

Jean Piaget's Theory of Cognitive Development



Jean Piaget 1896-1980



Sensorimotor Stage
0-24 months



Preoperational Stage
2-7 years



Concrete Operations
7-11 years

Subjective → Objective

Concrete → Abstract

Uncoordinated → Coordinated

The Sensorimotor Stage

- Basic reflexes or schemes
- Primary & secondary circular reactions
- Objects as sensory pictures
- Objects and schemas indistinguishable
 - A not B error
- 24 months: Object permanence
 - Objectivity and subjectivity distinguished

The Sensorimotor Stage

- Object permanence → symbolic function

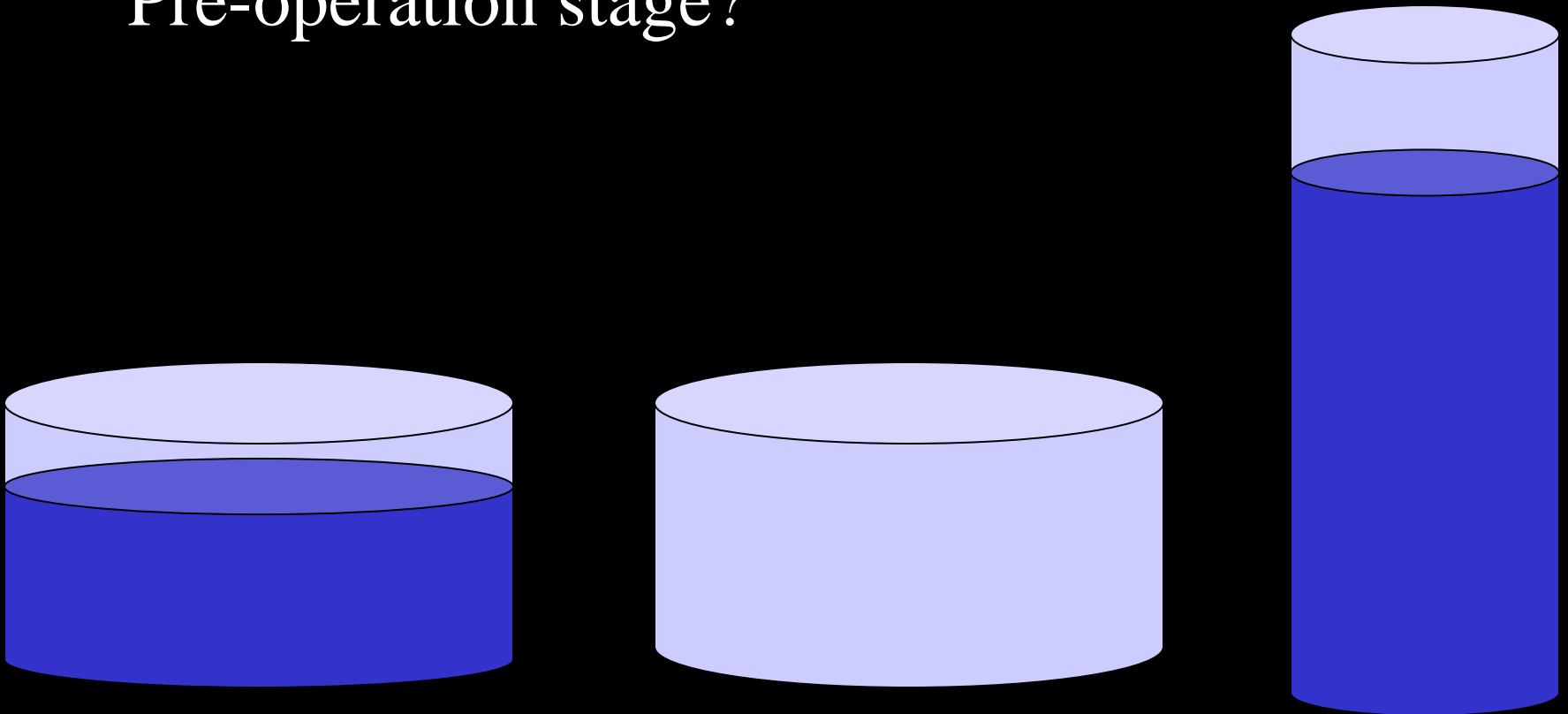


Pre-operational Stage

- Symbolic thought without operations
 - Operations: Logical principles
- Conservation tasks
 - Perceptual reasoning vs logical consistency

Pre-operational Stage

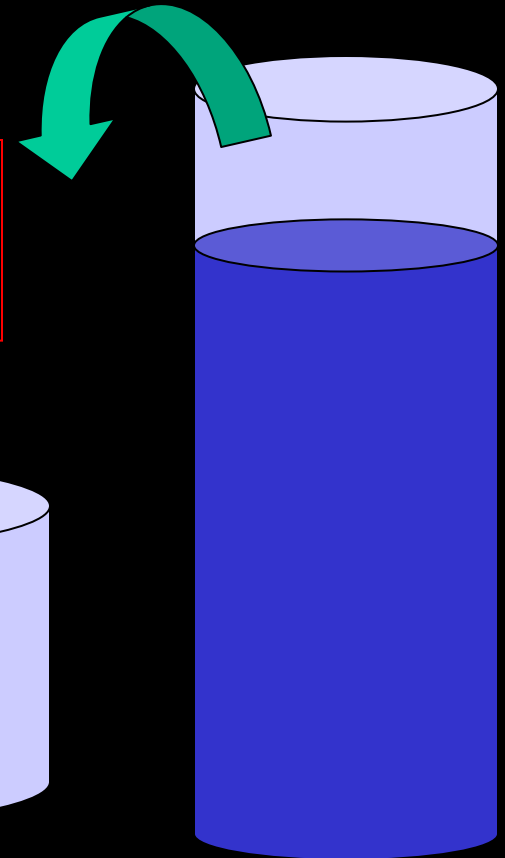
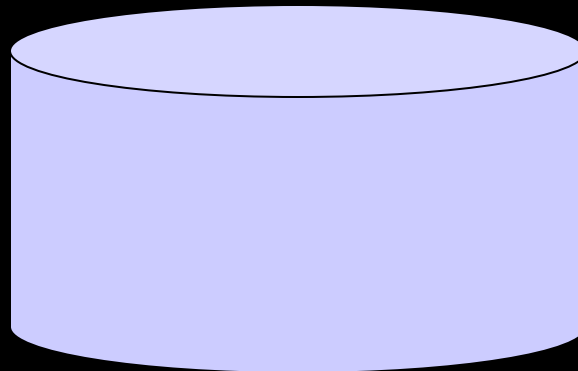
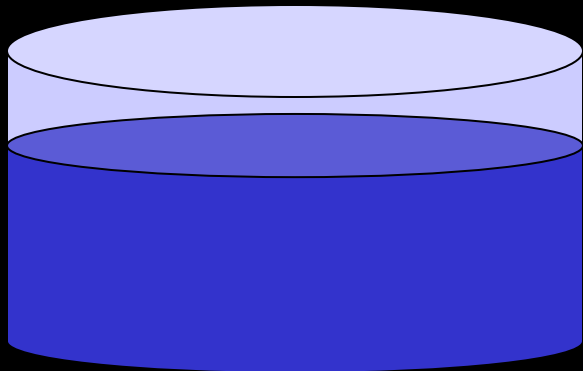
- What logical principles are mastered in the Pre-operation stage?



Pre-operational Stage

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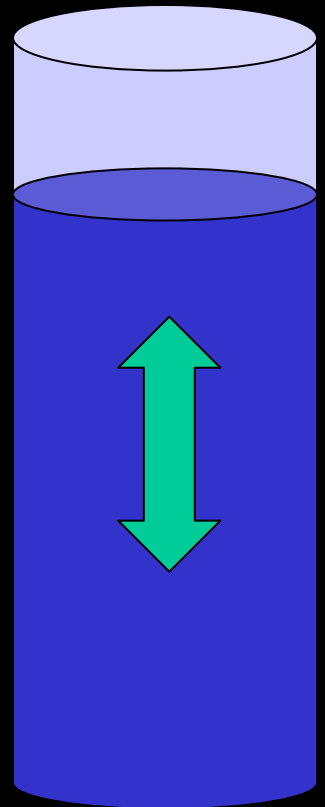
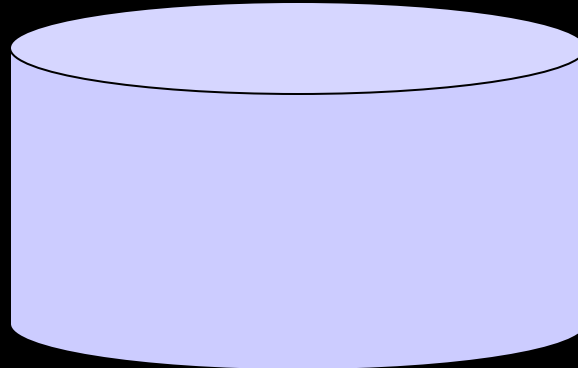
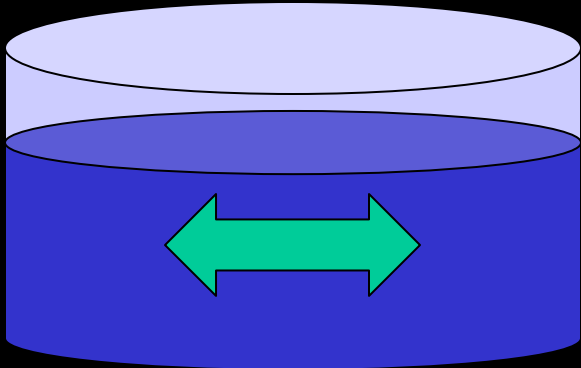
(1) *Reversibility*: Pouring water into the tall container can be reversed.



