

Supplementary Information

Cerebellar climbing fibers multiplex movement and reward signals during a voluntary movement task in mice

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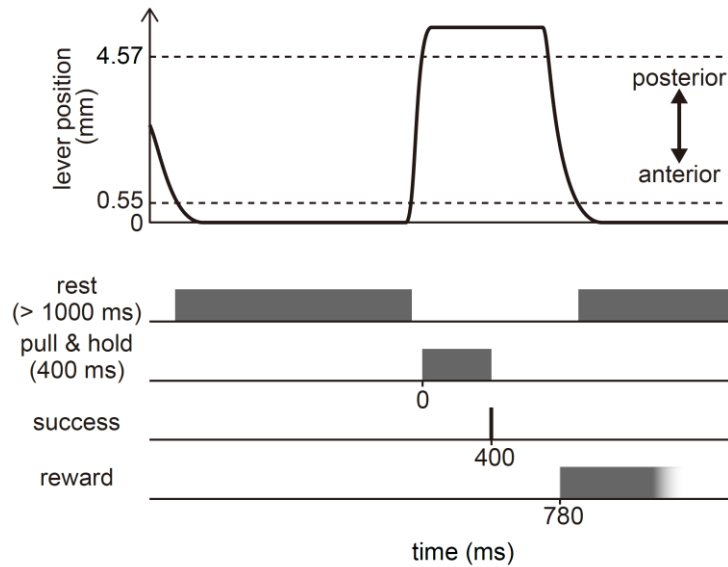
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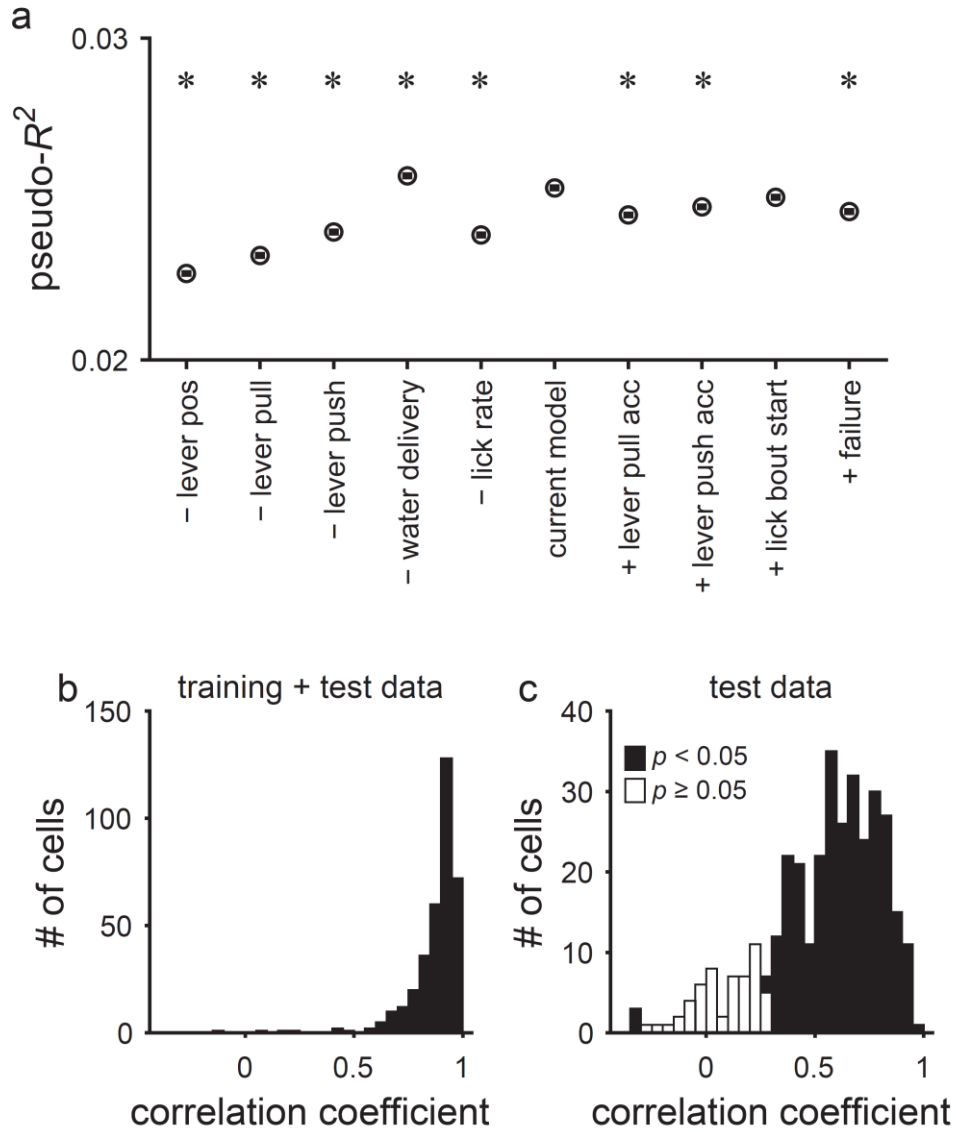
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Supplementary Figures 1 to 4



