

The effects of aging and cognitive tutoring on planning abilities



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Abstract

Planning abilities are known to deteriorate with aging. In a process-tracing experiment, we found that this may be partly because older adults use less effective strategies. In a second experiment, we used a cognitive tutor to teach people effective strategies and found that older adults benefitted the most from this tutoring.

Introduction

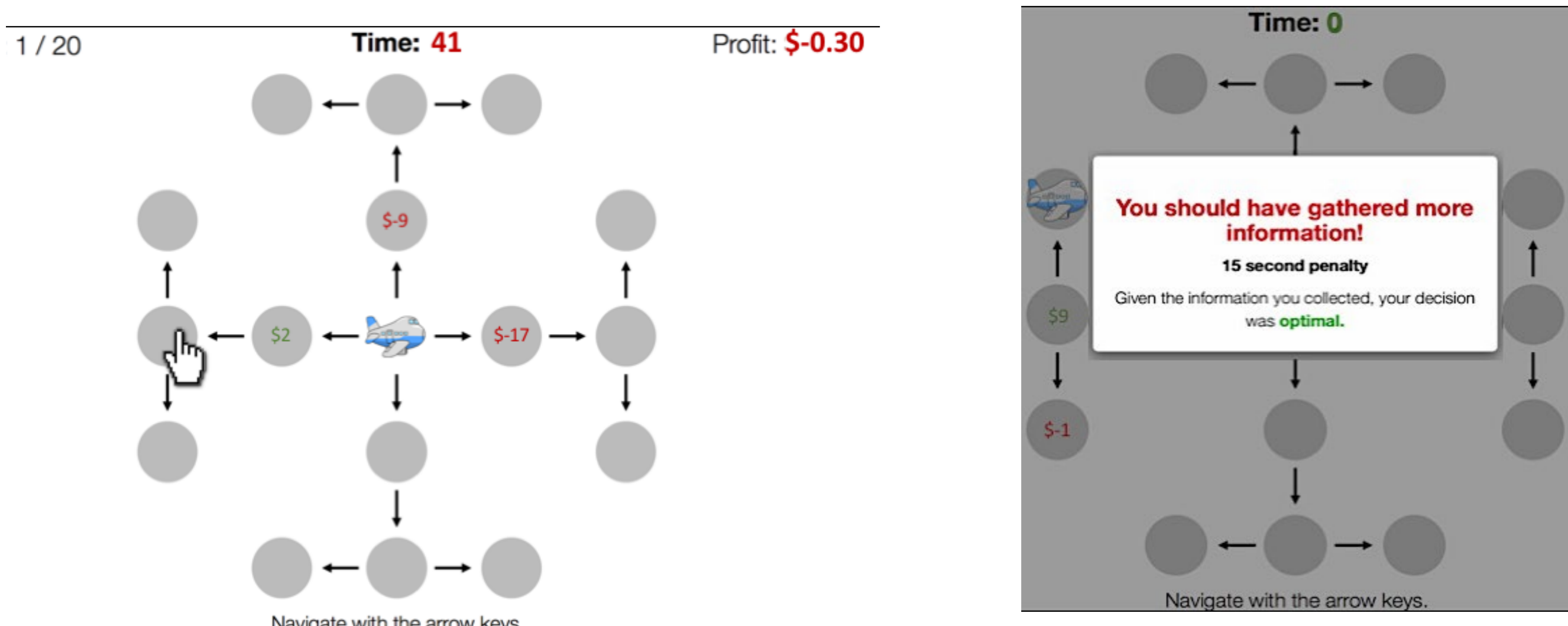
Previous studies have found that older adults have trouble formulating plans and updating them when given feedback compared to younger adults.^{1,2} Do planning strategies change with age and can metacognitive feedback help?

Contribution

Our findings suggest that cognitive tutoring systems may help aging decision-makers stay sharp.

