SUPPLEMENTARY FIGURES

Parietal stimulation reverses age-related decline in exploration, learning, and decision-making.

Eun Jung Hwang[1*], Sayli Korde[1], Ying Han[1,2,3], Jaydeep Sambangi[4], Bowen Lian[4], Ama

Owusu-Ofori[1,2], Megi Diasamidze[1,2], Lea M. Wong[1], Nadine Pickering[4], Sam Begin[4]

Affiliations:

1. Cell Biology and Anatomy, Chicago Medical School, Stanson Toshok Center for Brain

Function and Repair, Rosalind Franklin University of Medicine and Science, North Chicago, IL

60064, USA

2. Department of Neuroscience, Lake Forest College, Lake Forest, IL 60045, USA

3. Department of Computer Science, Lake Forest College, Lake Forest, IL 60045, USA

4. Chicago Medical School, Rosalind Franklin University of Medicine and Science, North

Chicago, IL 60064, USA

✶ corresponding author: eunjung.hwang@rosalindfranklin.edu (Eun Jung Hwang)
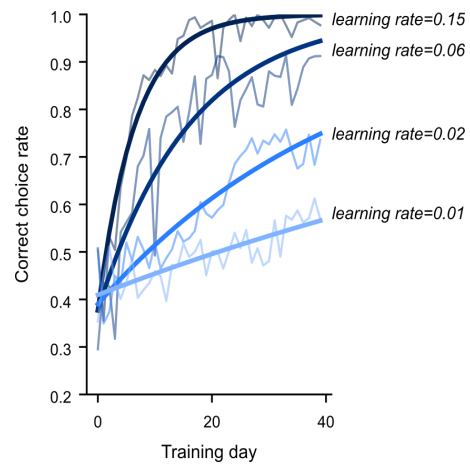
Figure S1. Learning rate estimates from exponential function fit to learning curves. Four example individual learning curves in different colors are fit with exponential functions. The time constant of each exponential function is used as the learning rate.
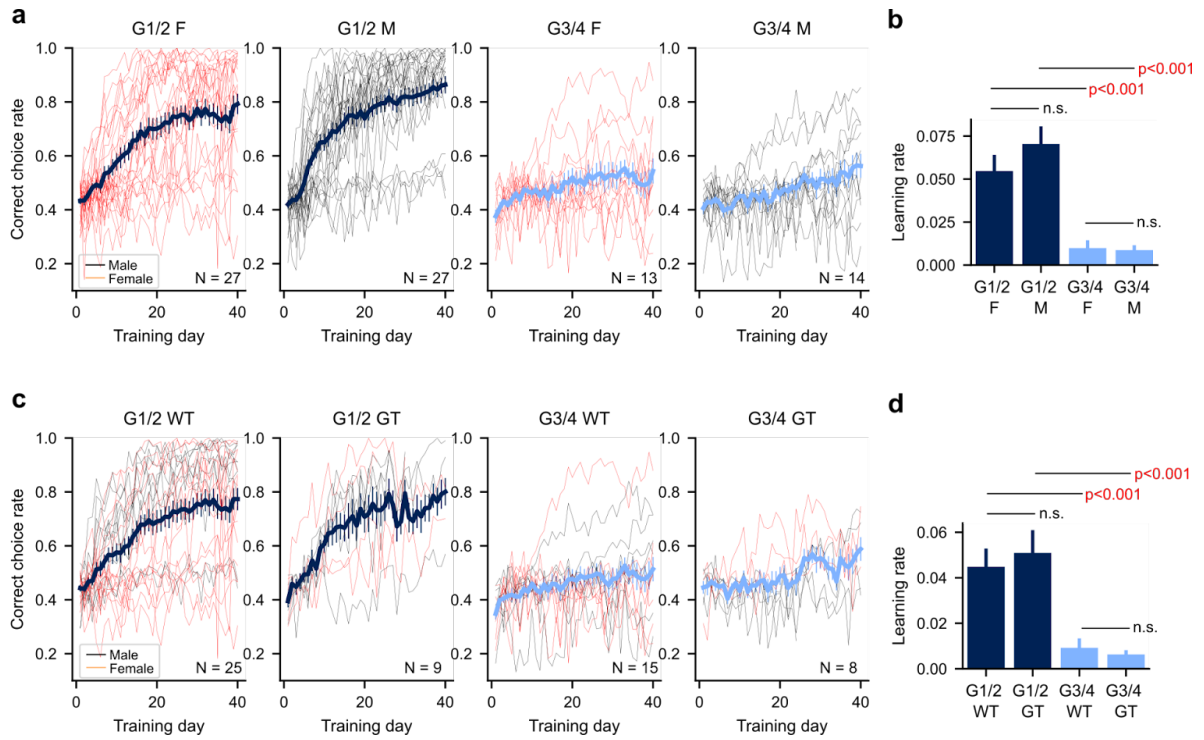
Figure S2. Age-related learning declines are similar across sexes and strains.

