



THREE-YEAR RETENTION OF SUBTLE SEQUENTIAL REGULARITIES BY OLDER ADULTS

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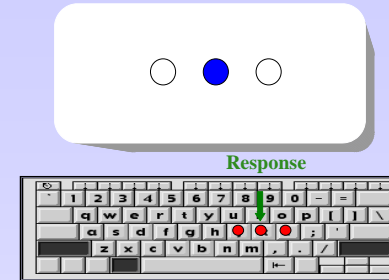
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Abstract

Older adults show implicit learning of both simple repeating (Howard & Howard, 1989; 1992) and subtle probabilistic regularities (Howard & Howard, 1997; Howard et al., 2004) in the serial reaction time (SRT) task. Although there is evidence that implicit knowledge is remembered over very long intervals in some tasks, little is known about the long-term retention of sequence learning. One previous study reported two-week retention of simple repeating patterns in Alzheimer's patients and age-matched healthy controls (Knopman, 1991), and we have found two-month retention in middle-aged adults (Feeny, et al., 2000). However, a study of young adults reported no retention after one year (Willingham & Dumas, 1997). The present study examined three-year retention of implicit knowledge of higher-order probabilistic regularities acquired in a three-element Alternating Serial Reaction Time (ASRT) task (Howard et al., 2004). Participants relearned the probabilistic regularity they had learned earlier and showed some retention of the implicitly acquired knowledge after a three-year interval.

Alternating Serial Reaction Time Task



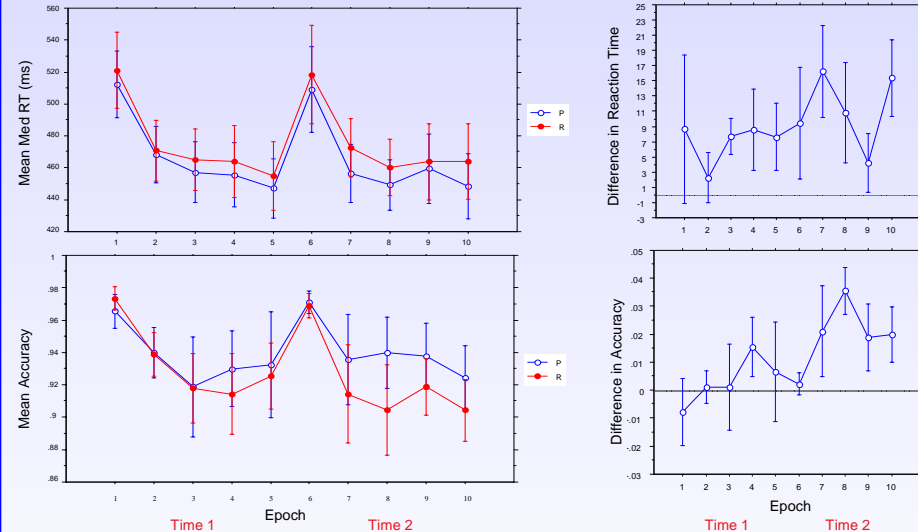
Pattern trials alternate with Random trials
Example sequences:
1r2r3r...
1r3r2r...

Procedure

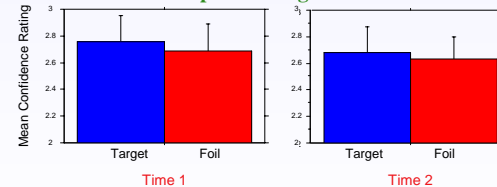
- 3-element ASRT task
- Pattern trials alternate with Random trials (e.g. 1r2r3r...)
- 5 epochs at **Time 1** and **Time 2** (3 years later)
- 1 epoch = 20 blocks of 65 trials (5 random trials + 6-item sequence repeated 10 times)
- **Measures of Learning:**
 - *Implicit:* Trial-Type Effect (Difference between Pattern and Random trials)
 - *Explicit:* Recognition test; Interview
- **Measures of Retention:**
 - *Epoch 1 vs. Epoch 6:* "Exposure Effects" (Knopman, 1991)
If there is retention, these Trial Type Effects should be different.
 - ^{1,2}*Epoch 5 vs. Epoch 6:* "Retention" (Knopman, 1991)
If there is retention, these Trial Type Effects should not be different.
 - ²*Epoch 5 vs. Epoch 10*
If there is retention, the Trial Type Effect at epoch 10 should be greater.
 - ¹*Average of Epoch 1-5 vs. Average of Epoch 6-10*
If there is retention, the average Trial Type Effect at Time 2 (epochs 6-10) should be greater than the Trial Type Effect at Time 1 (epochs 1-5).
 - ²*Epoch 2 vs. Epoch 7*
If there is retention, the Trial Type Effect at epoch 7 should be greater.

¹Indicates significant effects for accuracy. ²Indicates significant effects for reaction time.

Results



Explicit Recognition:



• There was a greater Trial Type Effect at Time 2 than at Time 1.

• At Time 2, participants did not increase their ability to identify the pattern.

Participants

Gender	6F / 3M
Age (in years)	72.22 (68-77)
Education (in years)	16 (12-20)
Self-Rated Health*	4.22 (3-5)
WAIS-III Digit Span	16.67 (10-24)
WAIS-III Vocabulary	31.11 (17-41)

*Responses ranged from 1 (poor) to 5 (excellent).
Means (and ranges) at Time 2 reported.

Conclusions

- Older adults retain knowledge of subtle sequential regularities for at least 3 years!
- Participants respond faster across epochs at **Time 1**.
- Participants retain and relearn the regularity quickly at **Time 2** (3 years later).
- Participants cannot differentiate Pattern and Random sequences explicitly.
- Learning is implicit.

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