Methods

Mouselab-MDP planning paradigm



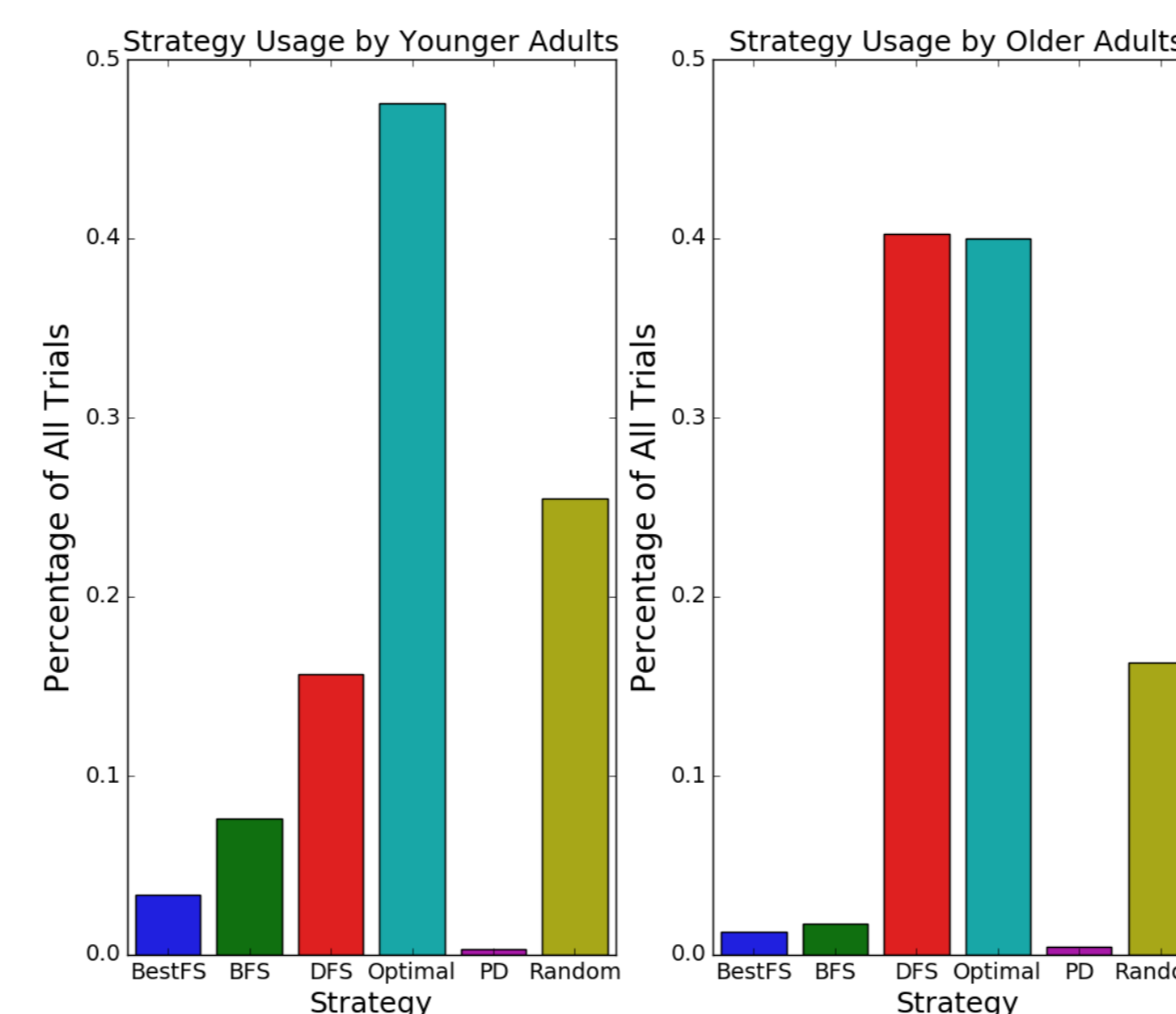
Tracing how people plan³ Metacognitive Feedback⁴