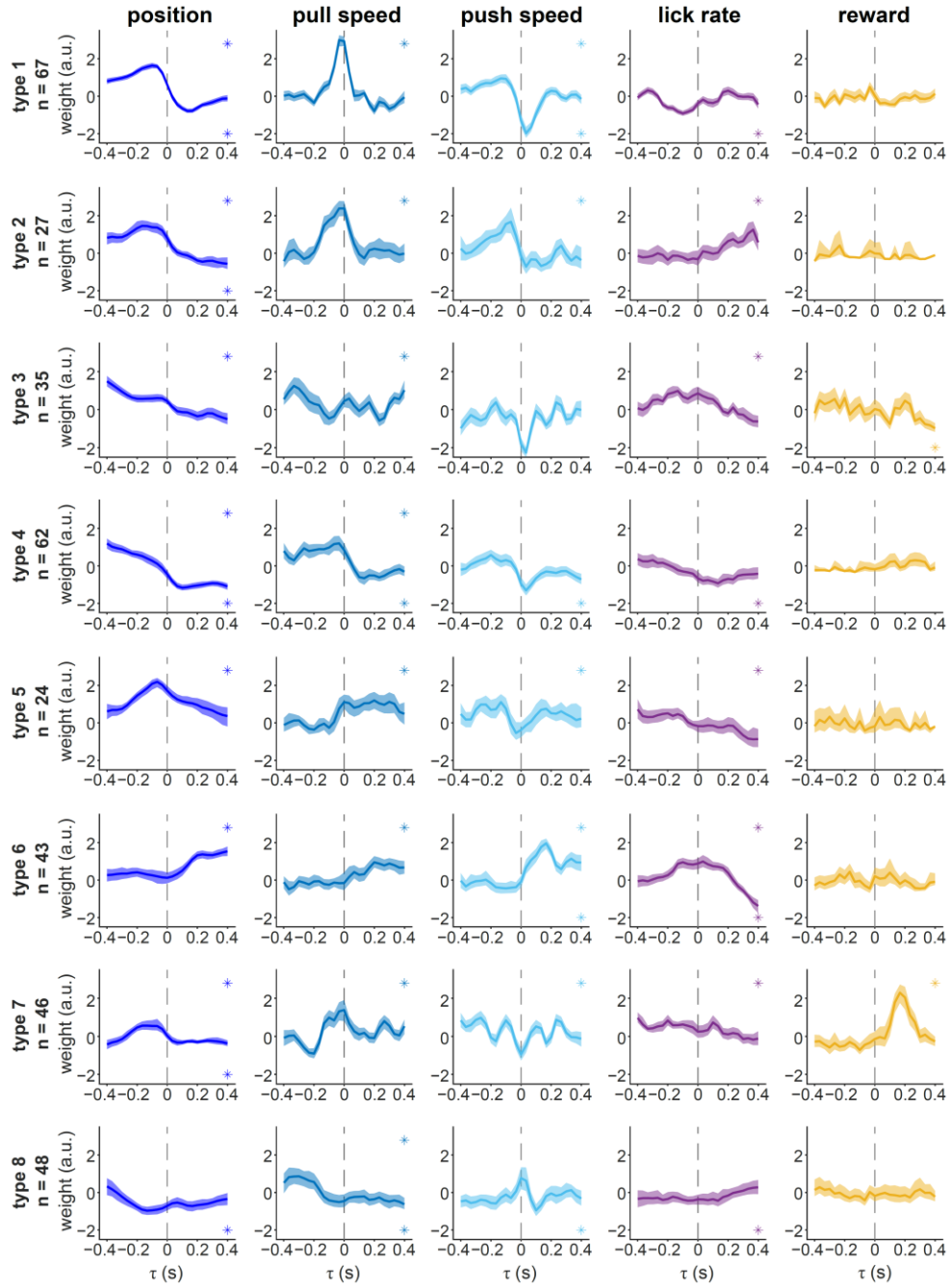
Supplementary Figure 1 | Timings of criteria in the lever pull task.

To obtain the water reward, mice have to keep the lever at the resting position (< 0.55 mm) for more than 1000 ms and then pull and maintain it beyond the higher threshold (> 4.57 mm) for 400 ms. Reward (4–8 μ L water) is delivered 380 ms following a task success.