a. G1 and G2 are combined as a young mouse group, while G3 and G4 are combined as an old mouse group. Learning curves of each age group from each sex separately. Thick lines: mean ± S.E.

b. The learning rate of each age and sex group. Mean ± S.E.

c. Learning curves from the two groups, separated for two different strains, wild type (WT) versus cross between Thy1-GCaMP6S and LSL-tdTomato (GT).

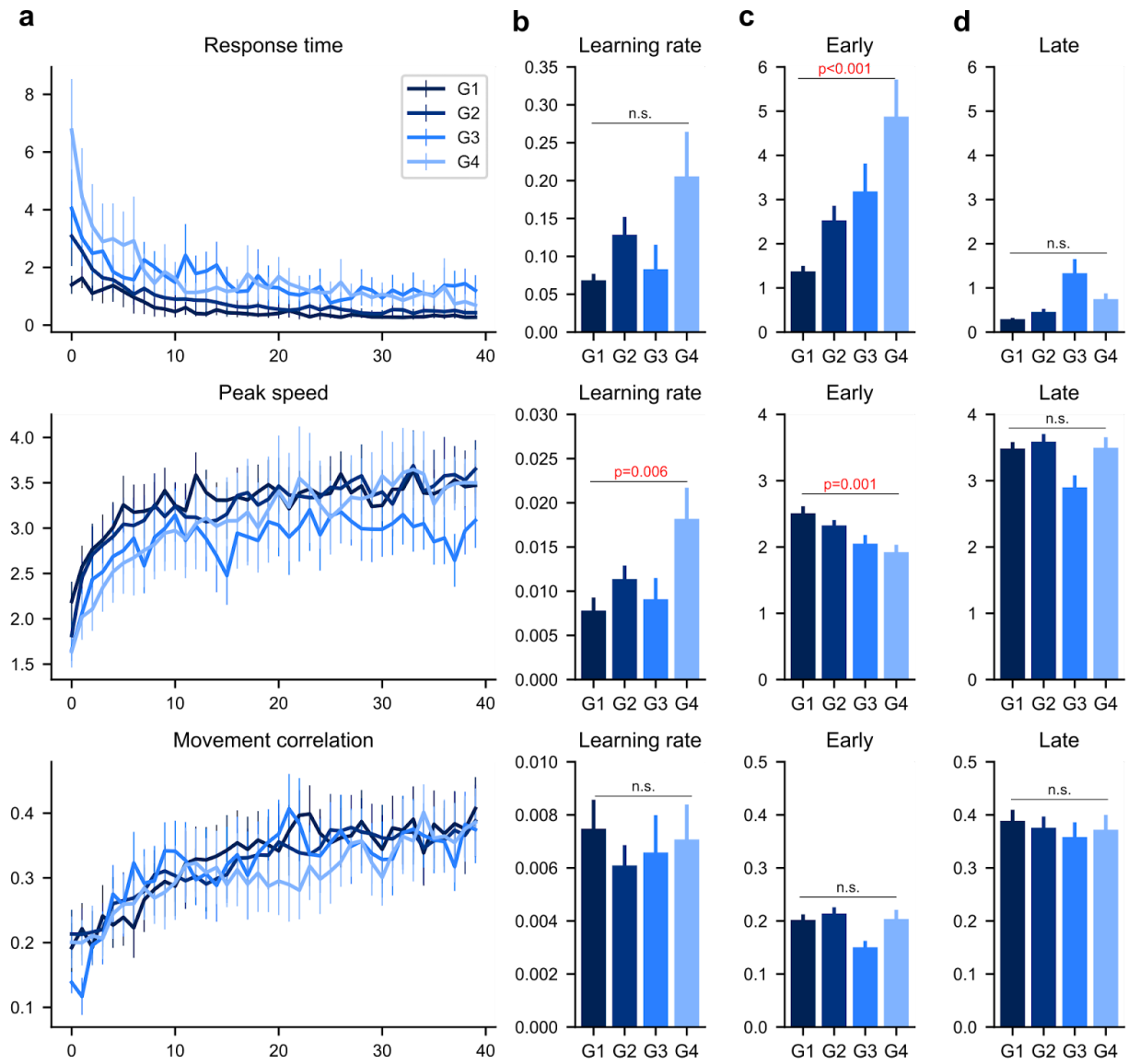**d.** The learning rate of each age and strain group.