Pre-operational Stage

- What logical principles are mastered in the Pre-operation stage?

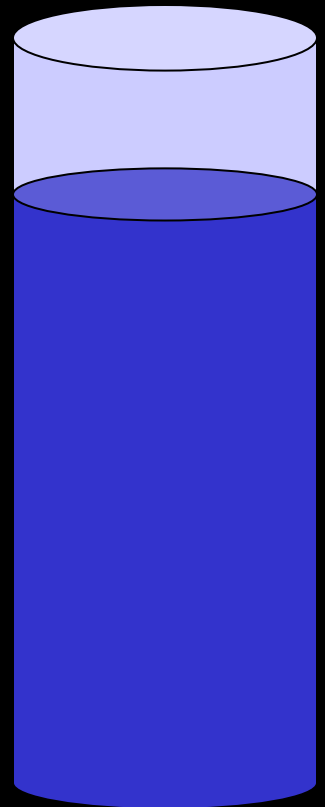
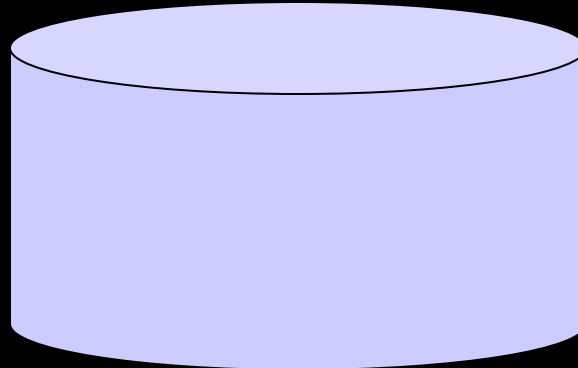
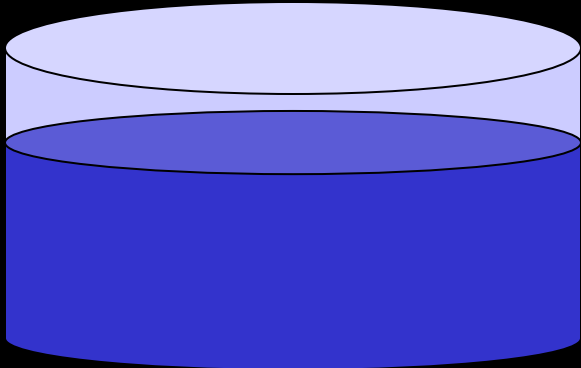
(2) Compensation: Change in height compensated by change in width.



Pre-operational Stage

- What logical principles are mastered in the Pre-operation stage?

(3) *Identity*: No amount of liquid has been added or taken away.



Pre-operational Stage

- Without operations, children's thinking is:
 1. Intuitive, perceptually-driven
 2. Uncoordinated
 3. Egocentric

Pre-operational Stage

- Without operations, children's thinking is:
 1. Intuitive, perceptually-driven
 2. Uncoordinated
 3. Egocentric
- Observed across tasks and domains
 - Thus considered a “stage” of development

Concrete Operations

- Actions internalized & mentally simulated
- Forms the basis of logical operations

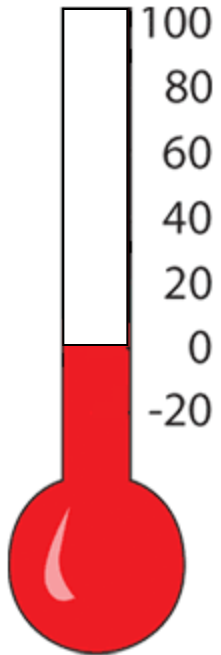
Evaluating Piaget

- Highly original thinker
 - Neither an empiricist nor a nativist
- Enormous scientific contributions
 - Errors and methods; developmental invariants
- Challenging
 - Dense writing style & broad theoretical scope
- Controversial
 - Competence-Performance distinction

Does performance under-estimate competence?

- Piaget's tasks challenging
- Distractions, reaching, etc.

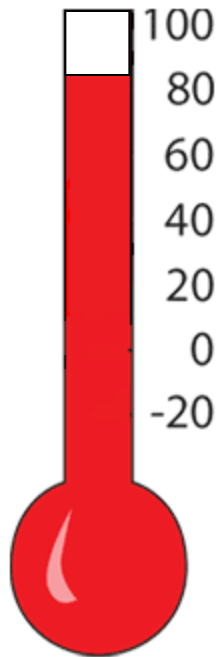
Habituation procedure



Looking time



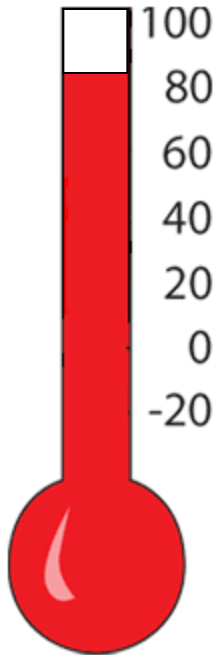
Habituation procedure



Looking time



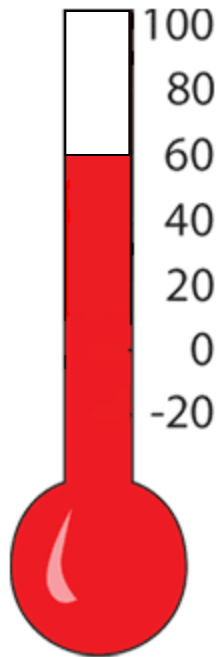
Habituation procedure



Looking time



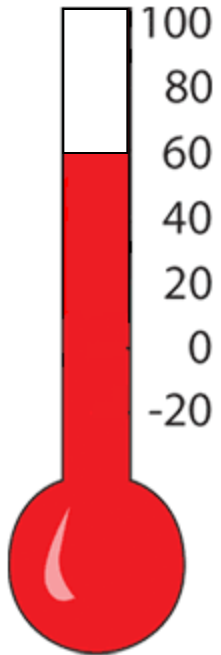
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Looking time



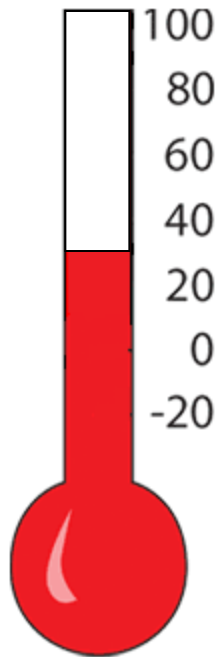
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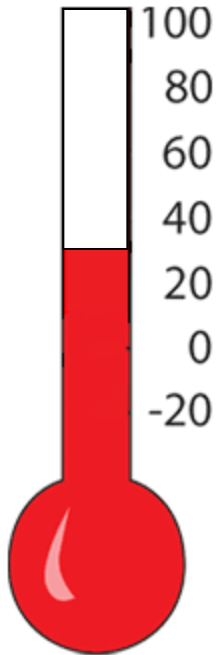
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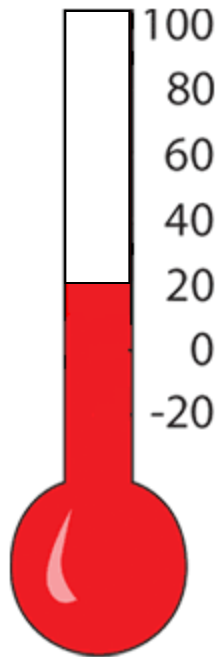
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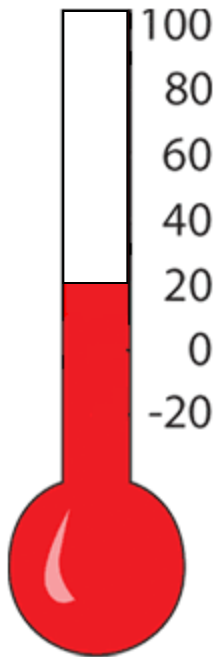
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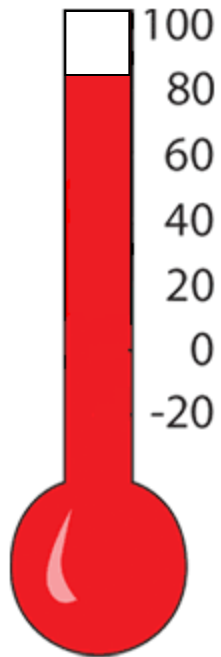
Habituation procedure



