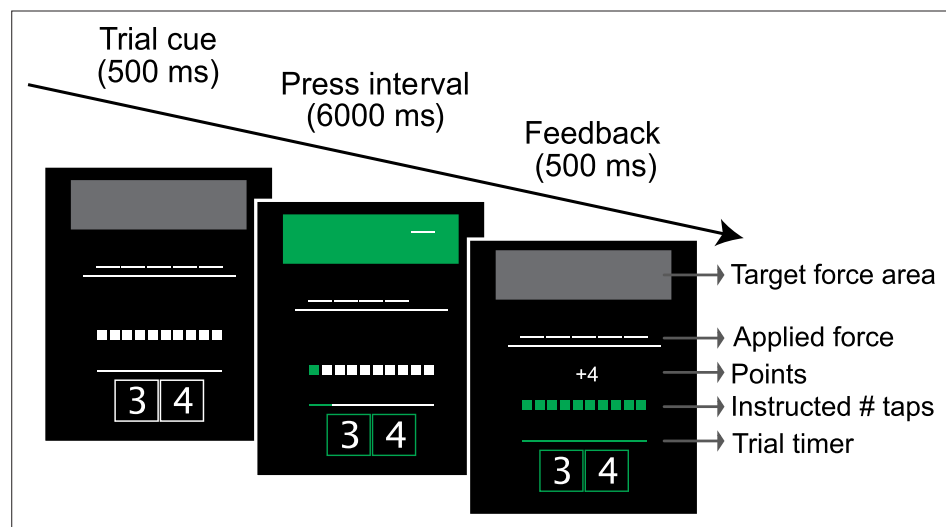


---

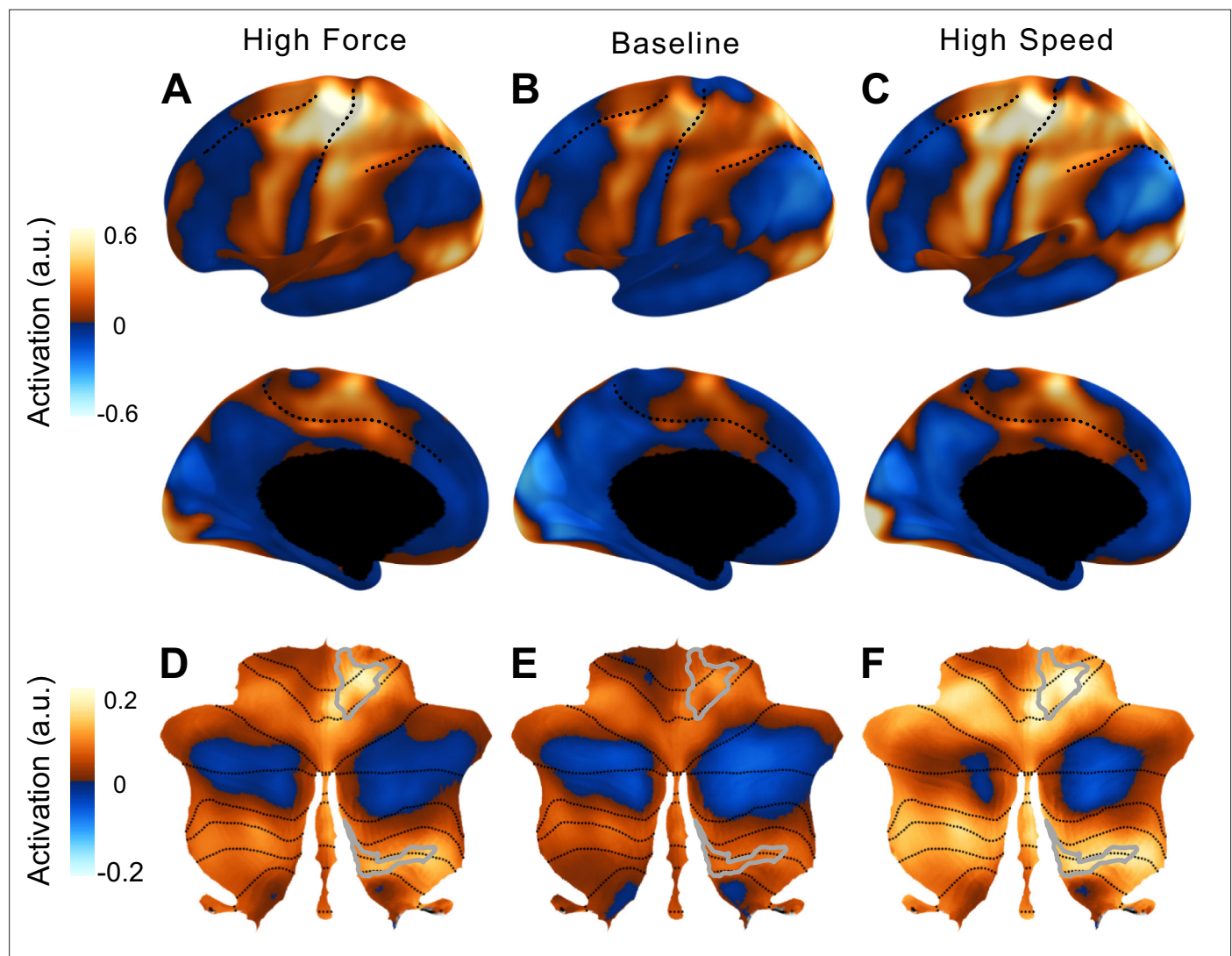
## Figures and figure supplements

Selective recruitment of the cerebellum evidenced by task-dependent gating of inputs