Figure S3. Repetition-based motor learning is preserved with age.

a. Learning curves for three kinematic metrics, response time, peak movement speed, and trial-to-trial movement correlation. Mean ± S.E.

b. The learning rate of the three kinematic variables across the four different age groups. Mean ± S.E.

c. The mean values in the first three training days.

d. The mean values in the last three training days.

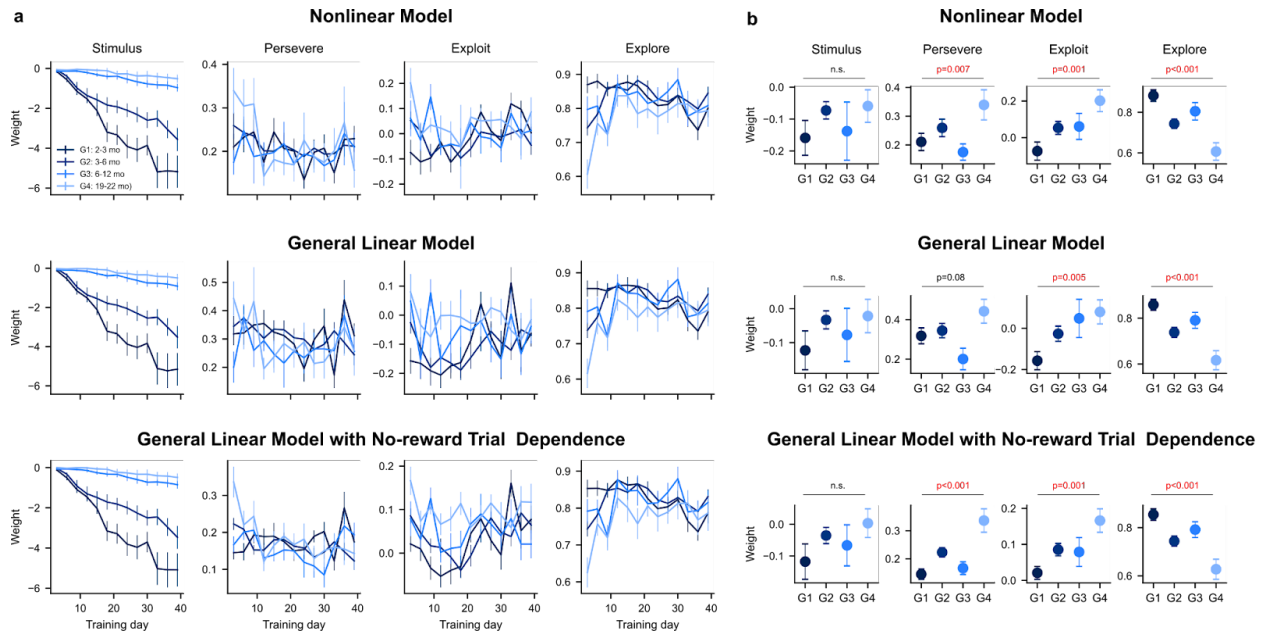**Figure S4. Different variants of choice models produce similar results.**

a. Nonlinear history mode: the same model as in Figure 2c. Mean ± S.E.

b. General linear model: The weight of each N-back term in the choice-history and outcome history terms were independently estimated, rather than constraining them to exponentially decay with temporal distance from the current trial.

c. In this model, outcome history dependence was removed, but non-rewarded choice dependence was added.