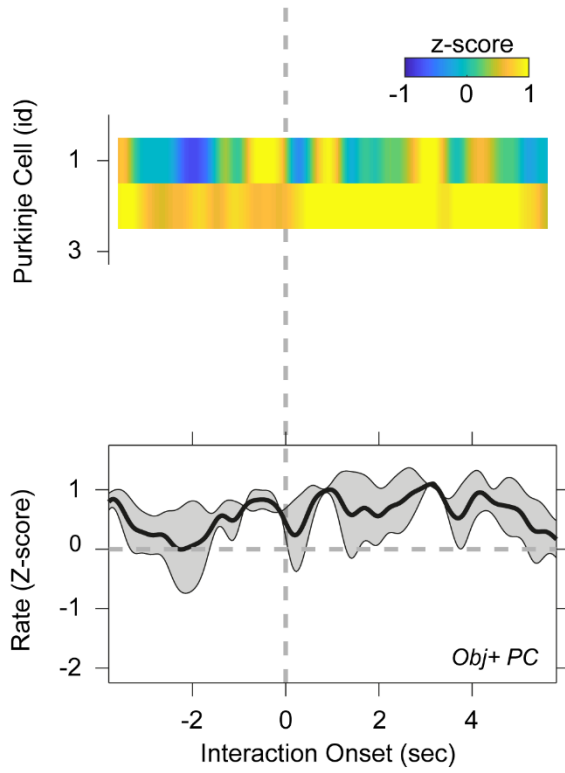


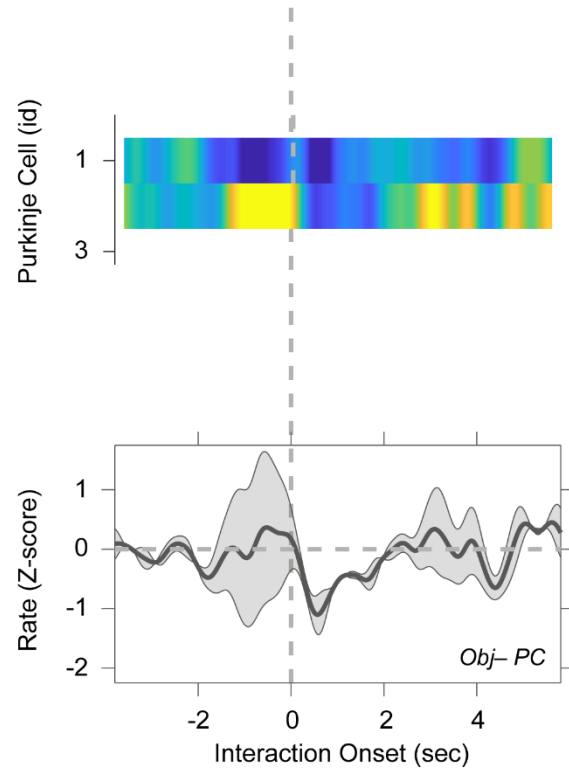
Figure 1 – Figure Supplement 1. E-Scope’s hardware multiplexed data flow and Purkinje cell recording probe location.

(A) 2-shank 32-channel silicon probe wire bonded to a PCB that is joined to another slimstack connector mounted PCB via two-layers of flex cable. **(B)** Custom electrophysiology amplifier PCB incorporating the Intan amplifier chip (*front*) and MCU (*back*). Analog neuronal data is amplified and digitized (TD) and transferred along with SSC pixel clock data (PCLK), SSC frame. **(C)** Open-sourced UCLA V3 Miniscope Interface PCB. Conveys acquired electrophysiology and image data via single coaxial cable. **(D)** UCLA Miniscope data acquisition system receives multiplexed data where the electrophysiology data is split to the **(E)** SSC-2-Intan-LVDS PCB. The converted electrophysiology data is passed through the **(G)** Intan DAQ (RHD 2000 evaluation board). Image data from **(D)** and electrophysiology data from **(G)** is then acquired and saved in the **(F)** host computer. **(H)** Right Crus I Purkinje cell recording probe location (Dil).