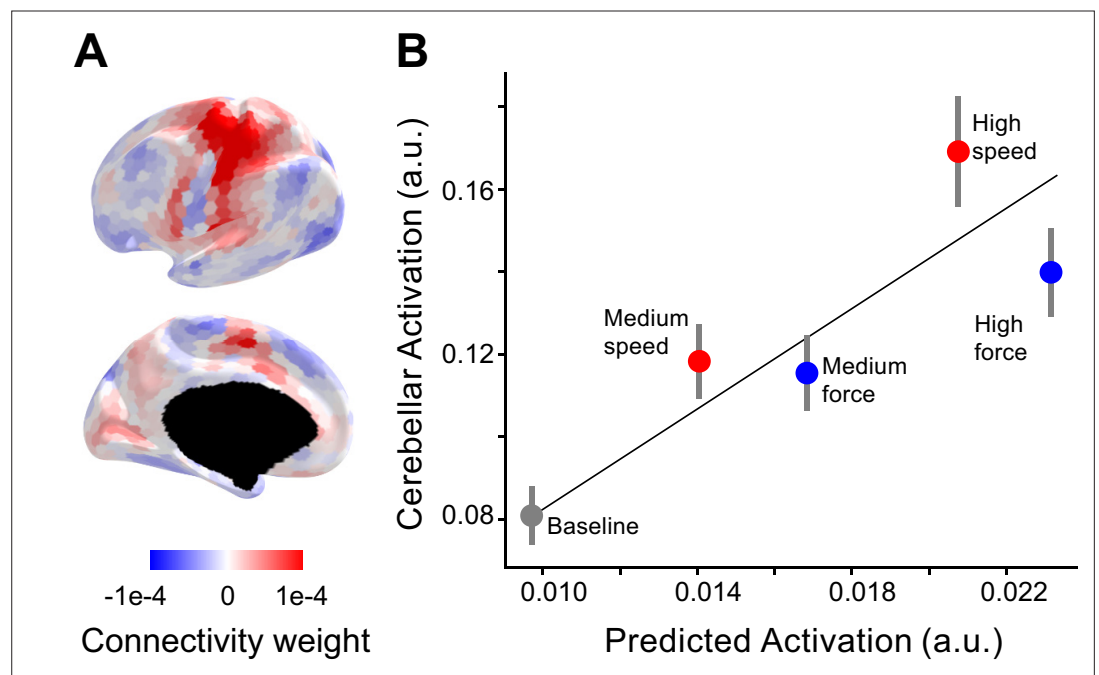
**Ladan Shahshahani et al.**



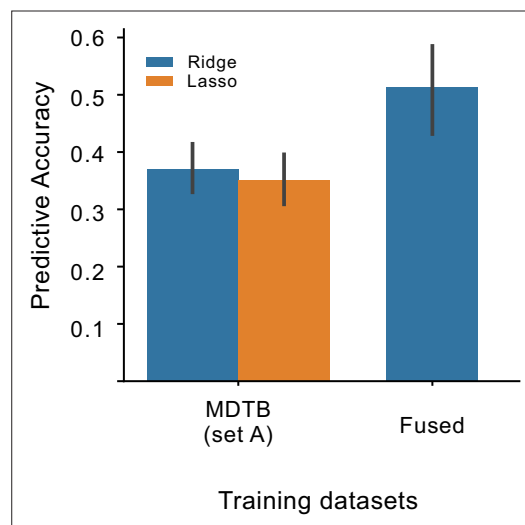
**Figure 1.** Timeline of events in the alternating finger tapping task. The height of the target force area indicated the target force, the number of white squares the target number of taps. During the press interval, the participant alternatively tapped the middle and ring finger. After each tap, the next box turned green. Reward feedback (e.g., +4) was based on their performance.



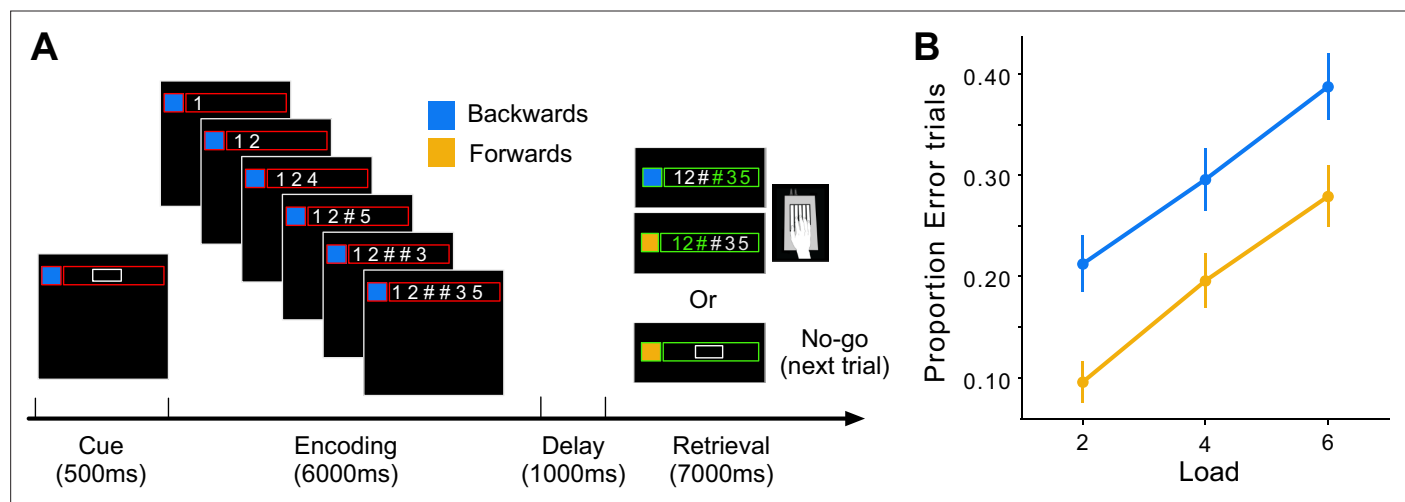
**Figure 2.** Activation in the cortico-cerebellar motor network compared to rest. Activity maps for high-force (left), baseline (middle), and high-speed (right) conditions. High levels of force and speed were chosen to show the spatial distribution of activity. Medium level of force and speed resulted in similar maps with activity levels between the baseline and high conditions. (A–C) Lateral and medial surface of the left hemisphere. Dotted lines indicate the superior frontal, central, intra-parietal, and cingulate sulcus. (D–F) Flat map of the cerebellum (*Diedrichsen and Zotow, 2015*) with lobular boundaries indicated in dotted line. The right anterior and posterior hand motor area (M3R, gray outline) was defined by a new functional atlas of the cerebellum (*Nettekoven et al., 2024b*).



