

AGE-RELATED DEFICITS IN IMPLICIT LEARNING OF HIGHER-ORDER SEQUENTIAL STRUCTURE IN THE ABSENCE OF MOTOR SEQUENCING

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Goal

To investigate whether age-related deficits in higher-order sequence learning occur in the absence of motor sequencing and age-dependent event timing differences.

Abstract

Previous research has shown that age-related deficits occur when older people learn higher-order sequences in a serial reaction time task (SRTT) (Curran, 1997, Howard & Howard, 1997; Howard, Howard, Dennis, Yankovich, & Vaidya, 2004). Our analyses suggest that without being aware of doing so, people learn the relative frequency of event triplets in this task (Howard, Howard, Japikse, DiYani, Thompson, & Somberg, in press). Hence, the observed age deficits could reflect a resource limitation in that older people have fewer items simultaneously available for processing than younger people. However, age differences in event timing and motor sequencing cannot be ruled out in the SRTT. In the present study people responded only to the third event in a series of sequential triplets. We manipulated the triplet frequency to mimic a higher-order SRTT in that the first event predicted the third response event, but the second did not. Thus, the task did not entail motor sequencing, and event timing within triplets was held constant. Results paralleled those for higher-order SRTT in that young people showed greater sensitivity to the triplet frequency than the older participants. Neither group revealed evidence of explicit learning in either a recognition test or a post-experimental interview. These findings support a resource-limitation explanation of the age-related deficits shown in higher-order SRTT.

Participants

| | Young | Old |
|-------------------|--------------|---------------|
| Gender | 10F/2M | 9F/3M |
| Age | 19.17 (1.19) | 73.17 (4.89) |
| Self-Rated Health | 4.33 (0.49) | 4.33 (0.49) |
| Education | 12.83 (1.53) | 15.29 (2.57) |
| Vocabulary | 30.33 (6.57) | 31.92 (11.87) |