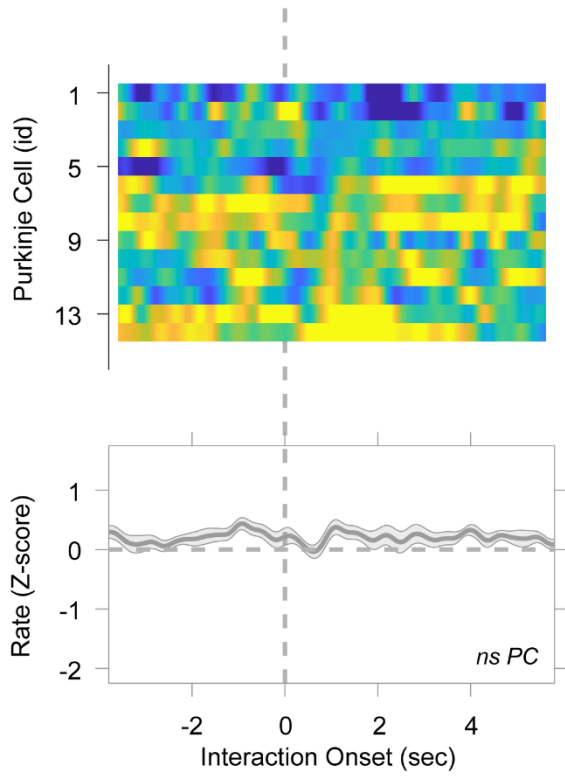
A



B



C



D

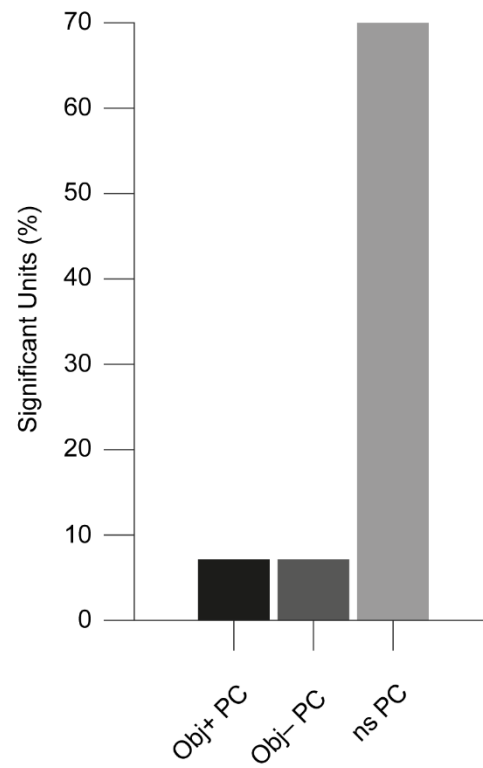


Figure 2 – Figure Supplement 1. Object-evoked Purkinje cell responses differ from social-evoked responses.

(A, B, C) Heatmaps of the average histogram for the individual Purkinje cells aligned to the onset of object interaction. Averaged traces of all cells for **(A)** Obj+ PCs, **(B)** Obj– PCs, and **(C)** ns PCs are shown below each of the corresponding heatmaps. **(D)** Bar graph of Obj+, Obj–, and ns PC proportion in the recorded population.