Looking time



Habituation procedure

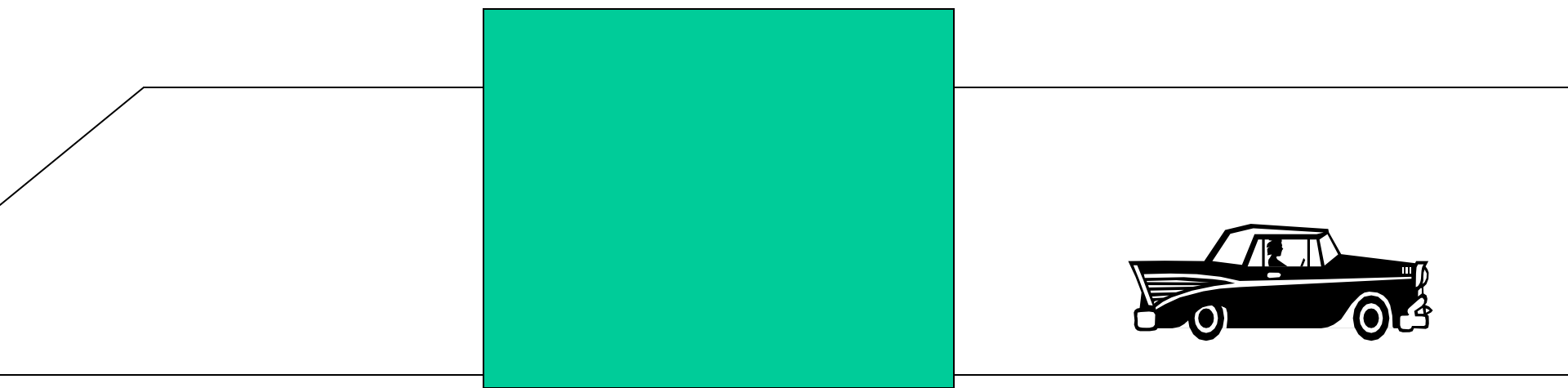


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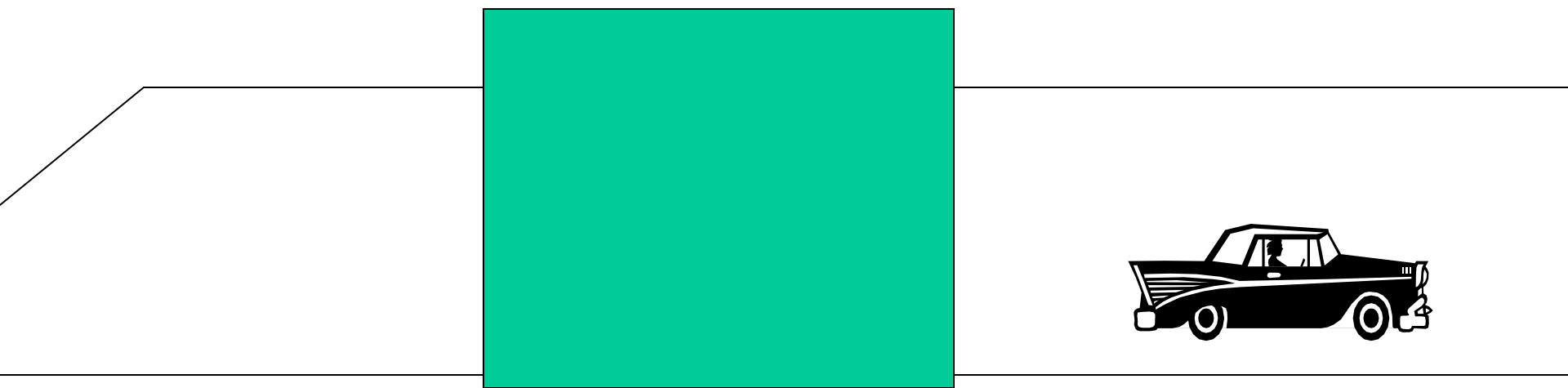


Object Permanence

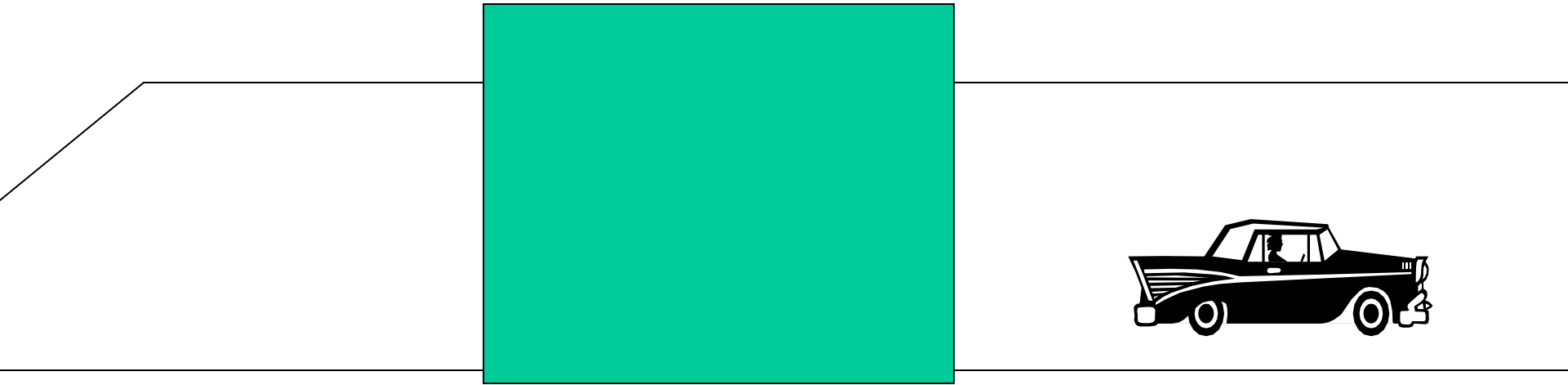
- **Baillergeon, 1986**
- **Used habituation procedure to assess object permanence in 6-month-old infants.**