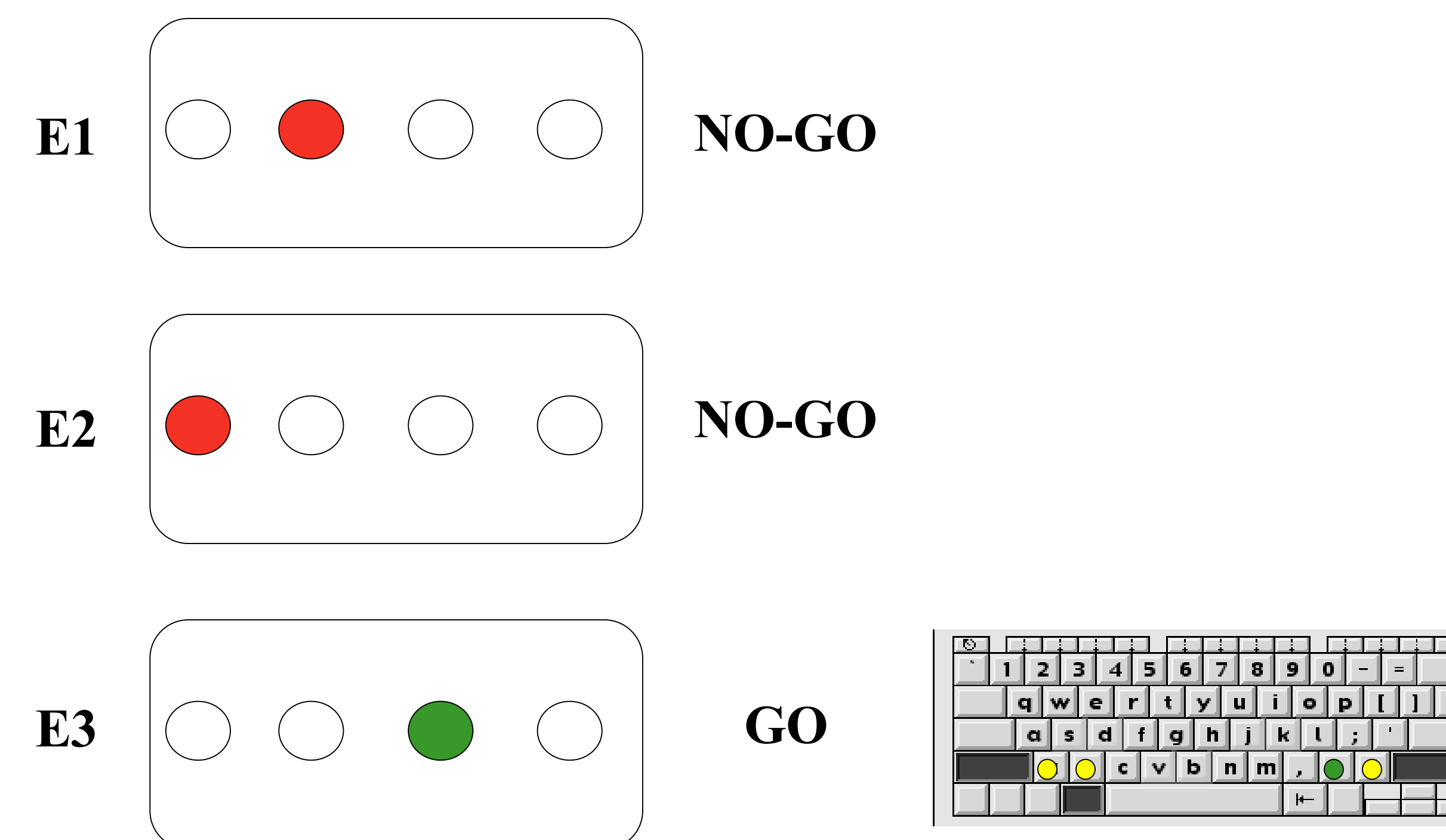
Method

Learning

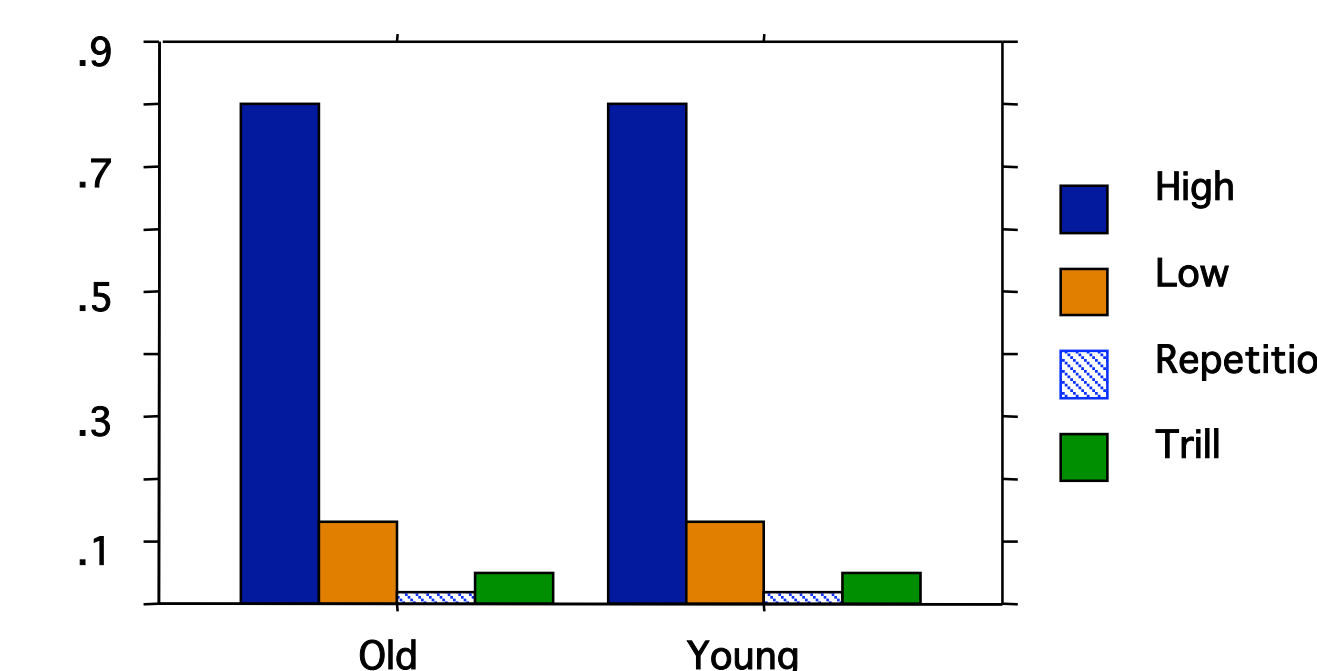
- 6 sessions of 20 blocks each
- 50 triplets per block
- Each triplet contains 2 NO-GO then 1 GO event
- Respond only to third, GO event
- Triplet frequencies match those in second-order sequence learning task