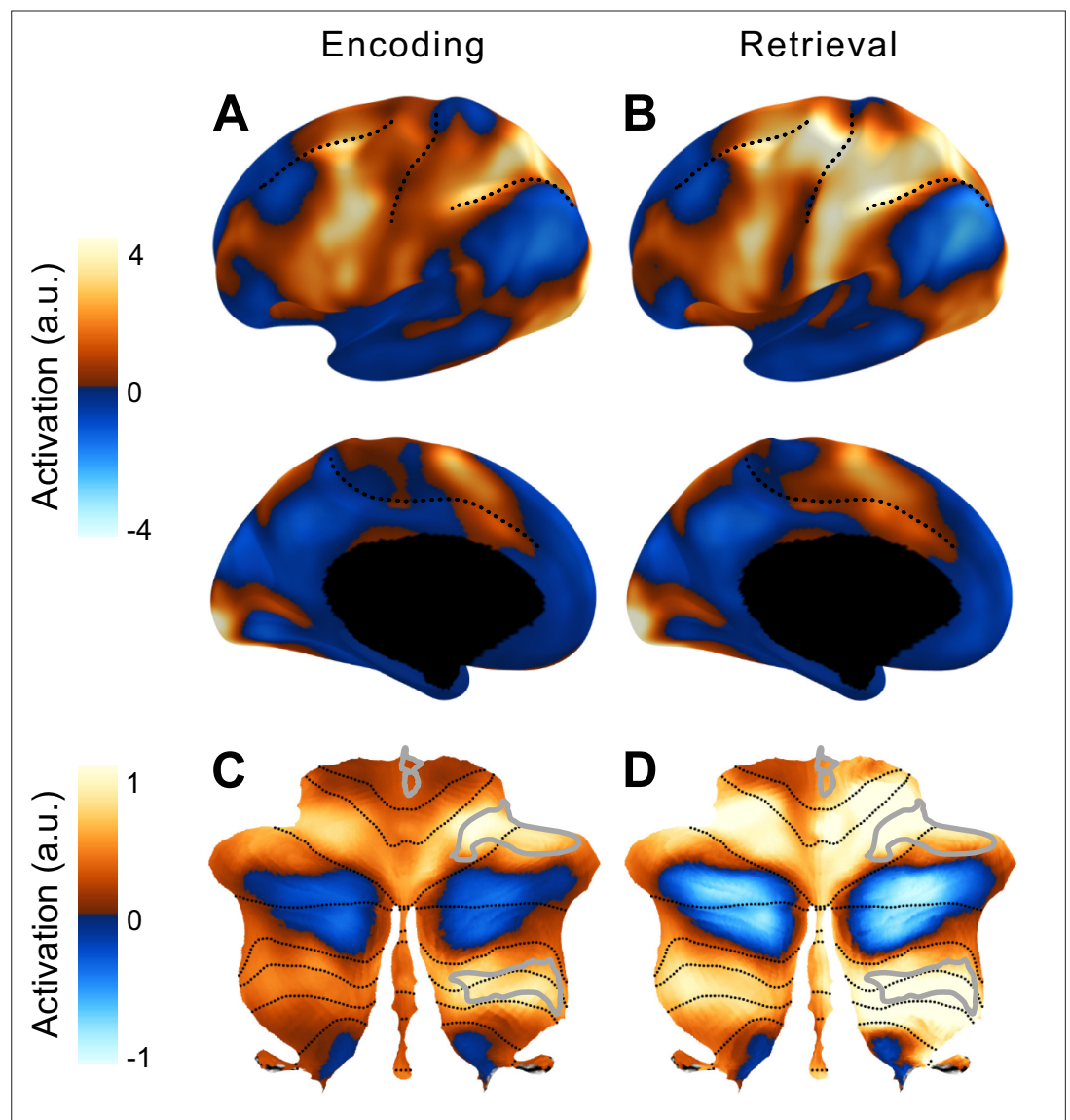
**Figure 3.** Selective recruitment of cerebellum for fast alternating finger movements. **(A)** Average connectivity weights from a group-level connectivity model (Ridge regression, multi-domain task battery [MDTB], task set A) for the cerebellar right-hand area shown on inflated surface of the left hemisphere. For evaluation of alternative connectivity models see **Figure 3—figure supplement 1**. **(B)** Average observed cerebellar activation (y-axis) plotted against average prediction from the connectivity model (x-axis). Resting baseline (located at 0,0) is not shown explicitly but included in the regression. The error bars indicate the standard error of the mean of the signed residuals.