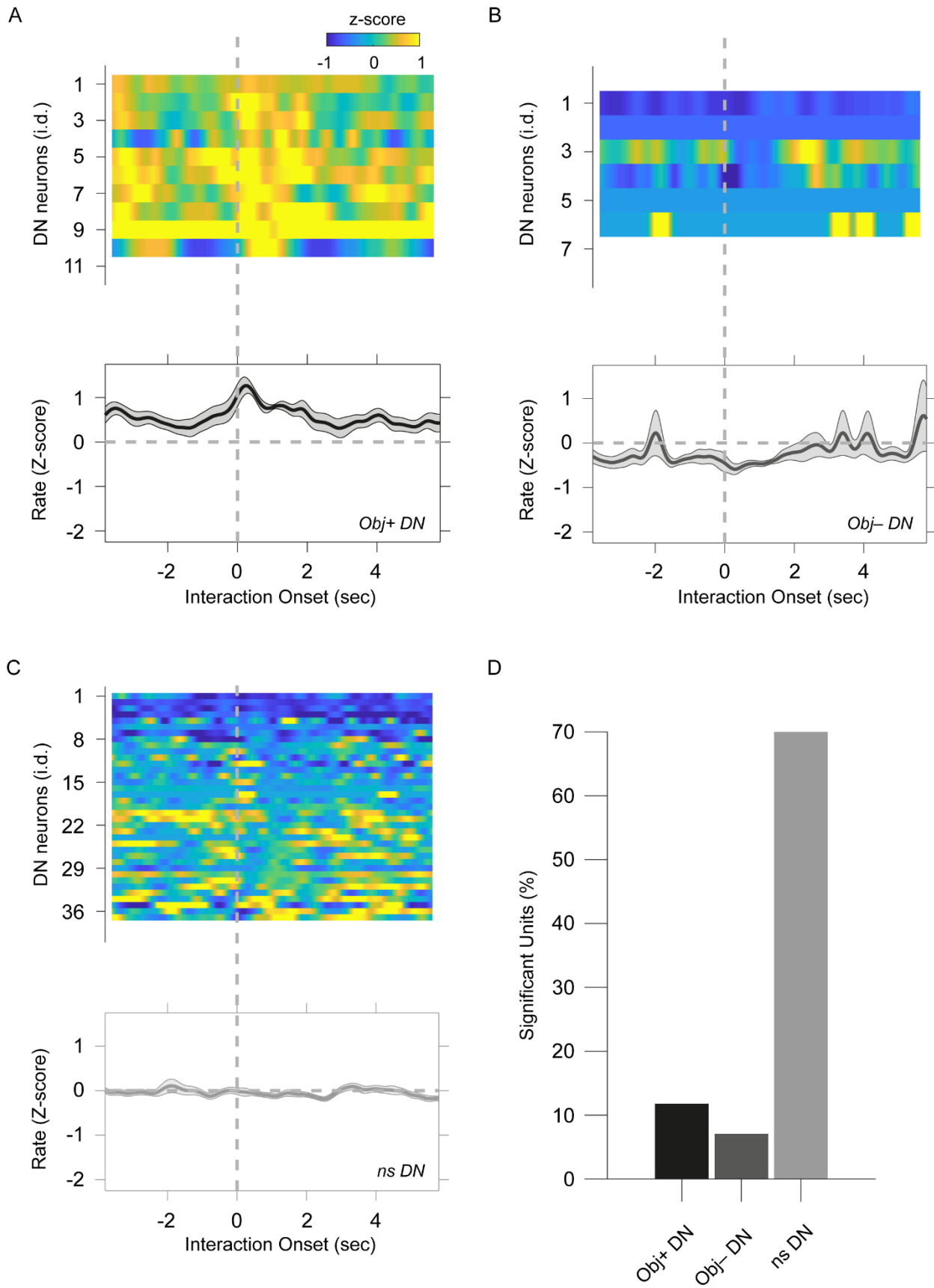


Figure 2 – Figure Supplement 2. Object-evoked dentate nucleus neuron responses differ from social-evoked responses.

(A, B, C) Heatmaps of the average peristimulus histogram for the individual dentate nucleus neurons aligned to the onset of object interaction. Averaged traces of all cells for **(A)** Obj+ DNs, **(B)** Obj– DNs, and **(C)** ns DNs are shown below each of the corresponding heatmaps. **(D)** Bar graph of Obj+, Obj–, and ns DN neuron proportion in the recorded population

