

Abstract

We report results from a longitudinal study in which a simple modeling tool was used to measure individual differences in recollective and nonrecollective retrieval. Ninety-two older adults received a battery of neuropsychological tests and performed low-burden recall tasks (to measure recollective and nonrecollective retrieval). The model fit the recall data of individual subjects well, and its parameter estimates were reliable within individuals. Declining scores on the Mini-Mental State Exam, a classic marker of neurocognitive impairment, were better predicted by declines in nonrecollective retrieval than recollective retrieval. These results replicated findings from an independent sample and, importantly, they demonstrated that the modeling tool can be applied in clinical settings to predict later emergence of neurocognitive impairment.

Overview of the Study

- Recall tests are the single best predictor of mild cognitive impairment and Alzheimer's disease, even better predictors than genetic markers, such as the e4 allele of the Apolipoprotein E genotype
- Analysis of neuropsychological tests that employ multiple recall tests, such as the Rey Auditory Verbal Learning Task (RAVLT) and the California Verbal Leaning Test (CVLT), rely on raw accuracy, which is guaranteed to be noisy measure if only a subset of recall processes is affected by cognitive impairment
- We provide a new tool for analyzing such data that separates the processes that control recall

Measurement Model

Subjects receive three study (S) and test (T) cycles of the form:



The resulting sequences of errors and successes over trials are analyzed with a two-stage Markov chain. Learning to recall consists of making transitions through a discrete state space composed of three performance states:



An initial unlearned state U, in which the probability of recalling the item is 0; an intermediate state P, in which the probability of recalling the item is some value 0 ; and an absorbing learned state L, in which the probability ofrecalling the item is 1. Transition probabilities between states are governed by three mechanisms:

- **Direct Access** (entry state L): recollective retrieval operation that access targets' verbatim traces without searching through traces of other items
- **Reconstruction** (entry state P): nonrecollective retrieval operation that regenerates targets from partial information, such as semantic features
- **Familiarity Judgment** (within state P): slave operation that evaluates familiarity signals produced by reconstructed items

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A Low-Burden Tool for Measuring Memory Declines in Healthy Aging and Neurocognitive Impairment

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Method

Materials

- Questionnaire (PRMQ)

• Procedure

List 1:	S ₁	T _{1A}	T _{1B}	S ₂	<i>T</i> ₂
List 2:	S ₁	T _{1A}	T _{1B}	S ₂	<i>T</i> ₂

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the a and b pooled data.

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Theory. Psychological Review, 116, 783-832.