Explicit Recognition

- 1 session of 64 trials
- Observe all 64 possible triplets (black)
- Rate whether each occurred frequently (2) or infrequently (1)

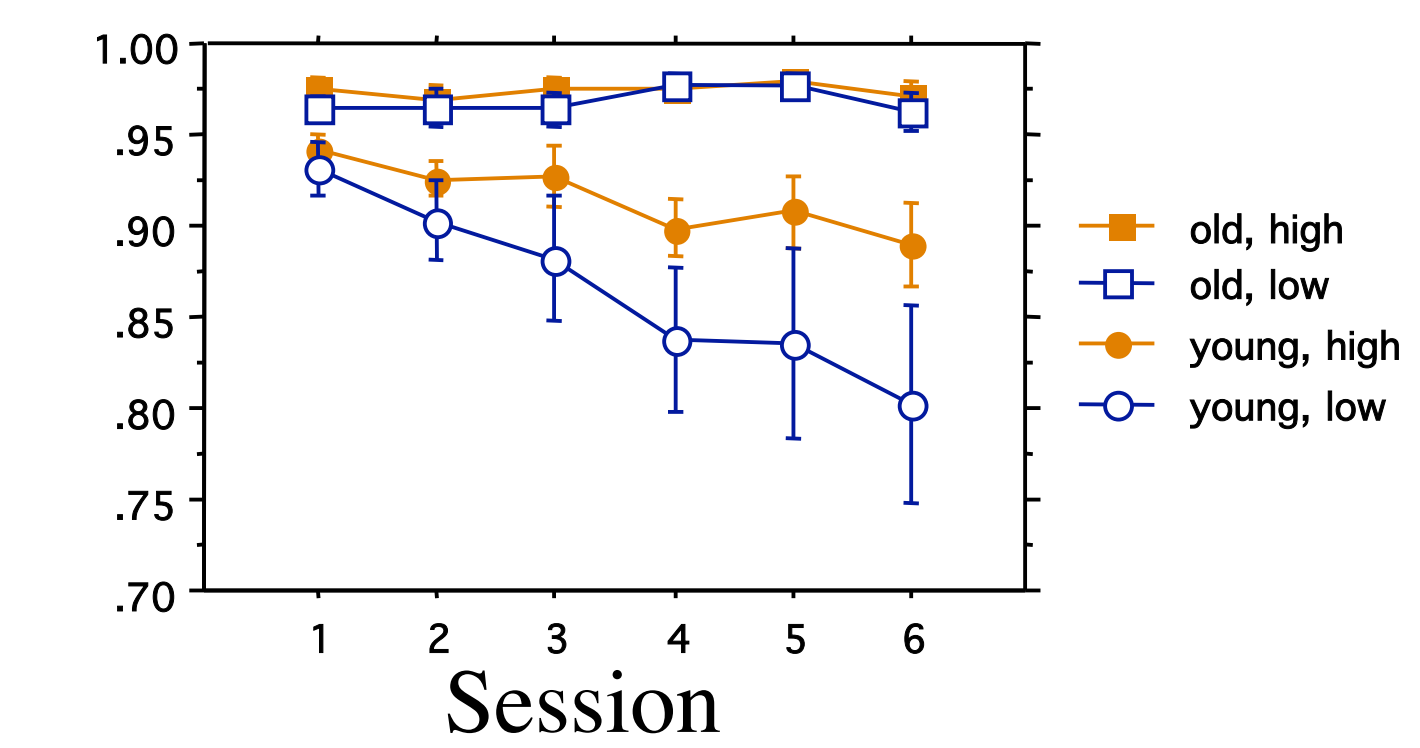


Actual Triplet Frequency

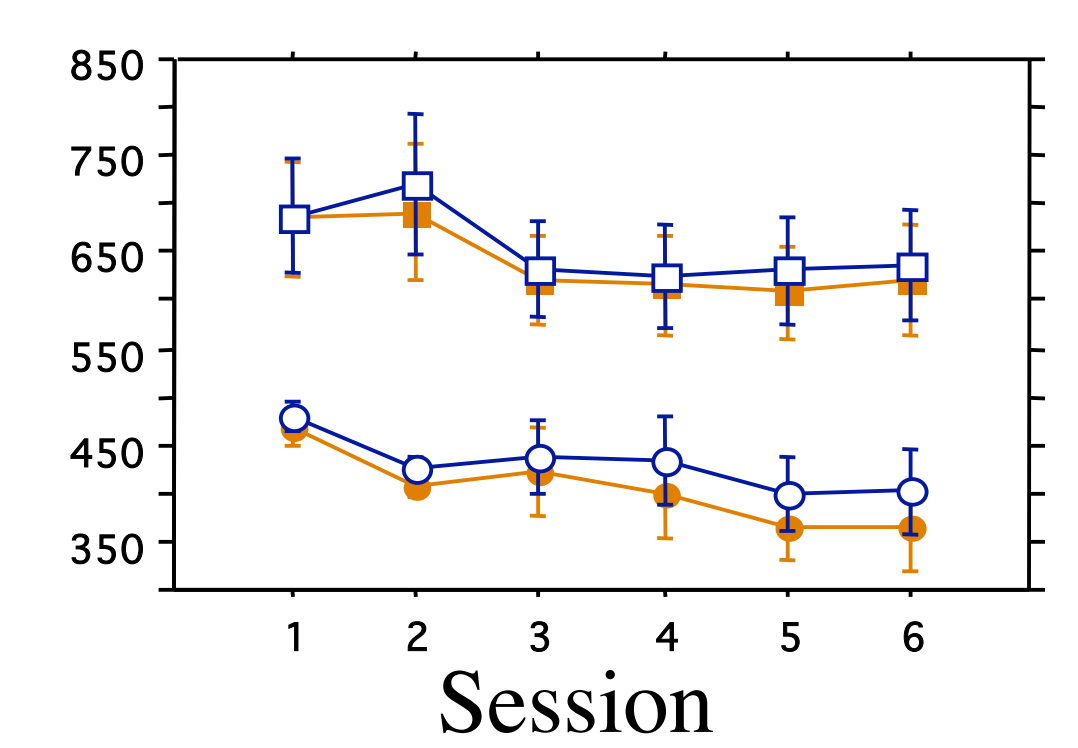


Learning

Mean Accuracy

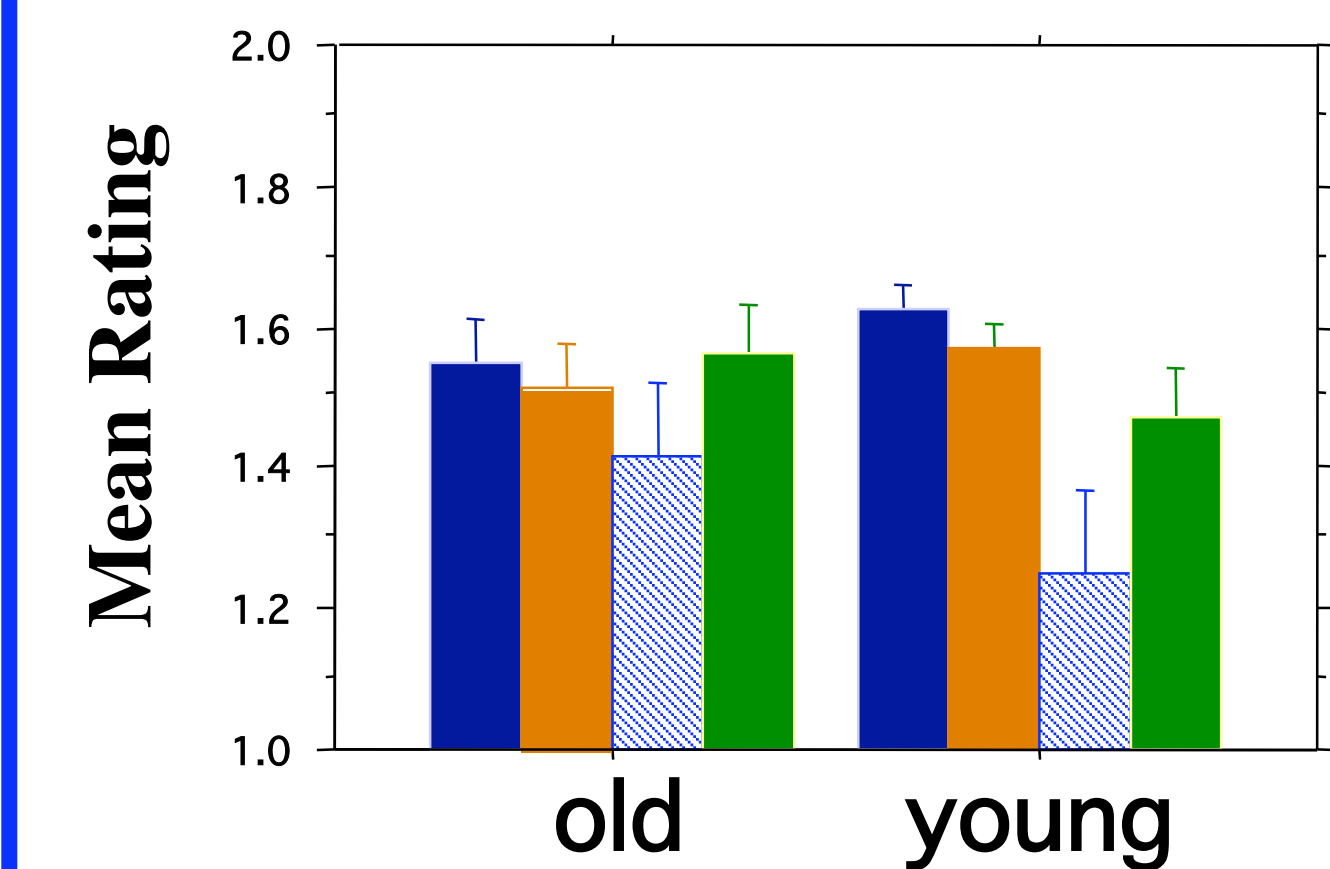


Reaction Time



For Accuracy and RT: Young adults demonstrate a greater separation between high and low frequency triplets than older adults.

Explicit Recognition



- Neither group distinguishes between high and low frequency triplets
- Young people distinguish repetitions from other triplets.

Conclusions

Findings parallel those of previous higher-order sequence learning studies requiring a response to every event

- Young adults learn triplet frequency in the absence of motor sequencing, but older people are impaired
- Learning is implicit; Neither group reveals explicit knowledge of the relative frequencies of high and low frequency triplets

Findings inform explanations of age-related deficits in higher order sequence learning

- Rule out event-timing differences and age-related motor sequencing deficits
- Consistent with resource-limitations explanations

References

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 •Howard, D. V., J. H. Howard, Jr., et al. (In Press). Implicit sequence learning: Effects of level of structure, adult age, and extended practice. *Psychology and Aging*.

11th Biennial Cognitive Aging Conference, Atlanta GA
April 1st-4th 2004
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Supported by NIA Grant R37 AG15450