Habituation Display



Test 1: Possible Event



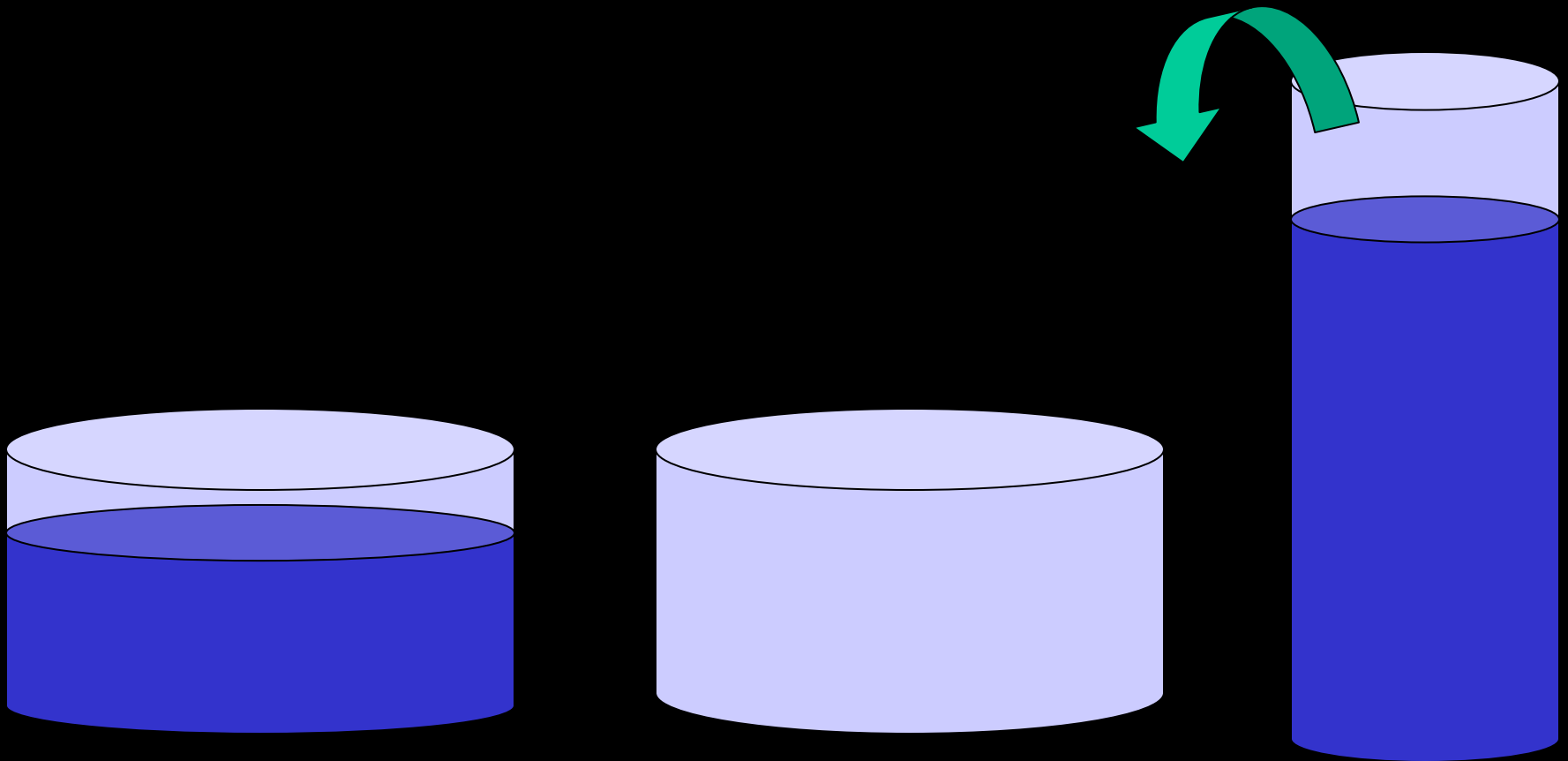
Test 2: Impossible Event

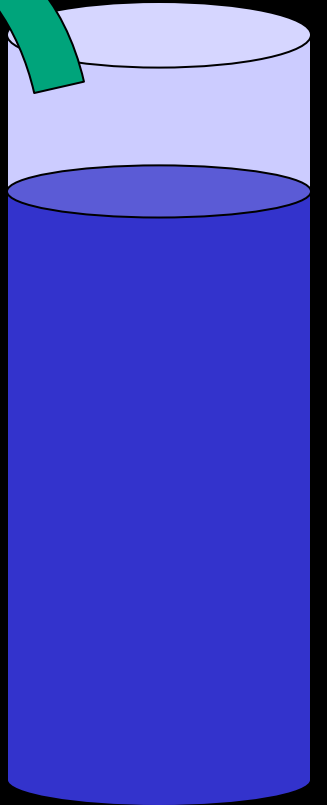
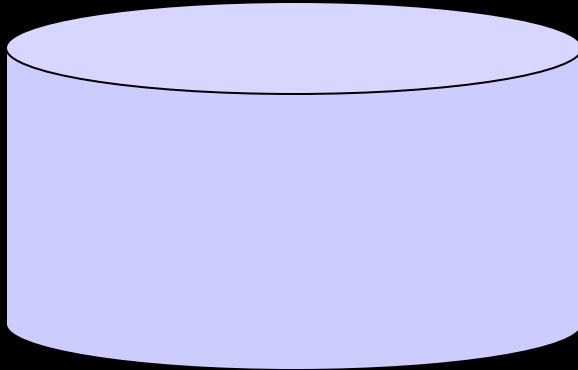
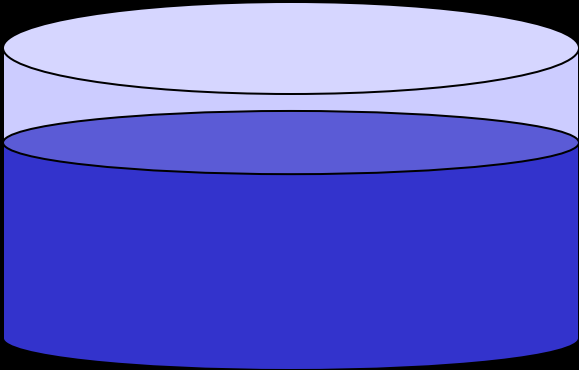
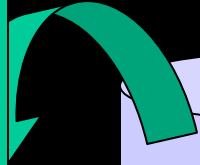
Results and conclusions

- **6- month-olds looked longer to impossible than possible test events.**
- **Young infants understand that objects continue to exist after being hidden behind a screen.**

Conservation Tasks

Jerome Bruner





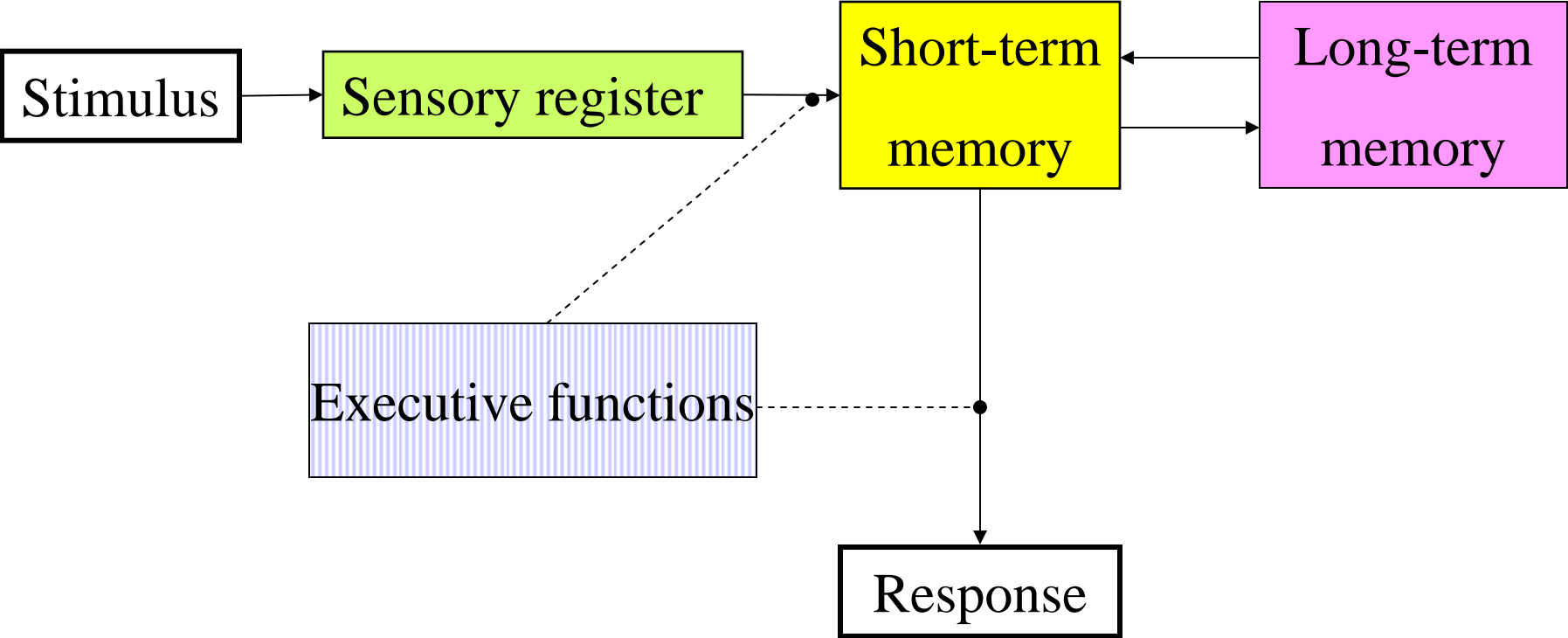
Challenges for Piaget

- **If object permanence achieved at 6-months, why do 12 month-olds commit the A not B error?**
- **If children understand the concept of conservation, why do they fail the tasks?**
- **What is developing?**