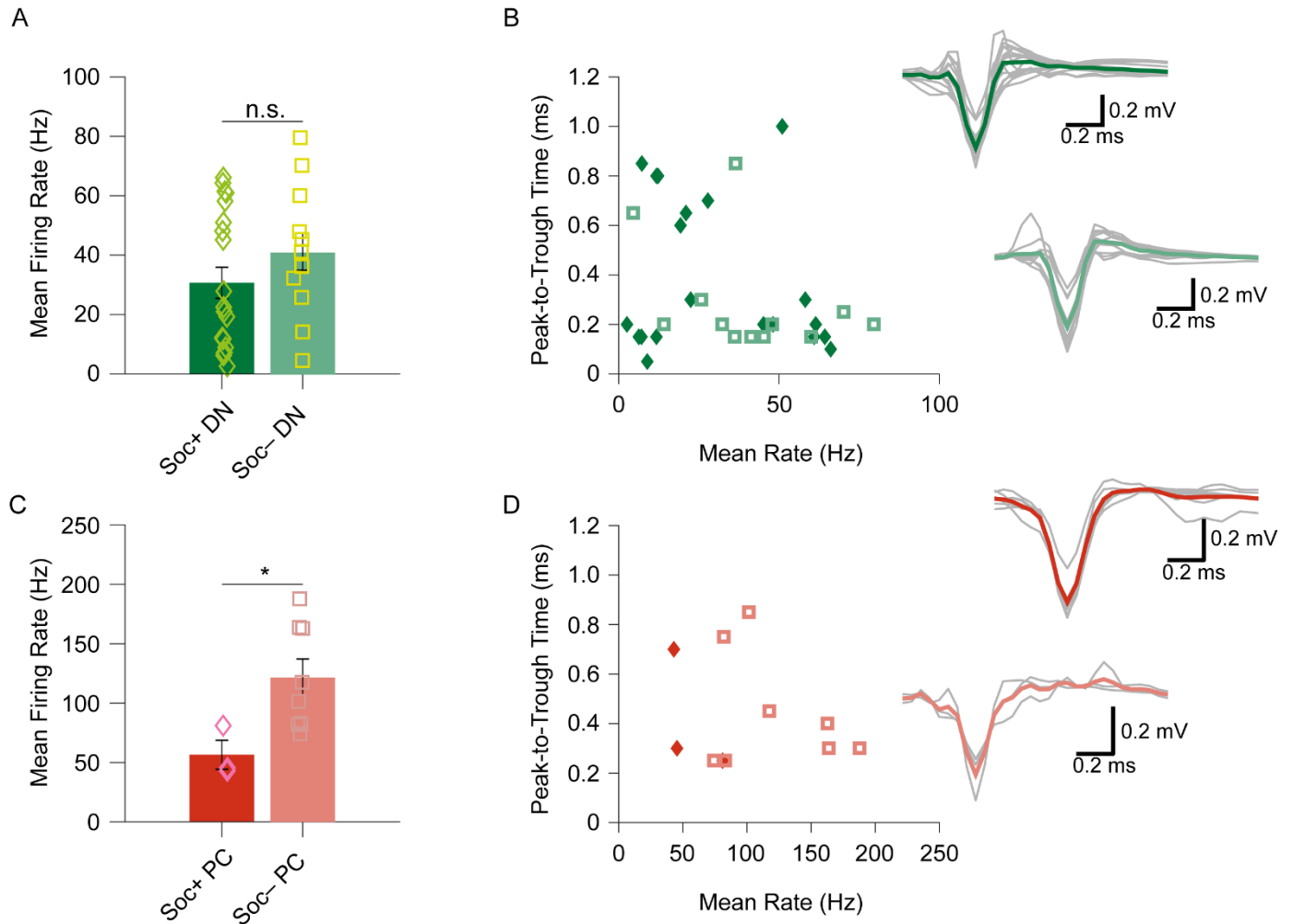


Figure 2 – Figure Supplement 3. Bimodality of socially excited and inhibited Purkinje cell simple spike but not dentate nucleus neurons.

(A) No significant difference in the mean baseline firing rate between Soc+ and Soc- DN neurons ($F = 1.589$, $p = 0.2172$). **(B)** Soc+ and Soc- DN neurons' mean firing rate in relation to the spike peak-to-trough kinetics. Waveforms of Soc+ and Soc- DN neurons (*right*). **(C)** Bimodality of the Soc+ and Soc- PC SS mean firing rate ($F = 5.742$, $p = 0.04$). **(D)** Soc+ and Soc- PCs' mean firing rate in relation to spike peak-to-trough kinetics. Waveforms of Soc+ and Soc- PCs (*right*).