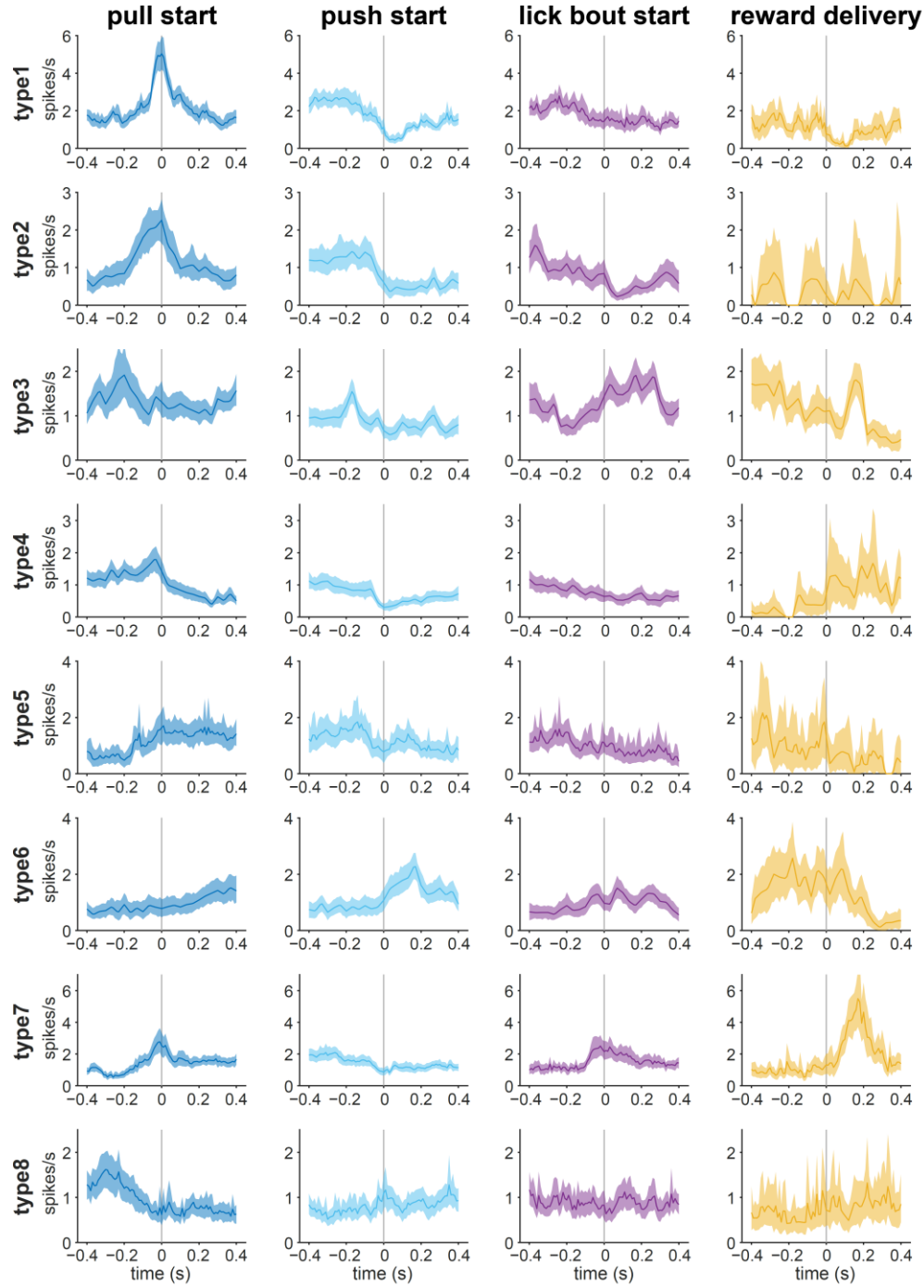


Supplementary Figure 2 | Prediction performance of the encoding model.

a Selection of the behavioral variables in the encoding model. Mean prediction performances (pseudo- R^2), explained deviance, of encoding models with different behavioral variables. A minus sign and a plus sign mean excluding and adding the parameter from and to the current model, respectively. Acc represents acceleration. Error bars: s.e.m. *: $p < 0.05$, two-sided Wilcoxon's signed-rank test. **b, c** Pearson's correlation coefficient between model prediction and PETH aligned to the start timing of lever pull in training and test data **b** and test data **c**, respectively.



Supplementary Figure 3 | Individual plots of the response kernels shown in Figure 3b. **Row:** functional type of PCs. **Column:** behavioral variables. The asterisks in the first and fourth quadrant of each panel indicate that the mean of a variable significantly deviates from zero toward the positive and negative direction, respectively. Shade: 99% bootstrapped confidence interval of the mean.



Supplementary Figure 4 | Population PETHs of dCSs of PCs in each functional type. Individual plots show the means of PETHs of PCs in the same functional types to one of the behavioral variables. **Row:** functional type of PCs. **Column:** Event types related to the behavioral variables for the encoding analysis. Shade: 99% bootstrapped confidence interval of the mean.