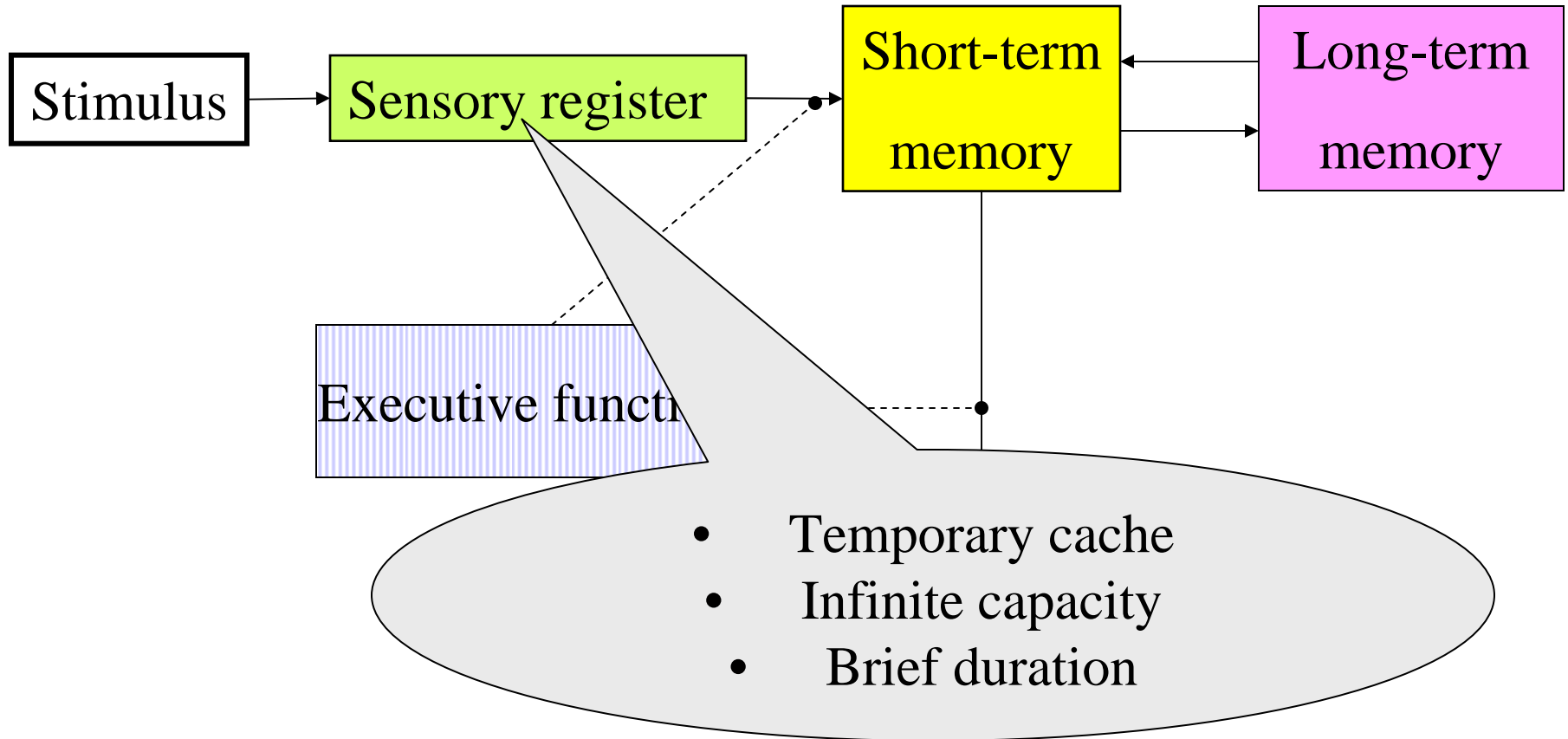
Information Processing Perspective

- American tradition of experimental psychology
- Thinking is information processing
- Computer as a metaphor
- Example: Atkinson & Shiffrin's store model

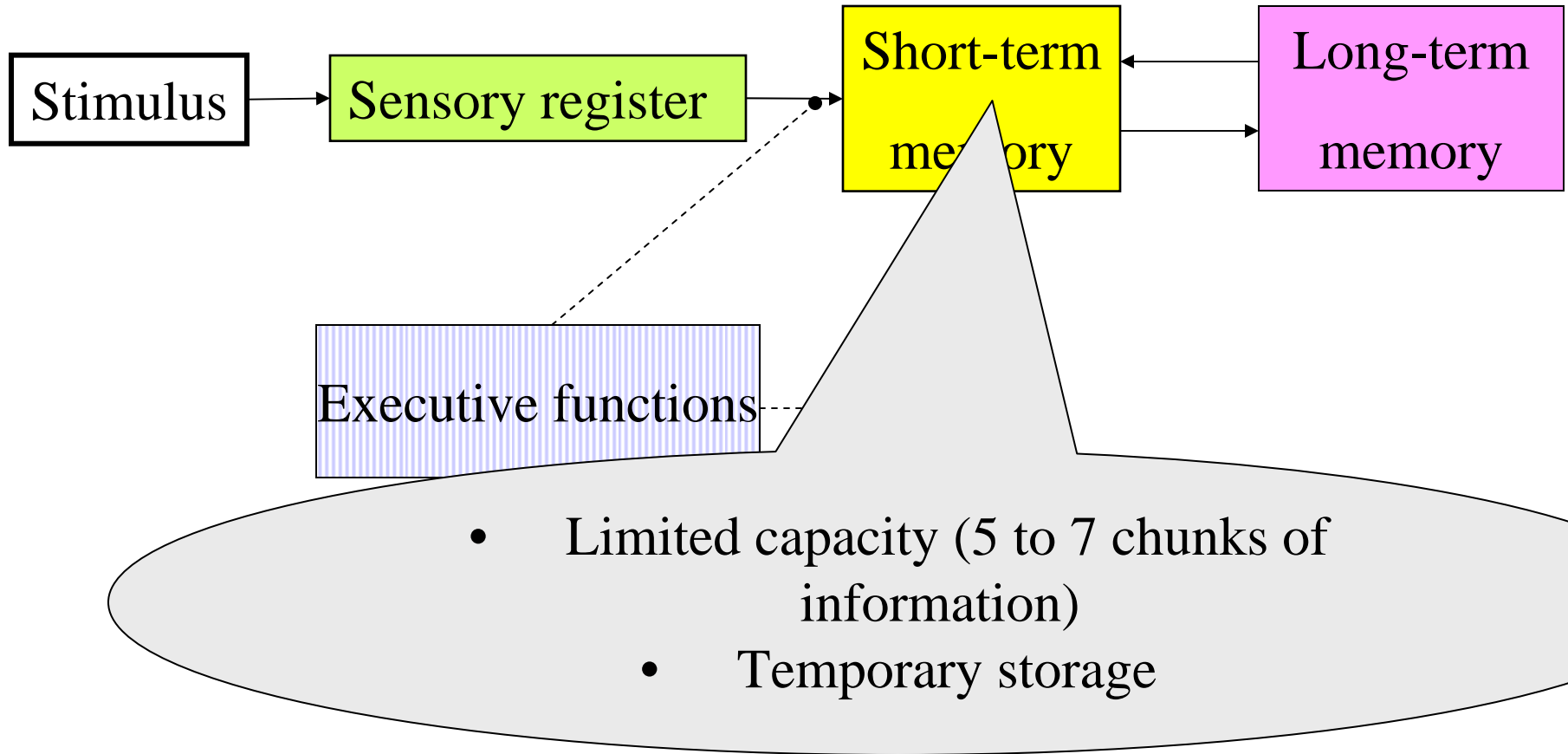
Atkinson & Shiffrin's store model



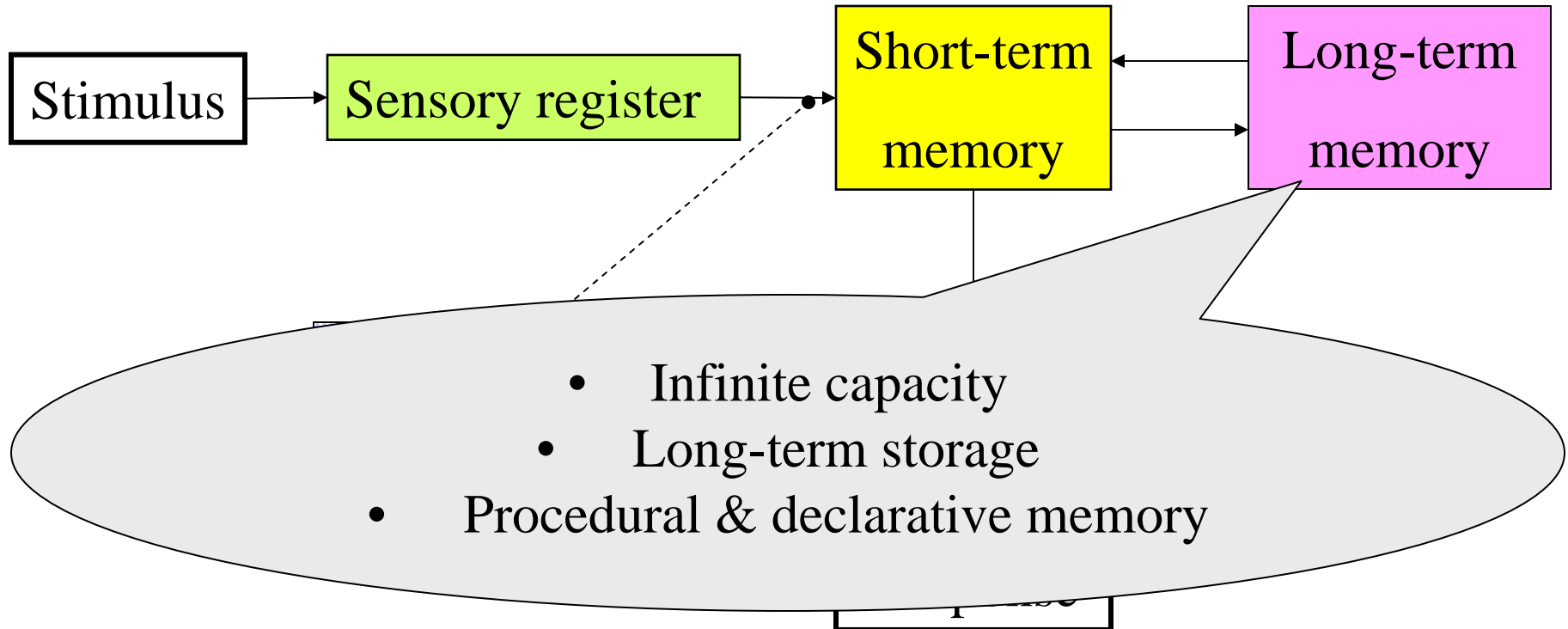
Atkinson & Shiffrin's store model



Atkinson & Shiffrin's store model



Atkinson & Shiffrin's store model



Procedural memory



“Can you show me how to make a cake?”