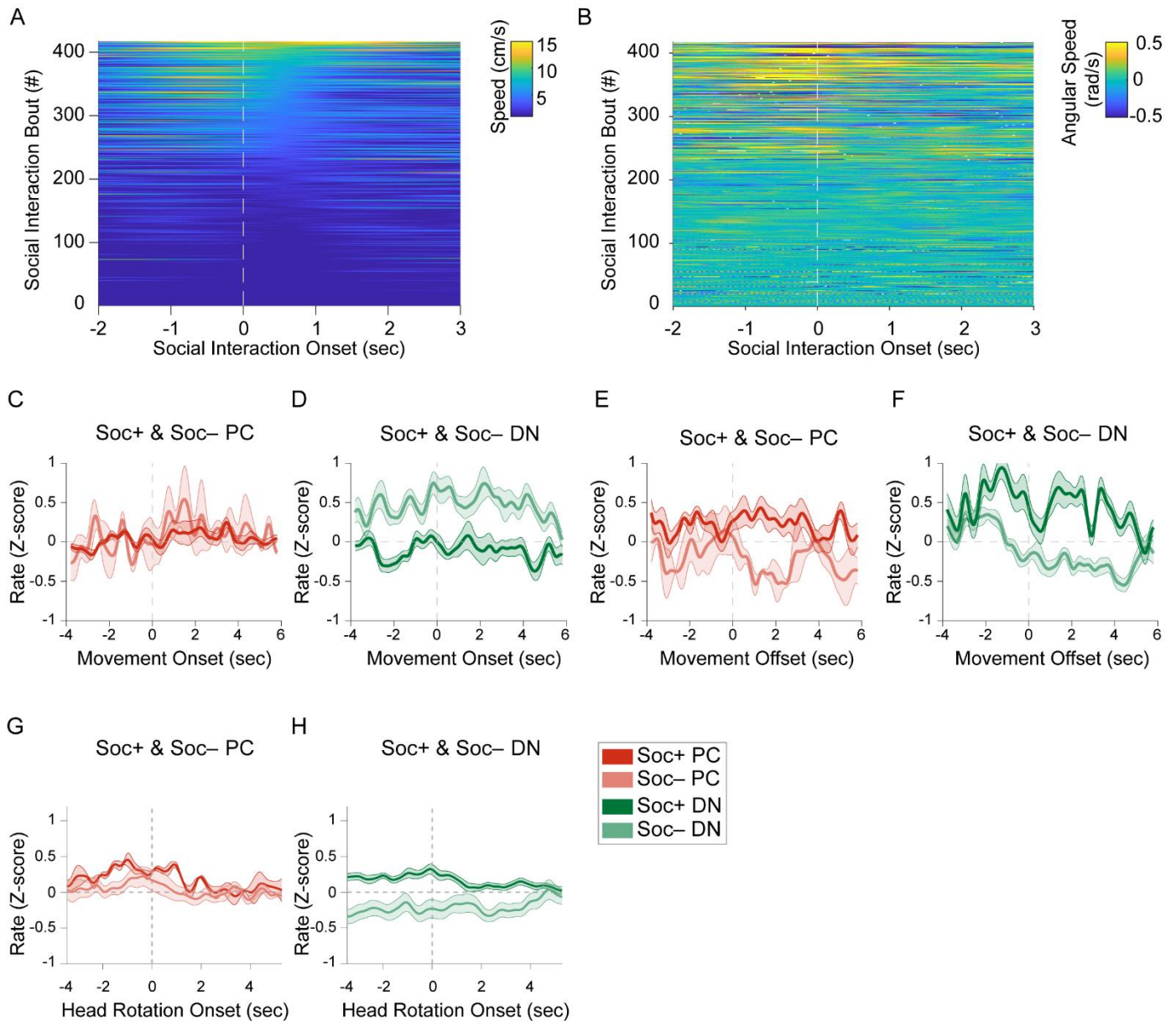


Figure 2 – Figure Supplement 4. Socially excited and socially inhibited Purkinje cell and dentate nucleus activity are not related to locomotion speed.

(A) Heatmap of locomotion speed in relation to social interaction onset aligned for all social interaction events. (B) Heatmap of angular speed (head rotation) in relation to social interaction onset aligned for all social interaction events. Normalized (Z-score) firing rate of Soc+ and Soc- (C) PCs upon locomotion onset, (D) DN neurons upon locomotion onset, (E) PCs upon locomotion offset, (F) DN neurons upon locomotion offset, (G) PCs upon head rotation onset, (H) DN neurons upon head rotation onset.

