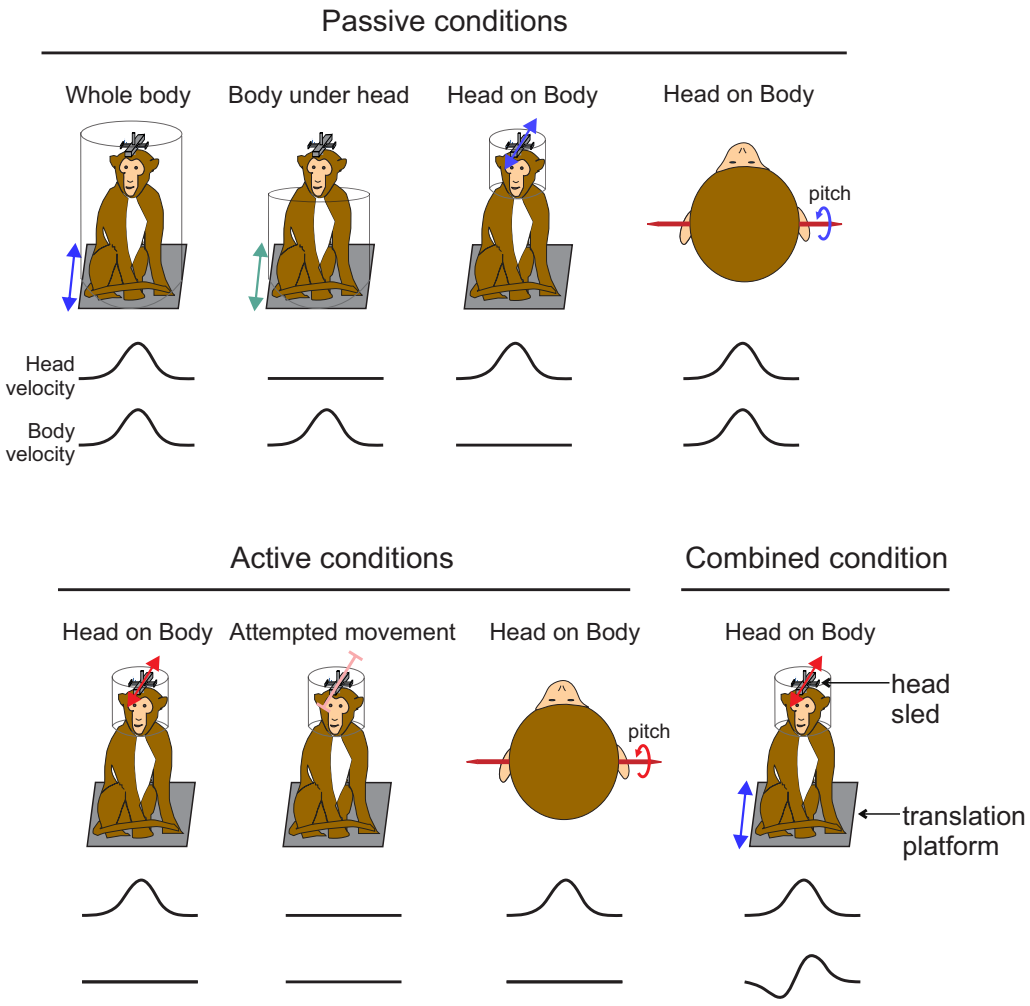