Exp. 1: Older adults and younger adults use different strategies

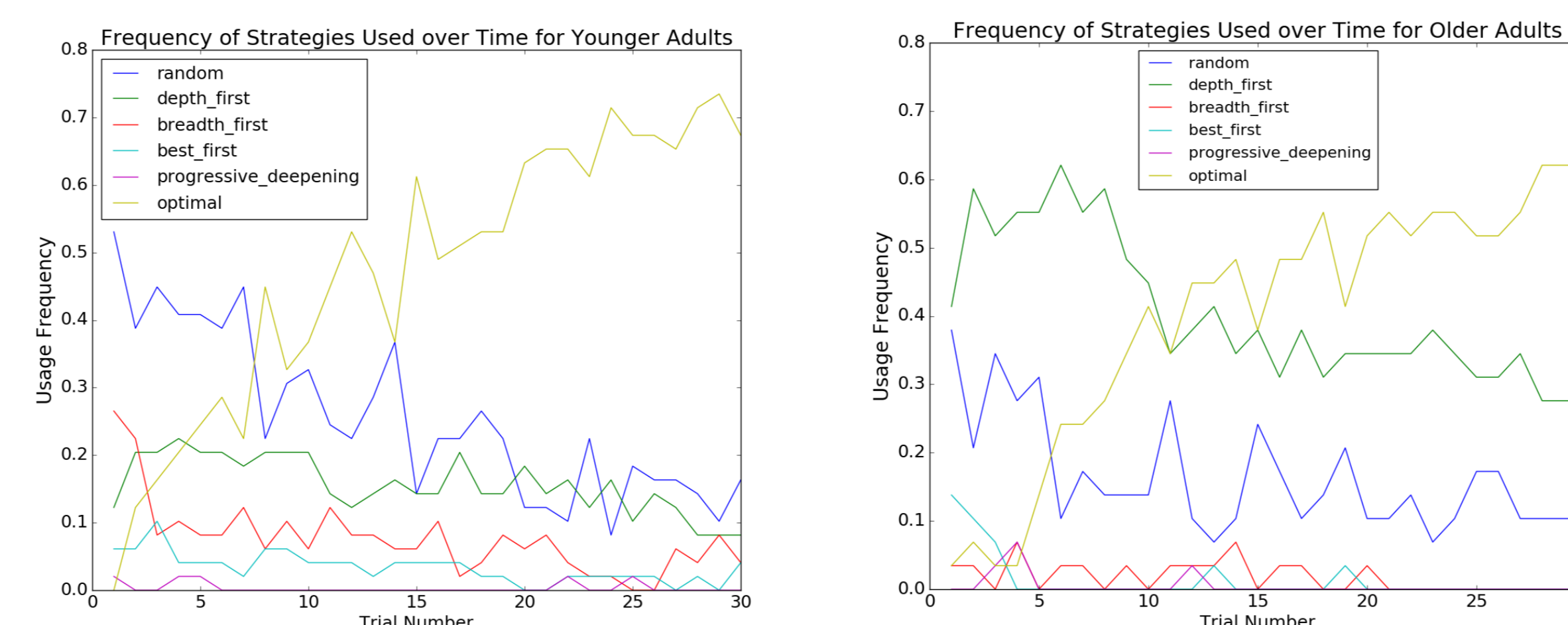
- 2 age groups: younger than 25 (n=49) and older than 47 (n=29)
- 30 trials of Mouselab-MDP without feedback
- Likelihood models used to classify strategies

Results

- Older adults prefer depth-first search compared to younger adults; younger adults prefer the optimal strategy



- Both groups learn the optimal strategy on their own by the end of the experiment



Acknowledgement

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Exp. 2: Older adults benefit from cognitive tutoring