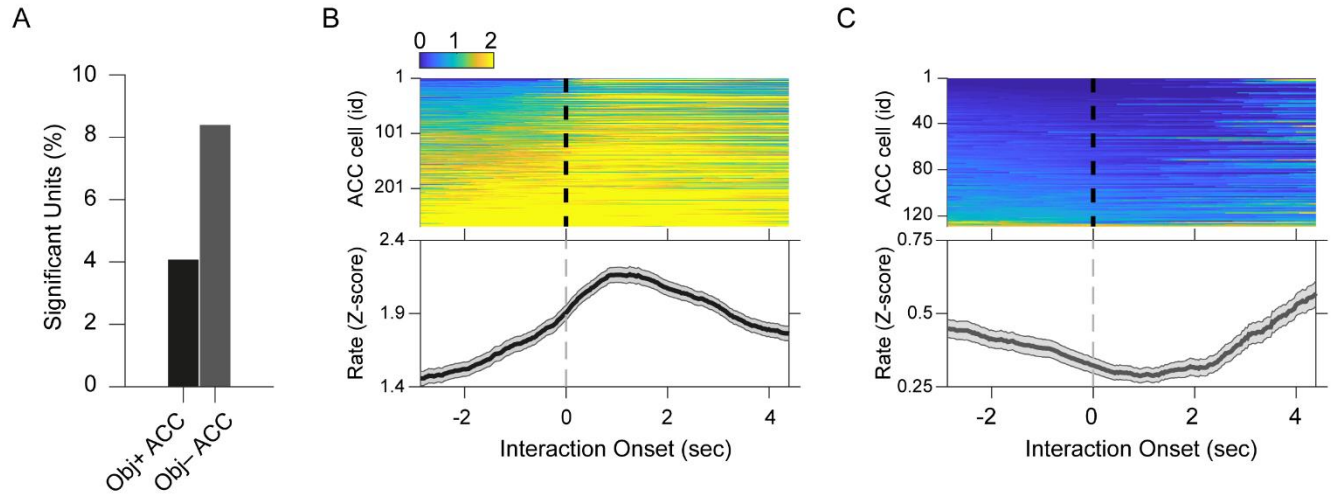


Figure 3 – Figure Supplement 1. ACC neuron activity patterns during object interaction. (A) Percentage of significant Obj+ and Obj- ACC neurons. (B, C) (top) Heatmap of Z-scored ACC activity aligned to object interaction onset (dashed line) and (bottom) averaged activity traces for (B) Obj+ and (C) Obj- ACC neurons.

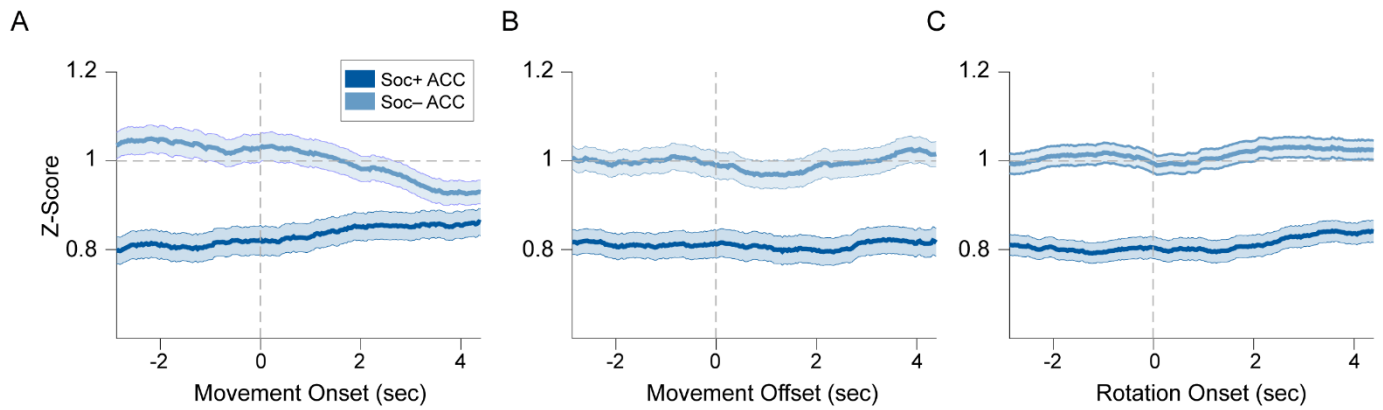


Figure 3 – Figure Supplement 2. Socially excited and inhibited ACC neurons are not related to the onset or offset of locomotion bouts or onset angular head rotation.

(A, B) PSTH of averaged normalized (Z-score) activity for movement **(A)** onset and **(B)** offset for Soc+ and Soc- ACC neurons. **(C)** PSTH of Z-scored ACC activity upon head rotation onset.

