

Description of Additional Supplementary Files

Supplementary Movie 1: Example trial-averaged population trajectory. Left panel: Example trial-averaged population trajectory over the response period (Mouse 4, stimulus speed = $32^\circ/\text{s}$, behavioural state = stationary). The trajectory moves from a baseline state to a stimulus steady-state following stimulus onset and returns to the baseline state following stimulus offset. The top 3 latent factors are shown for visualisation. Right panels: Trajectory speed (top) and acceleration (bottom), over the response period. For visualisation purposes the speed and acceleration were calculated based on the 3 latent factors shown.

Supplementary Movie 2: Comparison of population trajectories from stationary and locomotion trials. Trial-averaged population trajectory responses (Mouse 2, stimulus speed = $128^\circ/\text{s}$) from stationary (black) and locomotion (red) conditions. The top 3 latent factors are shown for visualisation purposes. The trajectories exhibit distinct temporal dynamics, particularly during the stimulus onset period ($t=0\text{s}$ to $t=0.5\text{s}$).

Supplementary Movie 3: Comparison of population trajectory responses to all stimulus speeds shown, for stationary and locomotion trials. Trial-averaged population trajectory responses to the six visual speeds presented (0, 16, 32, 64, 128, $256^\circ/\text{s}$; lighter colours indicate faster speeds) from stationary (left panel) and locomotion (right panel) conditions, for an example subject (Mouse 2).