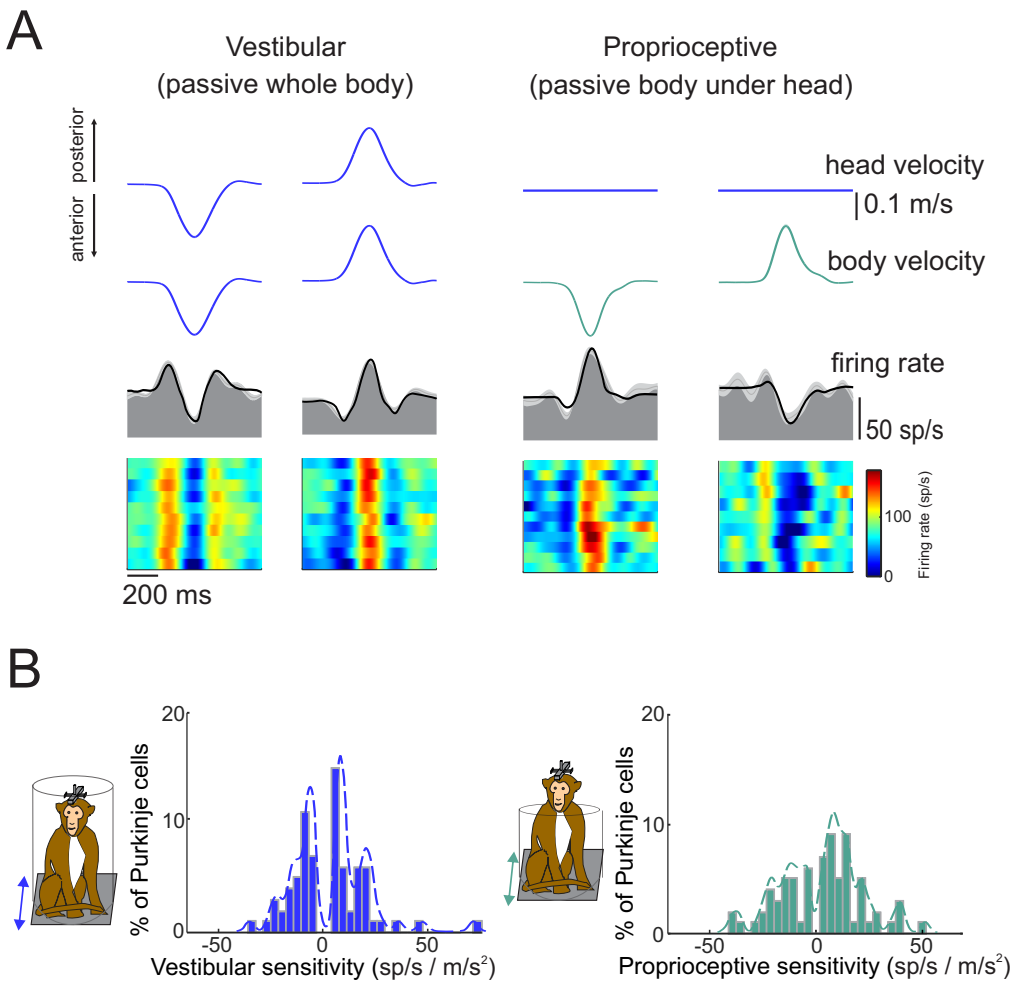
Extended Data figures:

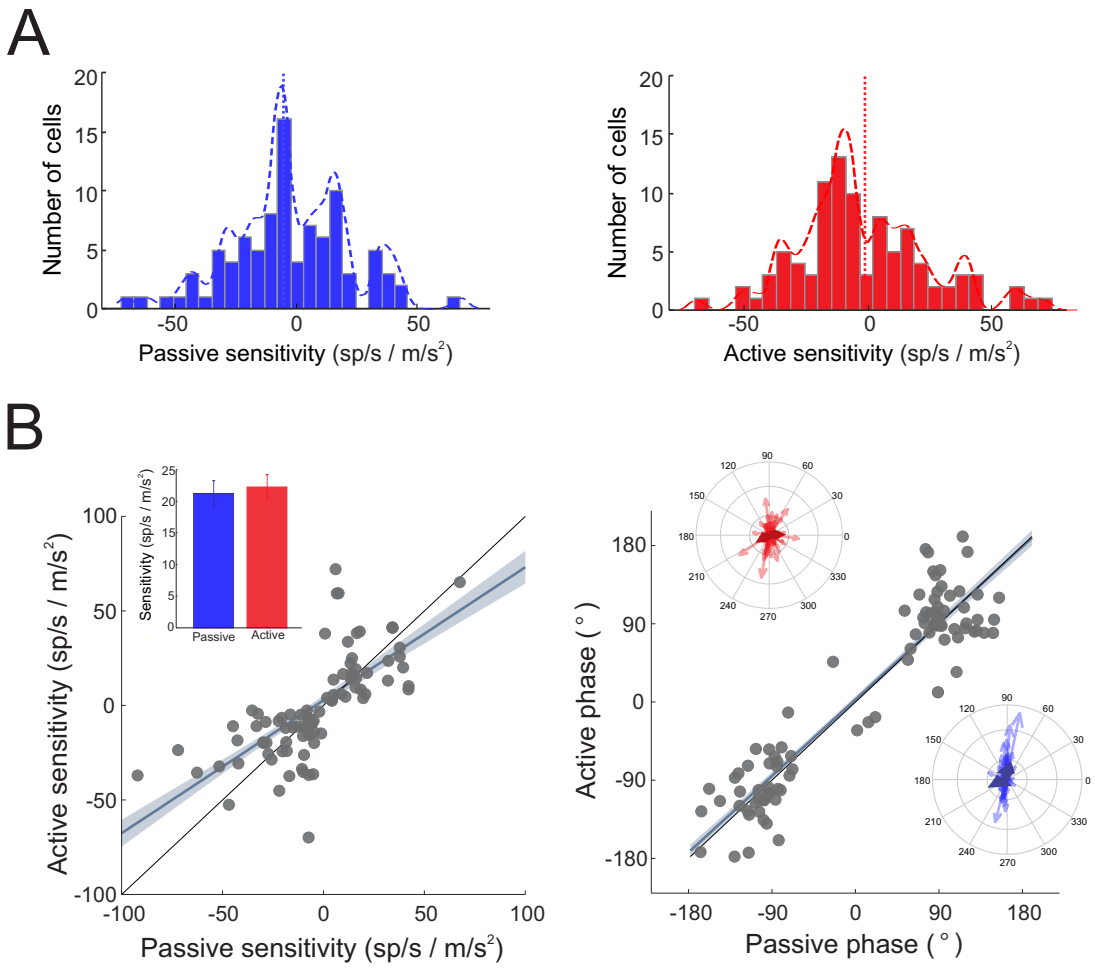


Extended Data Fig. 1. Illustration of the experimental setup to apply passive vestibular and proprioceptive stimulation, and allow the monkey to perform active head movements Experimental approaches to apply vestibular (whole body), proprioceptive (body under head), and combined (head on body) translations, as well as head on body pitch. Integration of motor command information was tested by allowing the monkey to make, or attempt to make, active head on body movements alone or simultaneously paired with passive vestibular stimulation.