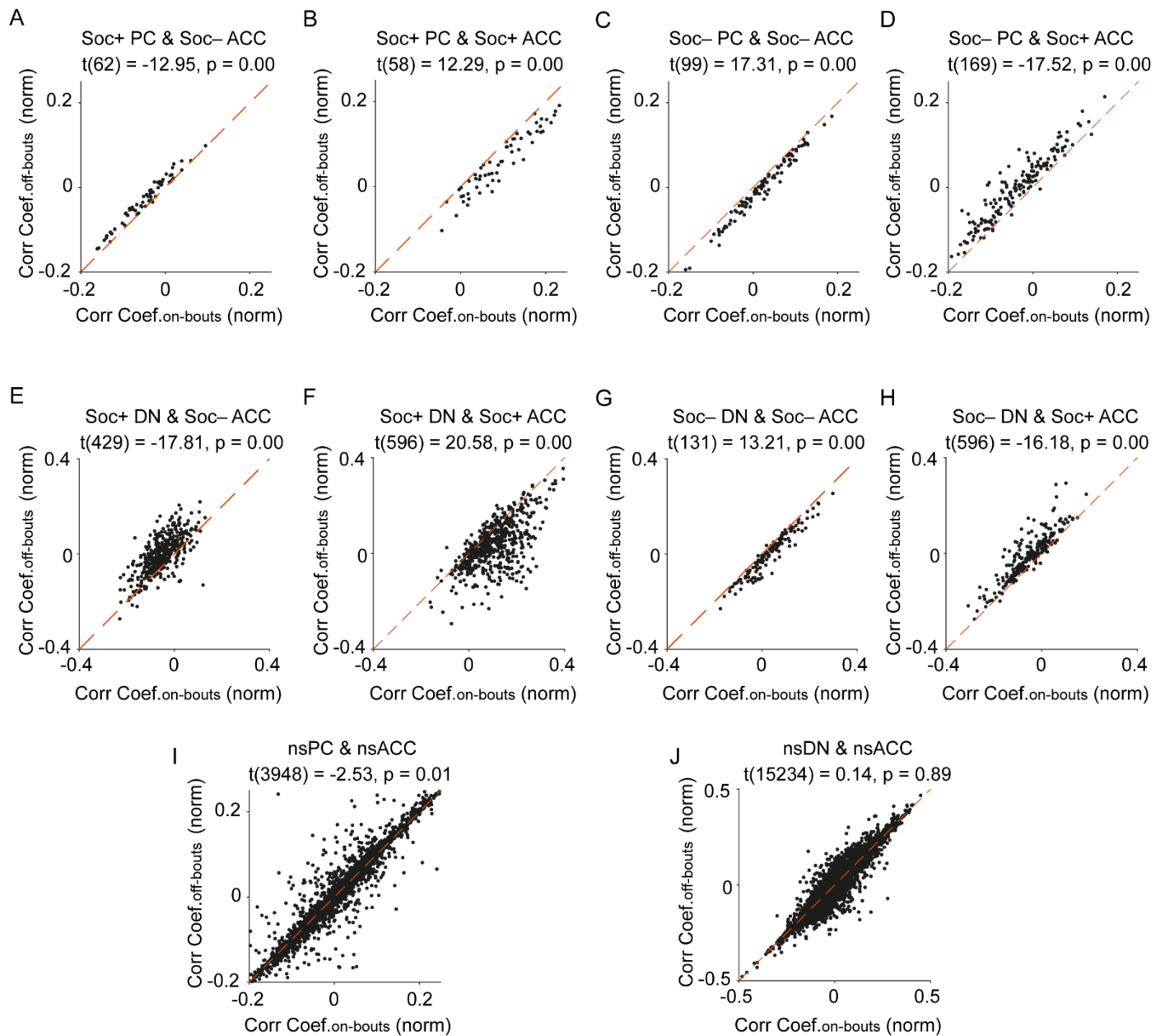


Figure 4 – Figure Supplement 1. Relationship of significant social cell pair correlation coefficients during social on- and off-bouts.

Scatter plots of significant social (A, B, C, D) PC or (E, F, G, H) DN and social ACC pair correlation coefficients during social on- and off-bouts. The scatter plot of the (I) nsPC or (J) nsDN and nsACC pairs shows no increase in correlations for social on- vs social off-bouts.

