



ADULT AGE DIFFERENCES IN POSITIVE VERSUS NEGATIVE FEEDBACK LEARNING IN PROBABILISTIC SELECTION

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BACKGROUND AND PURPOSE

FEEDBACK LEARNING is learning based on positive and negative outcomes of similar decisions in the past

DOPAMINERGIC (DA) MECHANISMS

- Parkinson's Disease (PD) Study (Frank et al., 2004)
- Striatal Dopamine Genes Study (Frank et al., 2007)

LEARNING BIAS

| "Go" (↑ DA) | "No-Go" (↓ DA) |
|---------------------------|----------------------------|
| PD patients on medication | PD patients off medication |
| Polymorphism of D1 | Polymorphism of D2 |

AGING AND DOPAMINE HYPOTHESIS

- Dopamine levels decline as individuals age (Van Dyck et al., 2002; Volkow et al., 1996a)

PURPOSE

- Are there age-related differences in feedback learning?

METHOD

PARTICIPANTS

- 16 Younger adults (M=18.9 ± .7 years)
- 18 Older adults (M=70.2 ± 5.4 years)

PROBABILISTIC SELECTION TASK

- Procedural learning via trial-and-error learning
- Taps decision making processes
- Forced-choice

まみ ACQUISITION PHASE

- 3 training pairs
- Probabilistic feedback
- 20 trials with each stimulus, per block
- Train to performance criterion

その POST ACQUISITION TEST PHASE

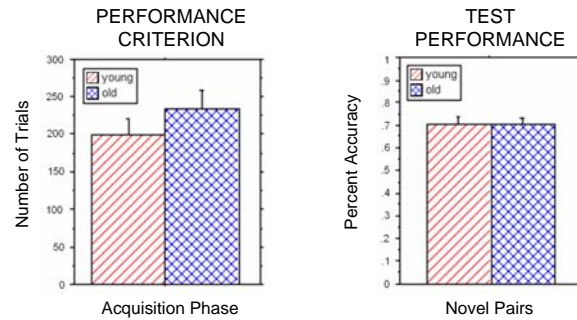
- 15 pairs: 3 trained, 12 novel
- No feedback
- 1 block of 60 trials

らや FEEDBACK LEARNING

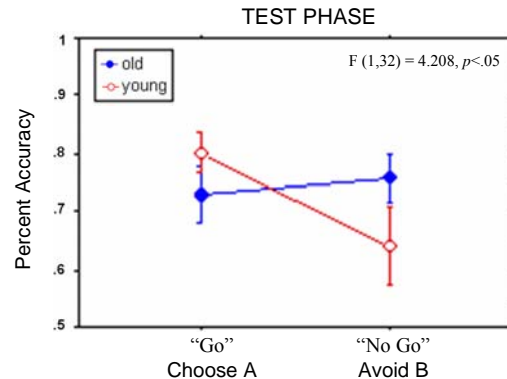
- "Go" learning tested by transfer pairs with A
 - Do subjects choose most reinforced stimulus?
- "No-Go" learning tested by transfer pairs with B
 - Do subjects avoid least reinforced stimulus?

| | | | |
|----|----|------|----|
| | Go | NoGo | |
| AB | AC | BC | CE |
| CD | AD | BD | CF |
| EF | AE | BE | DE |
| | AF | BF | DF |

RESULTS: PROBABILISTIC SELECTION



FEEDBACK LEARNING



RESULTS SUMMARY

- No significant differences between old and young:
 - Training required to reach performance criterion
 - Accuracy on novel test pairs
- Significant interaction with age
 - Young showed less No-Go learning
 - Old showed equal Go and No-Go learning
- Closer look at older adults demonstrates a trend toward increasing No-Go learning with advanced age

DISCUSSION

- Relative effectiveness of positive versus negative feedback differs for young and old
 - Young learn more from positive feedback
 - Older learn more from negative feedback
- Use of more risk-avoidant behaviors with age
 - Psychogenic: Enhanced ability to focus on avoiding negative outcomes
 - Neurogenic: Possibly linked to functional changes in the dopaminergic system

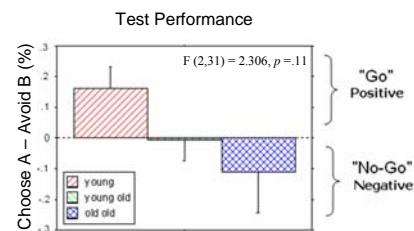
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RESULTS: CLOSER LOOK AT OLDER ADULTS

PARTICIPANTS

- 16 Young adults (M=18.9 ± .7)
- 14 'Young' Old adults (M=68.0 ± 2.4)
- 4 'Old' Old adults (M=77.8 ± 6.5)



NO SIGNIFICANT DIFFERENCES BETWEEN YOUNG, 'YOUNG' OLD AND 'OLD' OLD

- Training required to reach performance criterion
- Overall accuracy on novel pairs, at test

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