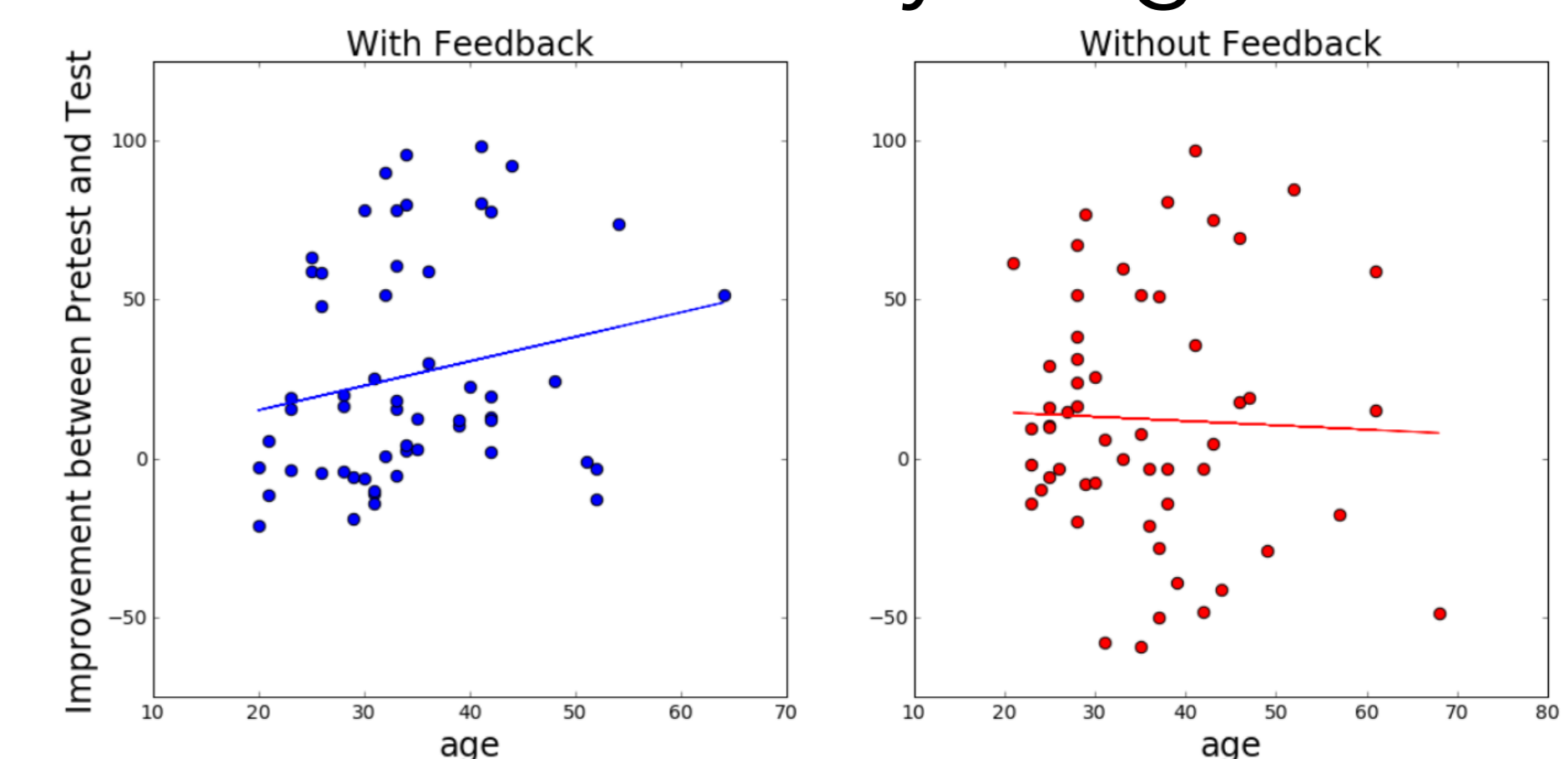
- Feedback (n=56) vs. No Feedback (n=55)
- Pretest, 10 Training Trials, 20 Test Trials

Optimal Metacognitive Feedback

- Compare people's actions against the optimal strategy and administer delays based on the difference
- Display message on how to improve

Results

Correlation between age and slope of learning curve ($\rho(54) = 0.285$; $p = 0.033$) suggests older adults benefit more than younger adults



The difference between the average score of the last 5 test trials and the pretest trial plotted against age for both conditions. The solid line depicts the fit of a linear regression model.

Discussion

Cognitive tutoring can be used to help older adults learn more effective strategies. Future work will investigate whether cognitive tutors can help close the gap between older and younger adults.

References

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- Sorel & Pennequin (2007). Brain and Cognition.
- Callaway, Lieder, Krueger, & Griffiths (2017). RLDM.
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