Procedural memory



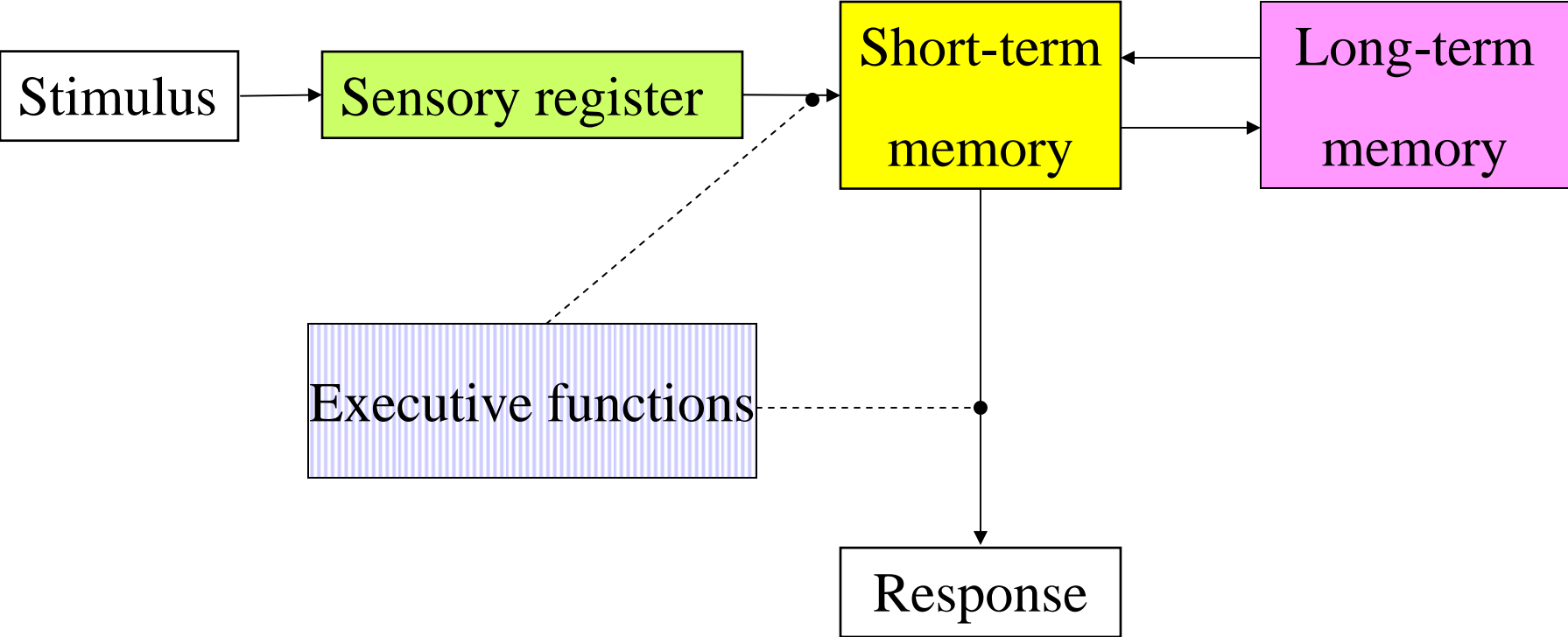
“Can you show me how to make a cake?”

Declarative memory

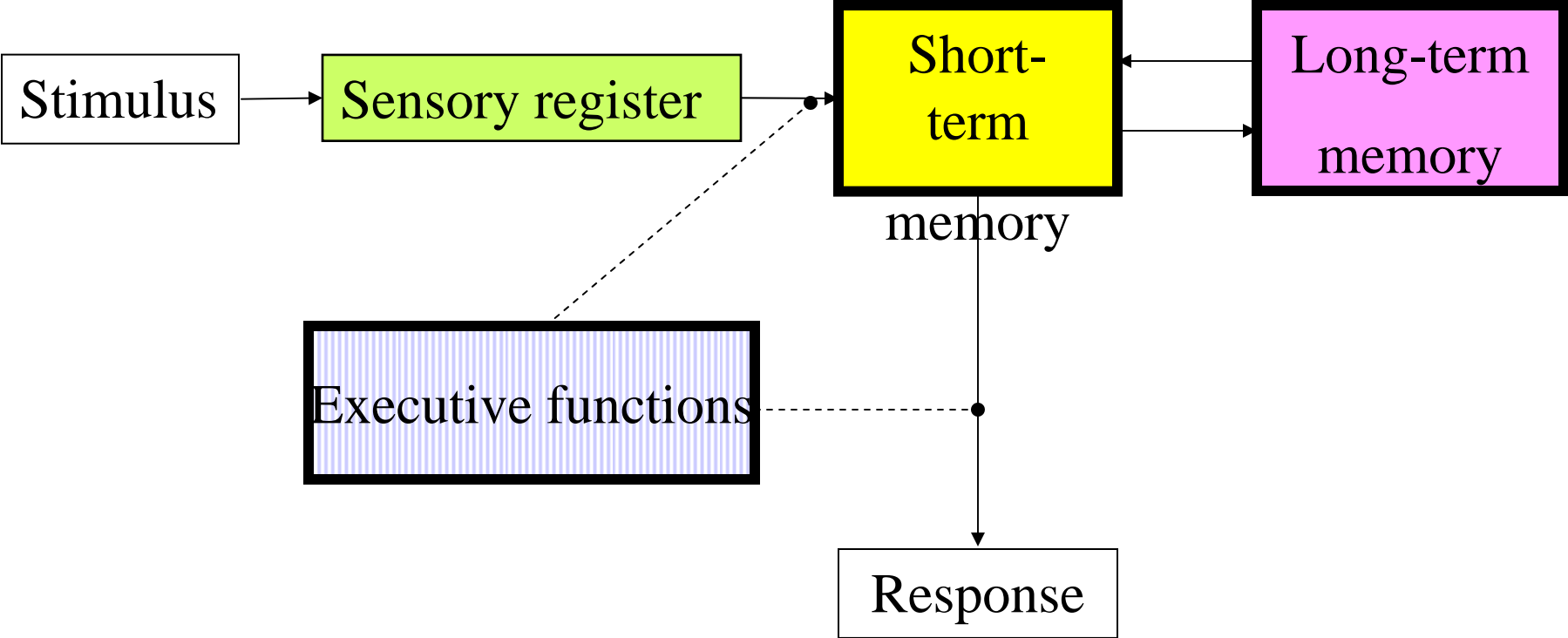


“What was your birthday cake like?”