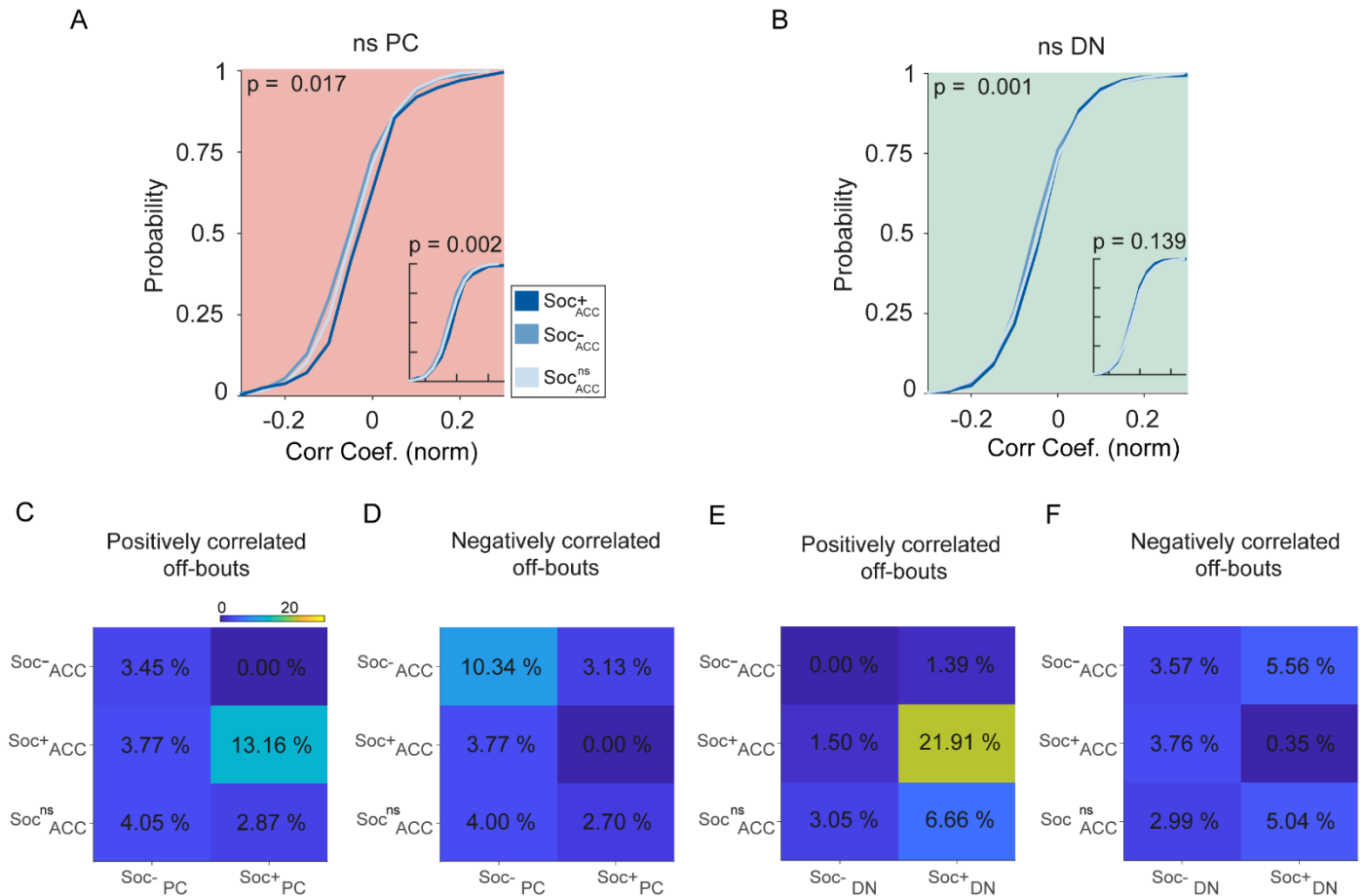


Figure 4 – Figure Supplement 2. Purkinje cells and dentate nucleus neurons are not correlated to ACC neuron activity in socially neutral neurons and during off-bout periods. Cumulative distribution histogram of the correlation coefficients for the activity of **(A)** nsPC with Soc+ (dark blue), Soc- (light blue) and Soc^{ns} ACC, and **(B)** nsDN with Soc+ (dark blue), Soc- (light blue) and Soc^{ns} ACC. Insets; cumulative histogram of the activity of each set of neurons calculated during periods when the mouse was not engaged in social interaction. **(C, D, E, F)** Correlation matrix showing percentage of cell pairs showing significant positive **(C, E)** or negative **(D, F)** correlations in activity between Soc+ and Soc- PCs **(C, D)** or Soc+ and Soc- DN neurons **(E, F)** with Soc+, Soc- and Soc^{ns} ACC neurons. The color of the squares represents the proportion of neurons correlated.