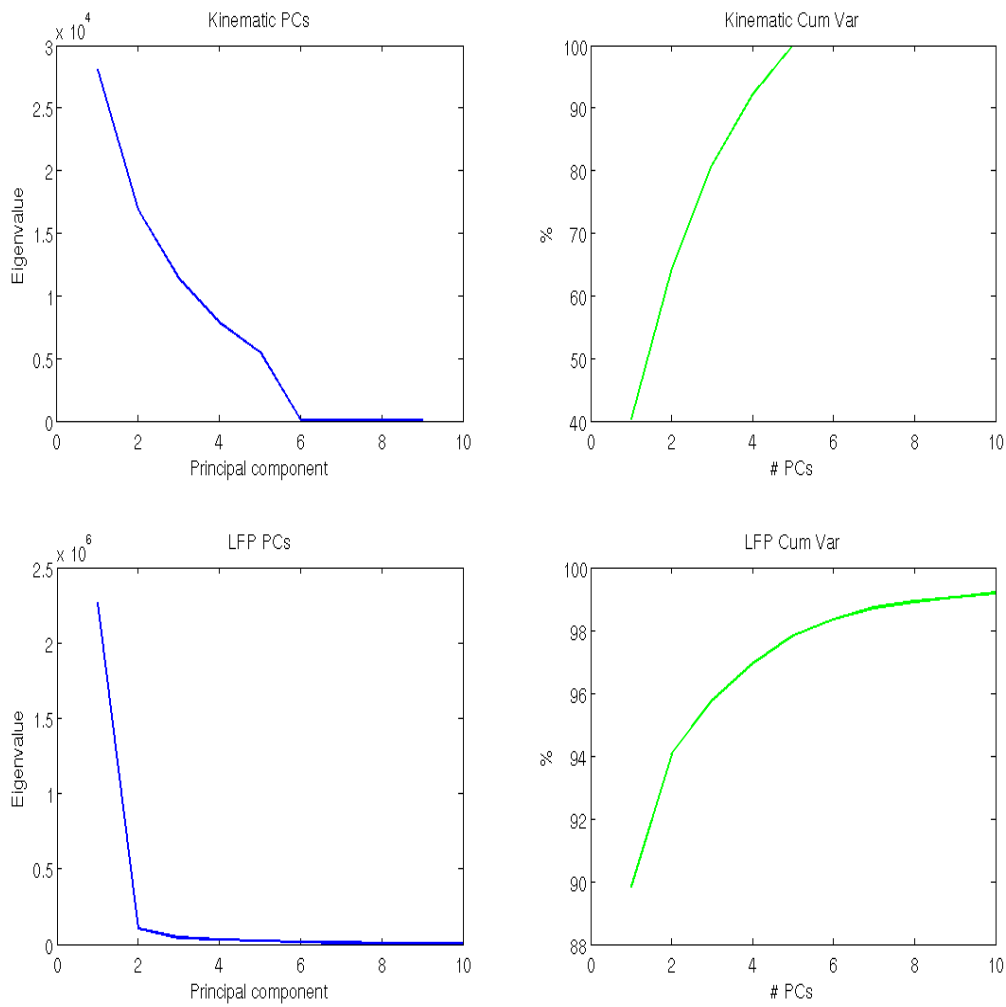


**Supplementary Figure 5b:** Top panel: Spectrogram of LFP (0.3-500 Hz) from Monkey CL, MI, recorded during a center-out task. 0 indicates movement onset. Black line shows summed spiking, thick white line shows average raw LFP, thin white line shows the average 1f-LFP (filtered 0.3-2 Hz) around movement onset. Bottom panel: The average LFP with a different bandpass filter (filtered 1-150 Hz for agreement with previous studies: Rickert et al., 2005; Donchin et al. 2001).

## Monkey CS; continuous grasping



**Supplementary Figure 6: Monkey C, continuous grasping task, mean preferred phase (radians) of spiking units with respect to the *lf*-LFP. (left) PMv; (right) MI. Mean phase was computed using circular mean.**



**Supplementary Figure 7: Dimensionality of kinematics vs *lf*-LFP. (Monkey G, Session 1, PMv). (top row) Top eigenvalues (left) and the explained variance (right) of kinematics. (bottom row) Top eigenvalues and explained variance of the 96 *lf*-LFP channels.**