Separating Effects of Practice and Age-Related Change

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Introduction

- In longitudinal studies, having multiple trials at each time point is useful to ensure reliability.
- This can cause practice effects which could obscure underlying age-related decline.

Two Questions

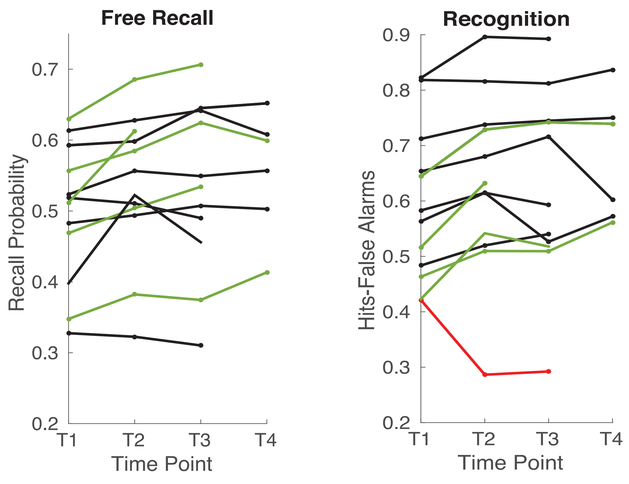
1. Can we effectively model practice (and forgetting) effects?
2. Are there *reliable* age-related changes in our data?

Experiment

- 12 older adults (age 61-85 years)
- Free recall & recognition; 7 sessions; 16 lists/session; 16 words/list
- Completed 2-4 waves of annual follow-ups

Initial Findings

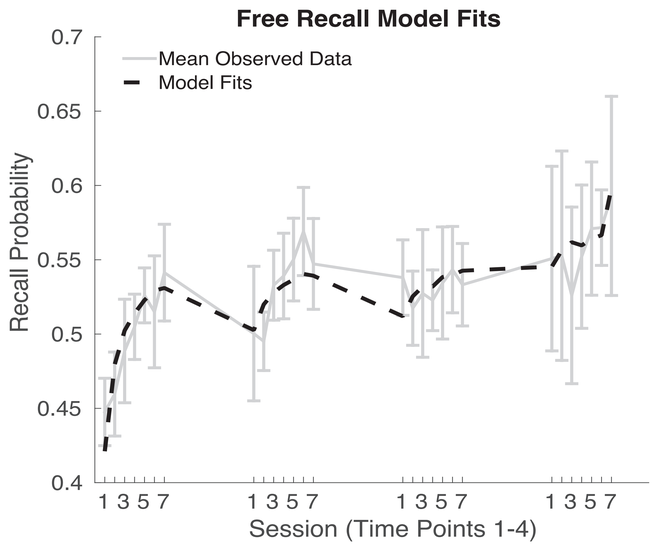
- When practice is ignored, only one individual (red line) shows significant decline
- Some participants (green lines) show a significant *increase* in annual performance.

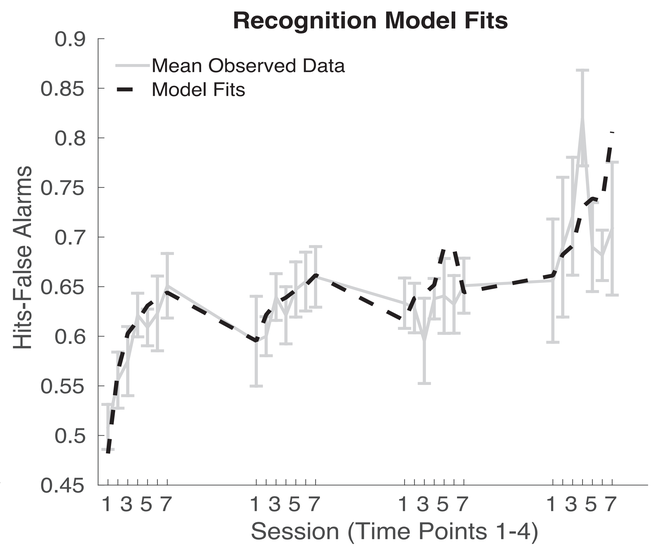


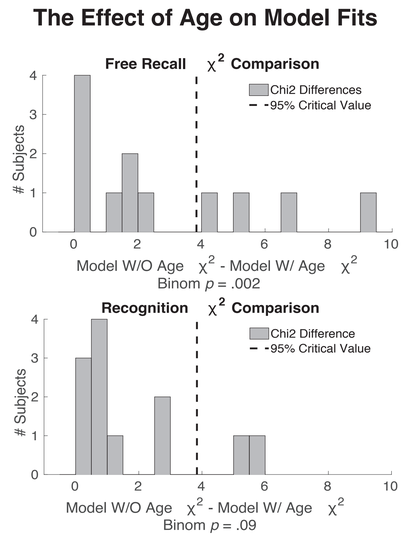
A model to account for practice:

- Adapted from the Strength Accumulation Equation (Anderson et. al., 1999)

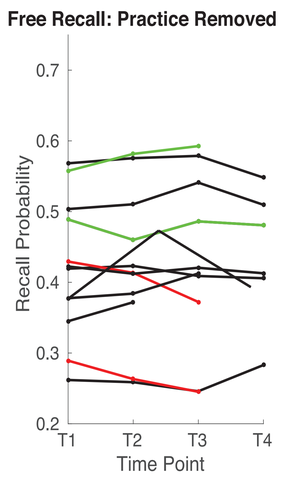
$$P_{rec} = \beta_0 + \beta_1 Age + \left(\beta_{prac} - \frac{\beta_{prac}}{\sum_{i=1}^{n} t_i^{-d}}\right) \qquad t_i = Date(n) - Date(i) + 1$$

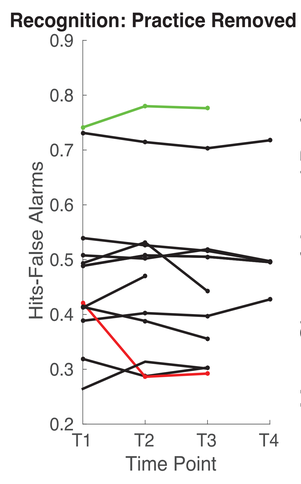


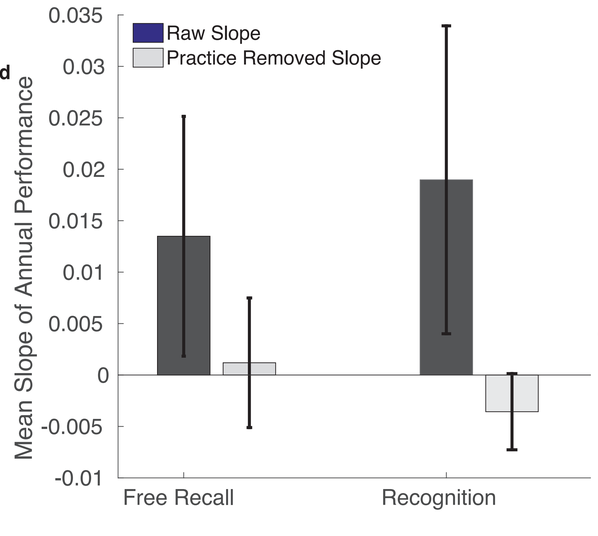


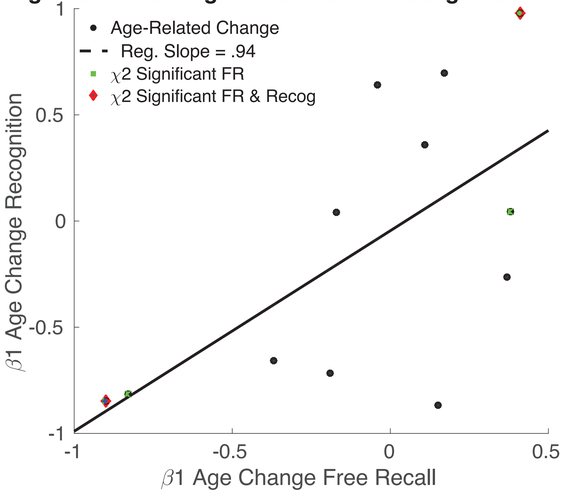


Age-Related Change Revealed by Model Predictions









Works Cited

1. Anderson, J. R., Fincham, J. M., & Scott, D. (1999). Practice and Retention: A unifying analysis. Journal of Experimental Psychology: Learning, Memory, and Cognition, 25(5), 1120-1136.

2. Sliwinski, M. J., Munoz, E., Hofer, S., & Scott, S. B. (2015). Global Perceived Stress Predicts Cognitive Change Among Older Adults. Psychology and Aging, 30(3), 487-499.

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Summary

- Age-related change predictions were highly correlated across free recall and recognition paradigms, and we get highly similar results when another model (Sliwinski et. al., 2015) is applied.
- Removing practice effects greatly reduced the slope of annual performance in both free recall and recognition.
- The application of the model to free recall data reveals previously masked age-related decline.