Atkinson & Shiffrin's store model



Atkinson & Shiffrin's store model



New approach to understanding the A not B error

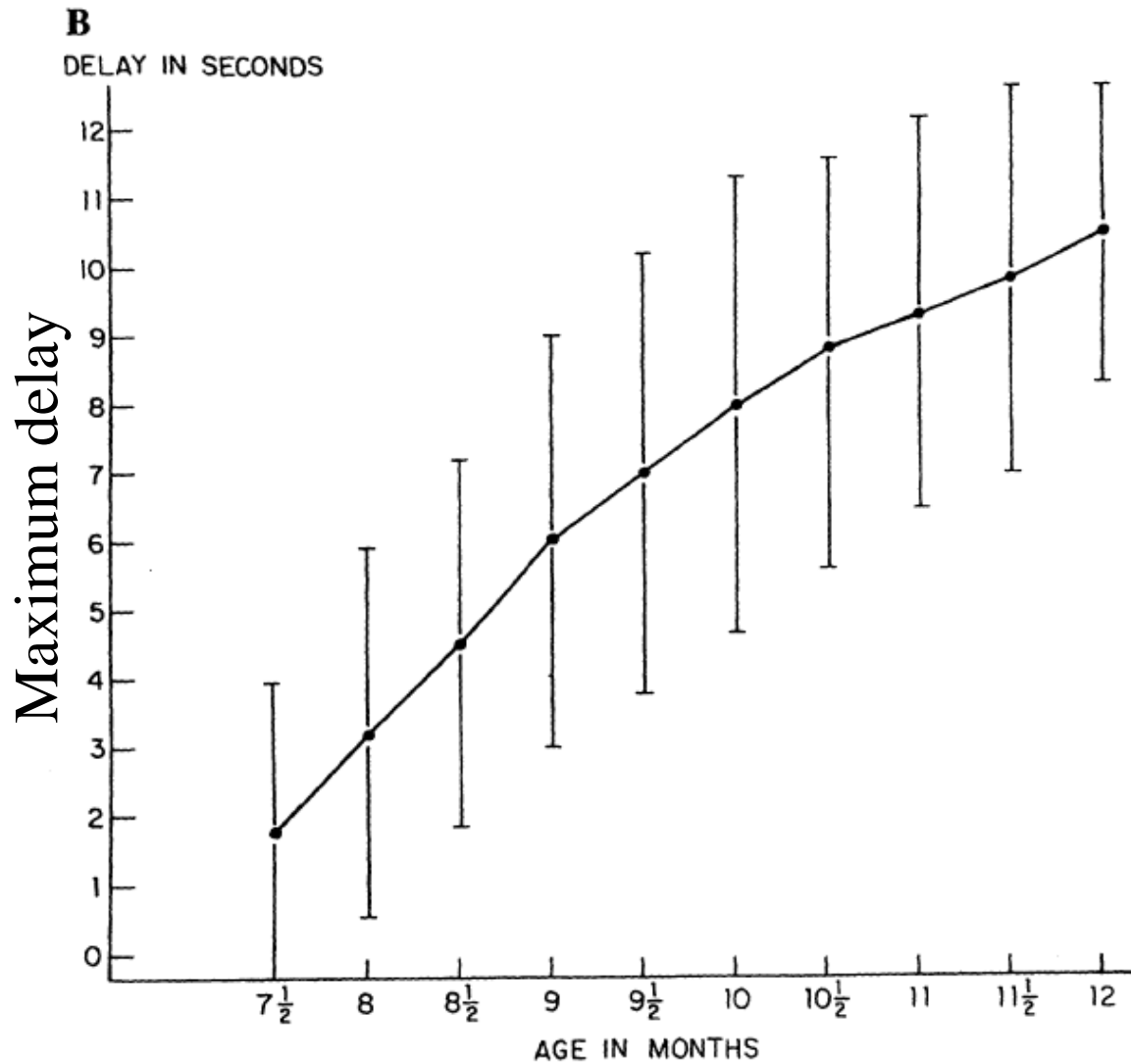
Role of STM

- B trials: New hiding location needs to be kept in short-term memory
- Do errors reflect age-related STM constraints?

Role of STM

- B trials: Needs to be kept in mind
 - Diamond (1985)
 - Longitudinal study
 - BTW 7 & 12 months, lab visit every 2 wks
 - Each visit, A not B assessed.
- Delay between hiding at B and search varied.

Results

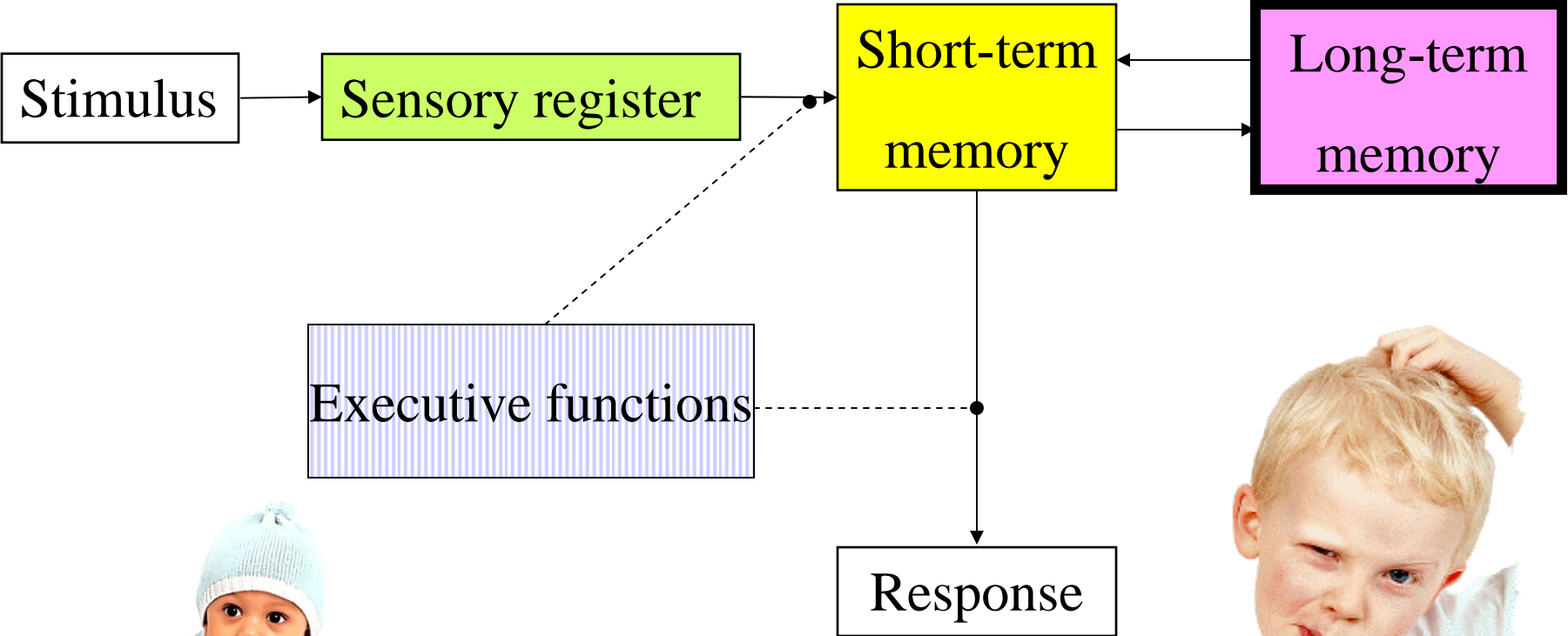


Results

- Across all ages:
 - A not B errors more likely at longer delays
- Older infants:
 - Sustain longer delays.

STM capacity may constrain infant A not B task performance

Atkinson & Shiffrin's store model



Development of LTM

1. Memory in infancy

- 3-month-olds
- Train on A
- Test on A & B, 2 weeks later
- More kicking for A than B
- Infant form LTMs



Rovee-Collier & Hayne, 1987

Development of LTM

2. Infantile Amnesia

The failure to *RECALL AUTOBIOGRAPHICAL EVENTS* from the first 2 or 3 years of life.

Development of LTM

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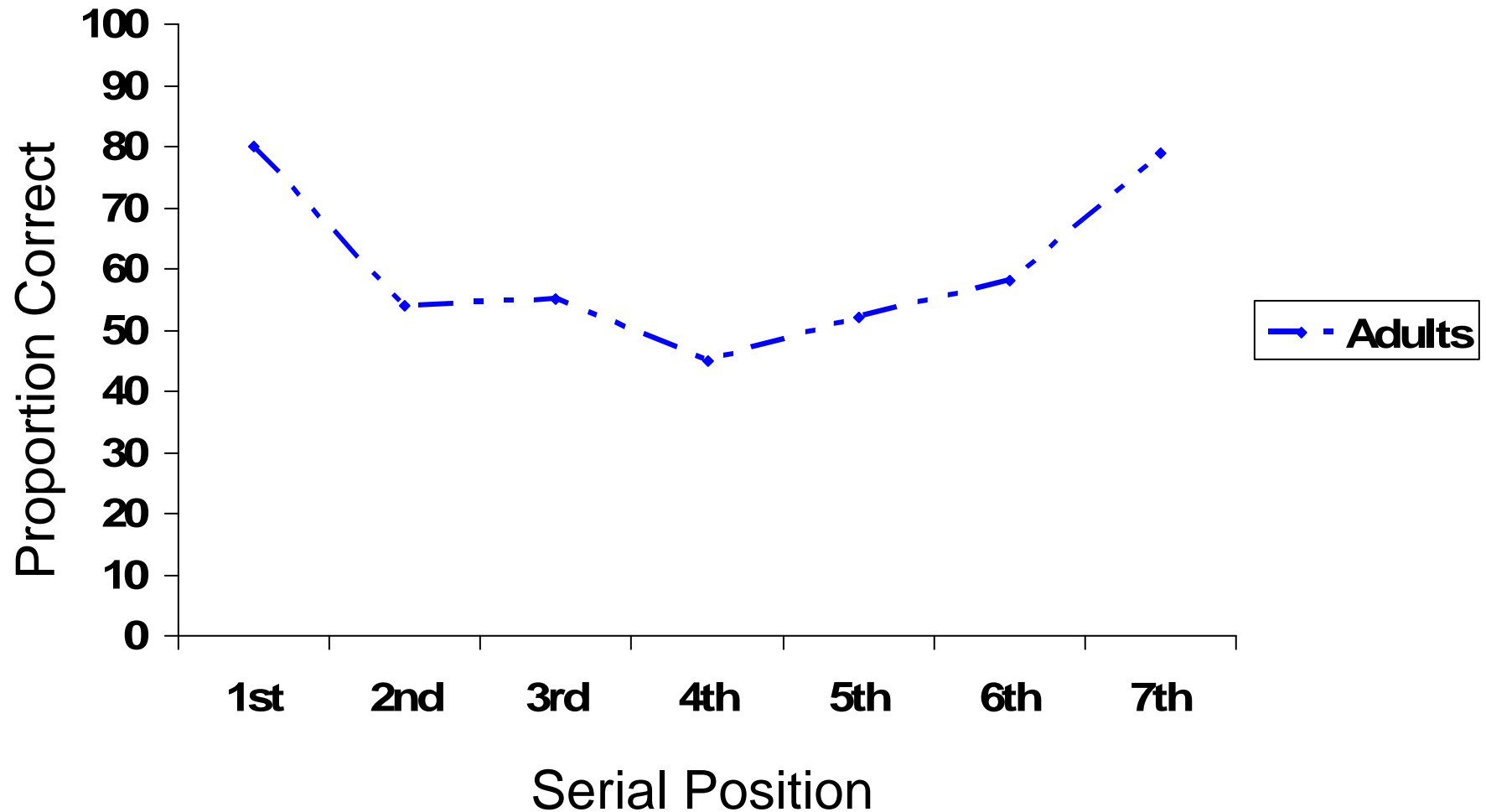


