Long-term sequence training alters movement representations in sensorimotor network

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Reprint: www.psy.cmu.edu/~coaxlab/posters/Beukema_SFN16.pdf

Motivation

• Sequential skill acquisition is associated with binding distinct movements into one.

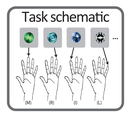
• It is unknown how sequential learning affects the representations of movements.

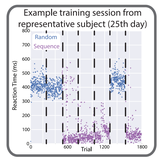
Methods

Dataset

• Participants: Neurologically healthy adults (n=18, age = 21-37, 6 female)
• Finger movement sequence production task cued with fractal images
• 10,000 trials per movement (40,000 trials total)

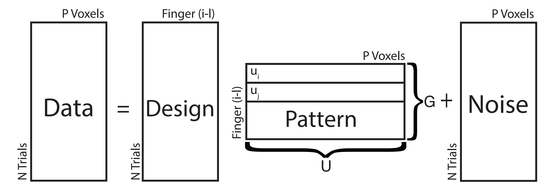
Control Group (n=9) randomly ordered elements
Training Group (n=9) 32 element sequence



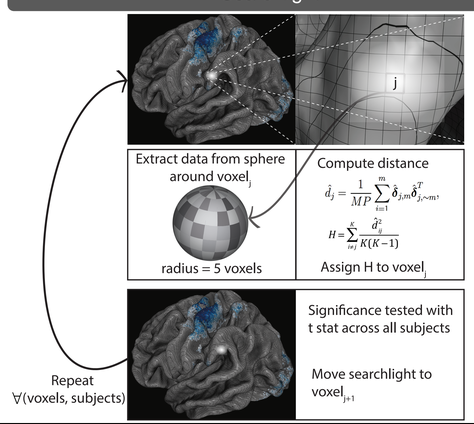


• Functional MRI data acquired pre and post training
• Scan Parameters: (6 runs/session, TR: 2000ms, MB = 3, 66 slices, 2mm^3)

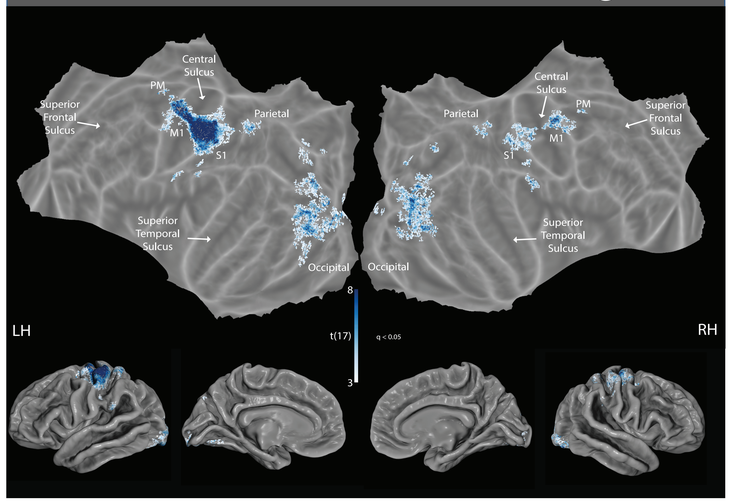
Representational Similarity Analysis



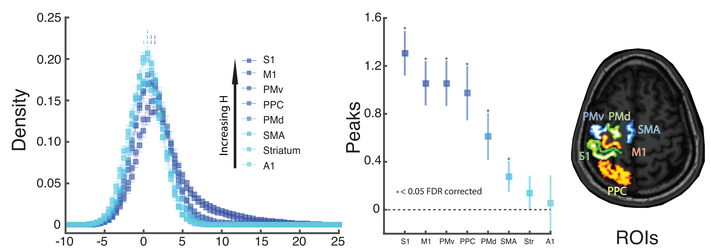
Searchlight



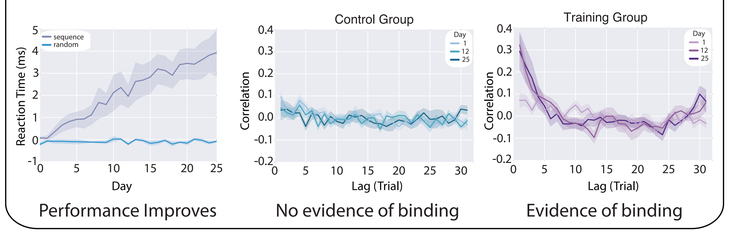
Unbiased Whole-Brain Decoding



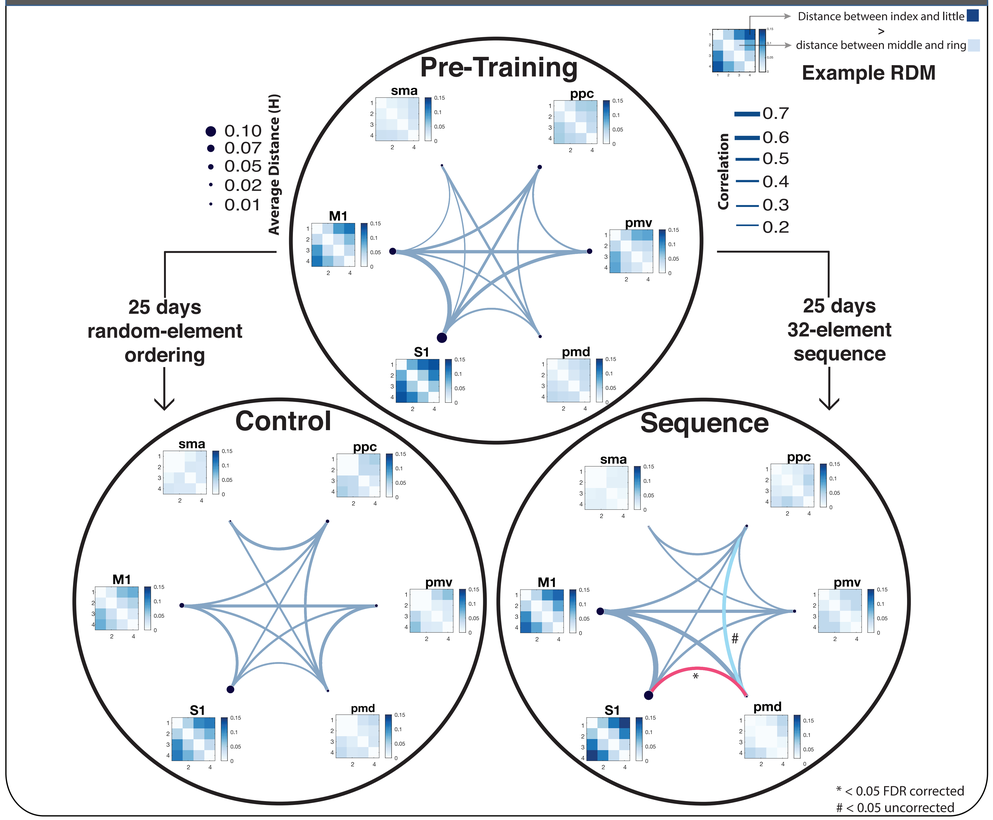
Decoding Within Motor Network



Behavioral Evidence of Binding



RDM Correlation in Motor Network



Conclusions / Next Steps

• Hand structure in sensorimotor cortex matches previous results.
• RDMs are highly correlated throughout motor control network.
• Training group shows increased RDM correlation in high level motor planning regions.
• Follow-up analyses will examine finger specific binding within motor control network.

References

Verstynen, T., Phillips, J., Braun, E., Workman, B., Schunn, C., & Schneider, W. (2012)
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