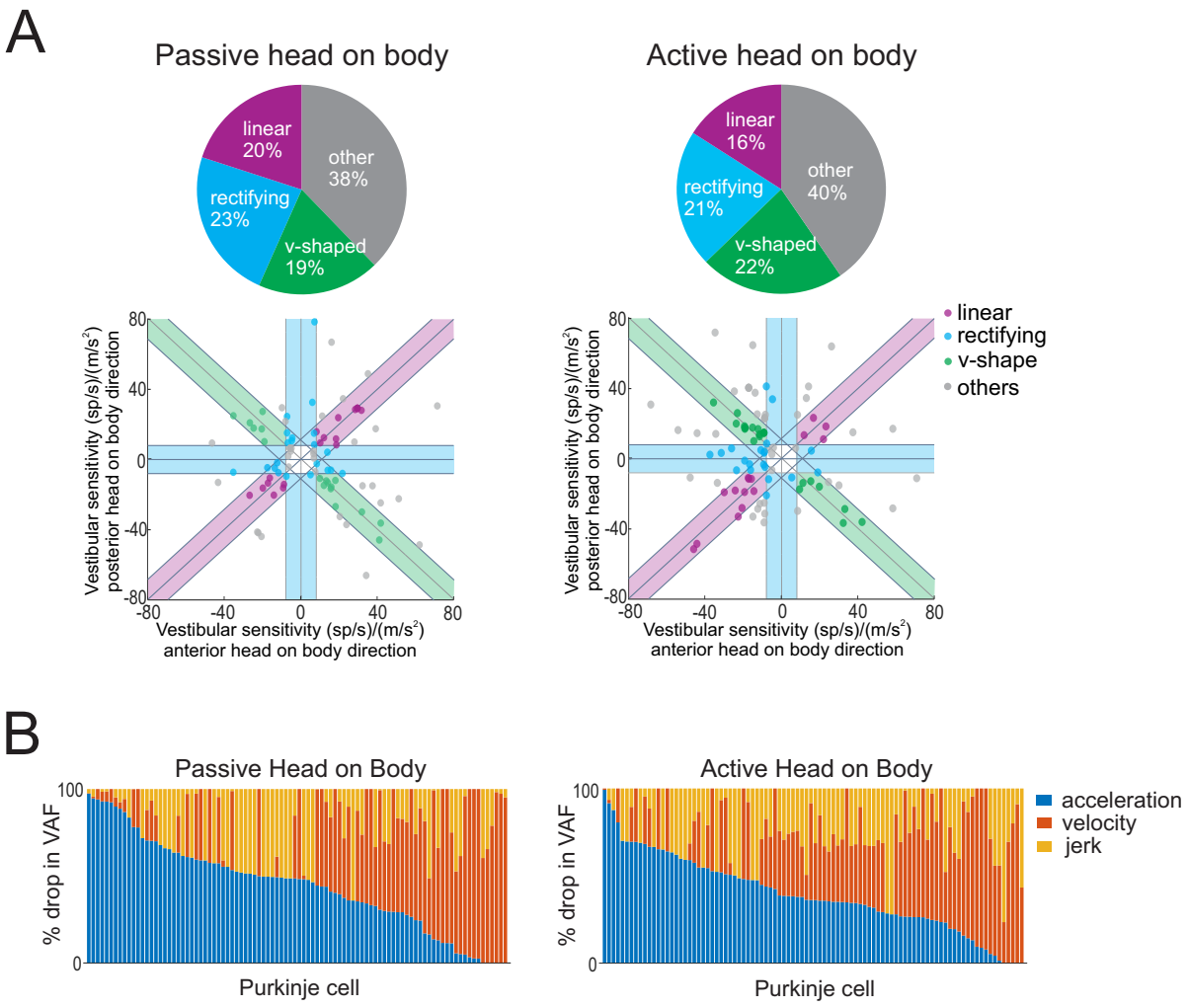
Extended Data Fig. 2. Responses of Purkinje cell simple spikes to vestibular and neck proprioceptive stimulation in the anteroposterior direction

(A) Head and body translation velocity are shown in the top two rows, and simple spike firing rate (gray shaded area) along with the linear estimation of the firing rate based on head motion (superimposed black trace), is shown in the bottom row. Heat maps illustrate simple spike firing rates for each motion trial. **(B)** Distribution of Purkinje cell responses to passive vestibular and proprioceptive stimulation in the anteroposterior direction.