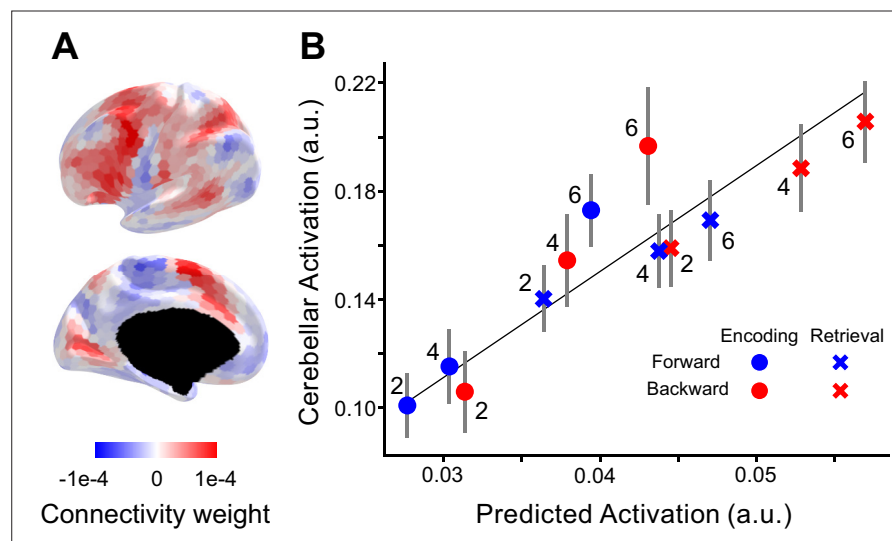
**Figure 3—figure supplement 1.** Connectivity models evaluation. The connectivity model used in the main analysis was trained on task set A of the multi-domain task battery (MDTB) dataset using Ridge regression (King *et al.*, 2023). As alternative connectivity models, we used Lasso regression on the same training set and a ridge regression model trained on five task-based datasets including MDTB (Nettekoven *et al.*, 2024b). Predictive accuracy was calculated as the cosine similarity between observed and predicted activity patterns of all the task conditions used in this paper. Error bars indicate the standard error of predictive accuracy of the evaluated models.



**Figure 4.** The digit span task and behavioral performance. **(A)** Timeline of trial events. The cue signaled the recall direction (blue for backward and yellow for forward) and memory load (size of the white box indicated the number of memory digits) of the upcoming trial. During encoding, a new digit appeared every second and was replaced by the # symbol if it was a memory digit. After a 1-s delay, the task progressed to either the retrieval phase (Go trial) or skipped directly to the next trial (No-Go trials). **(B)** Proportion of error trials. Error bars indicate standard error of the mean across participants.



**Figure 5.** Average activation in the cortico-cerebellar network for working memory. Group-averaged activation during the encoding (A) and retrieval (B) phases on an inflated representation of the left cerebral hemisphere (as in **Figure 2**). (C, D) Group average activity during the two phases in the cerebellum. The D3R subregion of the multi-demand network in the right cerebellar hemisphere was used in the main analysis (outlined in light gray).



**Figure 6.** Selective recruitment of cerebellum in digit span task. **(A)** Average connectivity weights from a group-level connectivity model for the cerebellar D3R region of interest. **(B)** Average observed cerebellar activation (y-axis) plotted against average prediction from the connectivity model (x-axis). Line shows the best linear relationship between predicted and observed activity with an intercept of zero. Error bars show standard error of the mean (SEM) of the signed residuals for each condition across subjects.