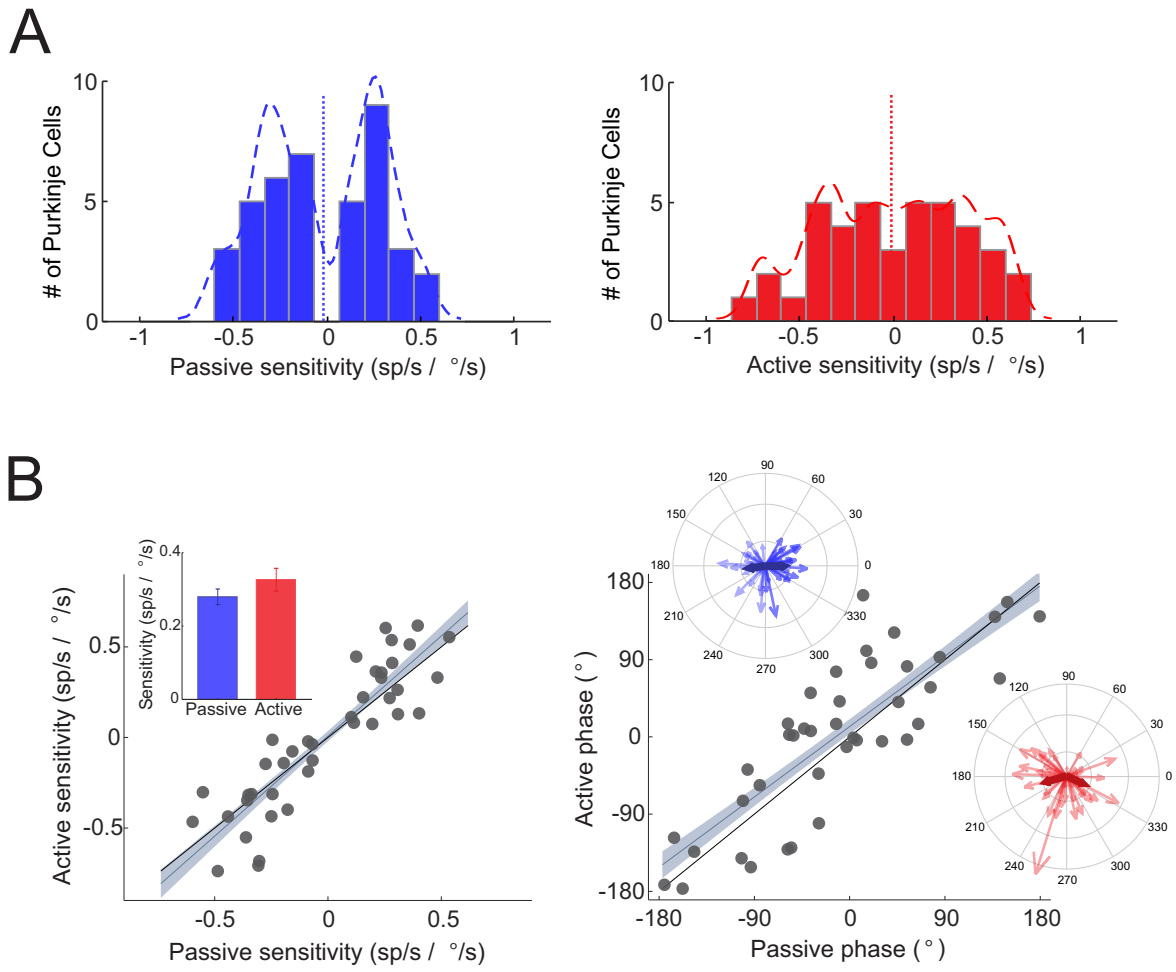


Extended Data Fig. 3. Purkinje cell responses to active and passive translations in the non-preferred movement direction

(A) Distribution of sensitivities across active and passive head on body motion conditions in the non-preferred direction for each neuron**. (B)** Passive vs. active Purkinje cell sensitivities and phases to head motion in the non-preferred movement direction. Gray line and shading represent the linear fit ±95% confidence interval. Insets: Bar graph demonstrates mean passive vs. active sensitivities, and polar plots show the magnitude (vector length) and the phase (angle) of Purkinje cell responses to passive and active head motion in the non-preferred movement direction.



Extended Data Fig. 4. Heterogeneity of responses of Purkinje cell simple spikes to passive and active head on body motion (**A**) Classification of cells into linear, rectifying, v-shaped, and other based on sensitivities to passive and active head on body motion. Pie charts show proportions of cells classified into each category. (**B**) The decrease in variance accounted for (VAF) when each kinematic term (acceleration, velocity, and jerk) was systematically removed from the linear regression model for passive and active head on body motion.



Extended Data Fig. 5. Purkinje cell responses to passive and active dynamic head pitch in the non-preferred moment direction

(A) Distribution of firing rates across passive and active head pitch conditions**. (B)** Passive vs. active Purkinje cell sensitivities and phases to head pitch in the non-preferred movement direction. Gray line and shading represent the linear fit ±95% confidence interval. Insets: Bar graph demonstrates mean passive vs. active sensitivities, and polar plots show the magnitude (vector length) and the phase (angle) of Purkinje cell responses to passive (blue) and active (red) head motion in the non-preferred movement direction.