Rouge test & the importance of self-recognition

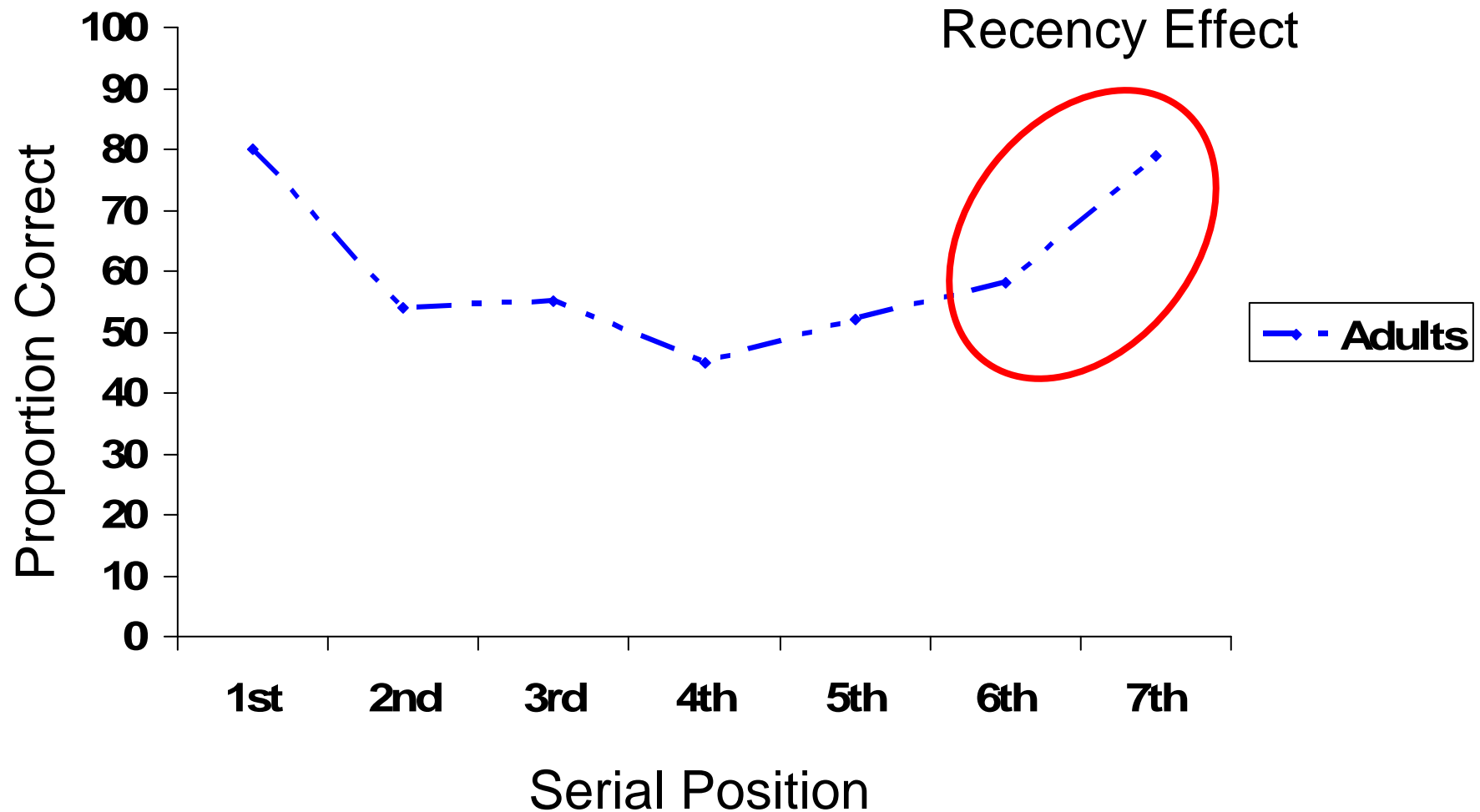
Development of LTM

3. Learning to Use Memory

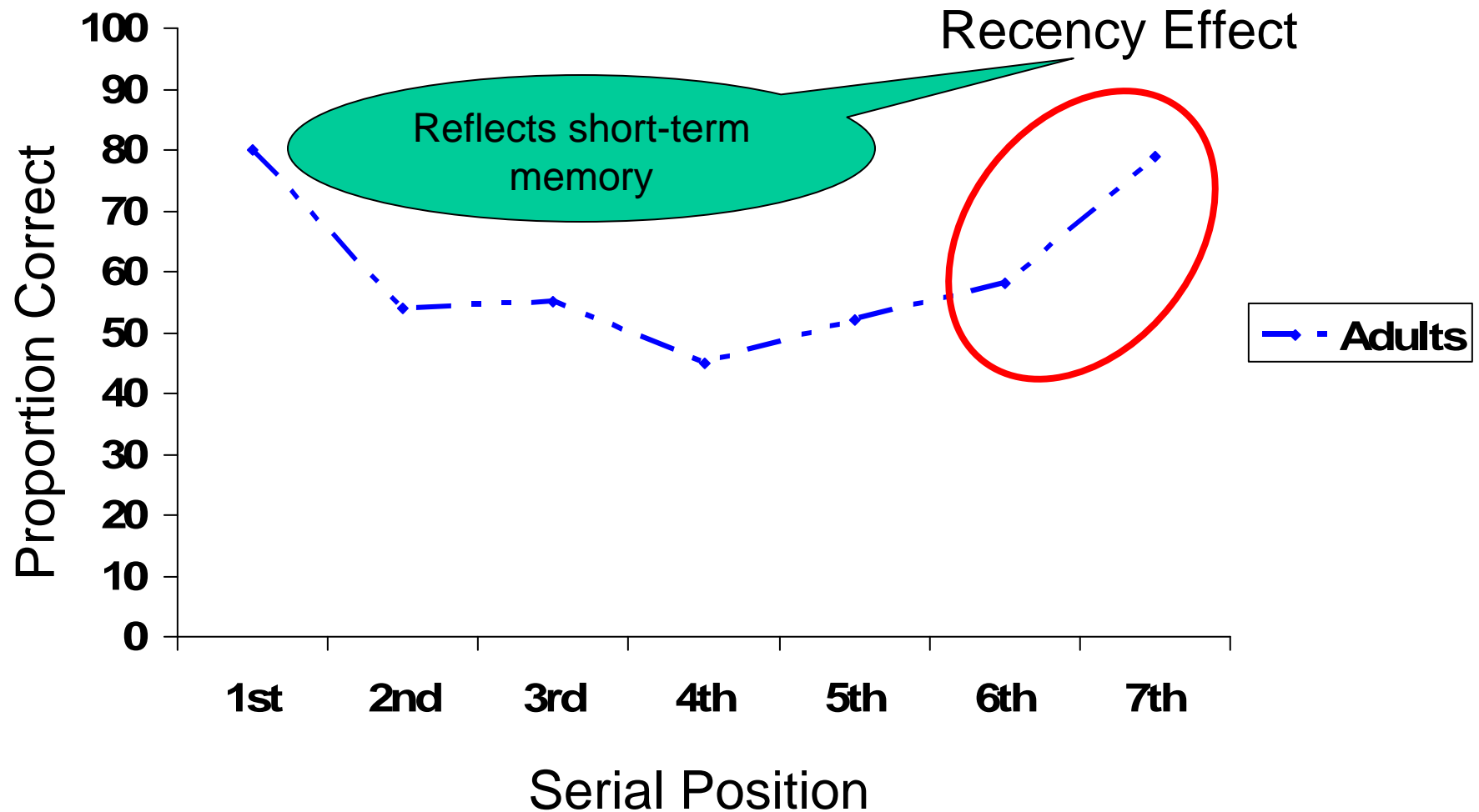
Serial Position Effect in Recall



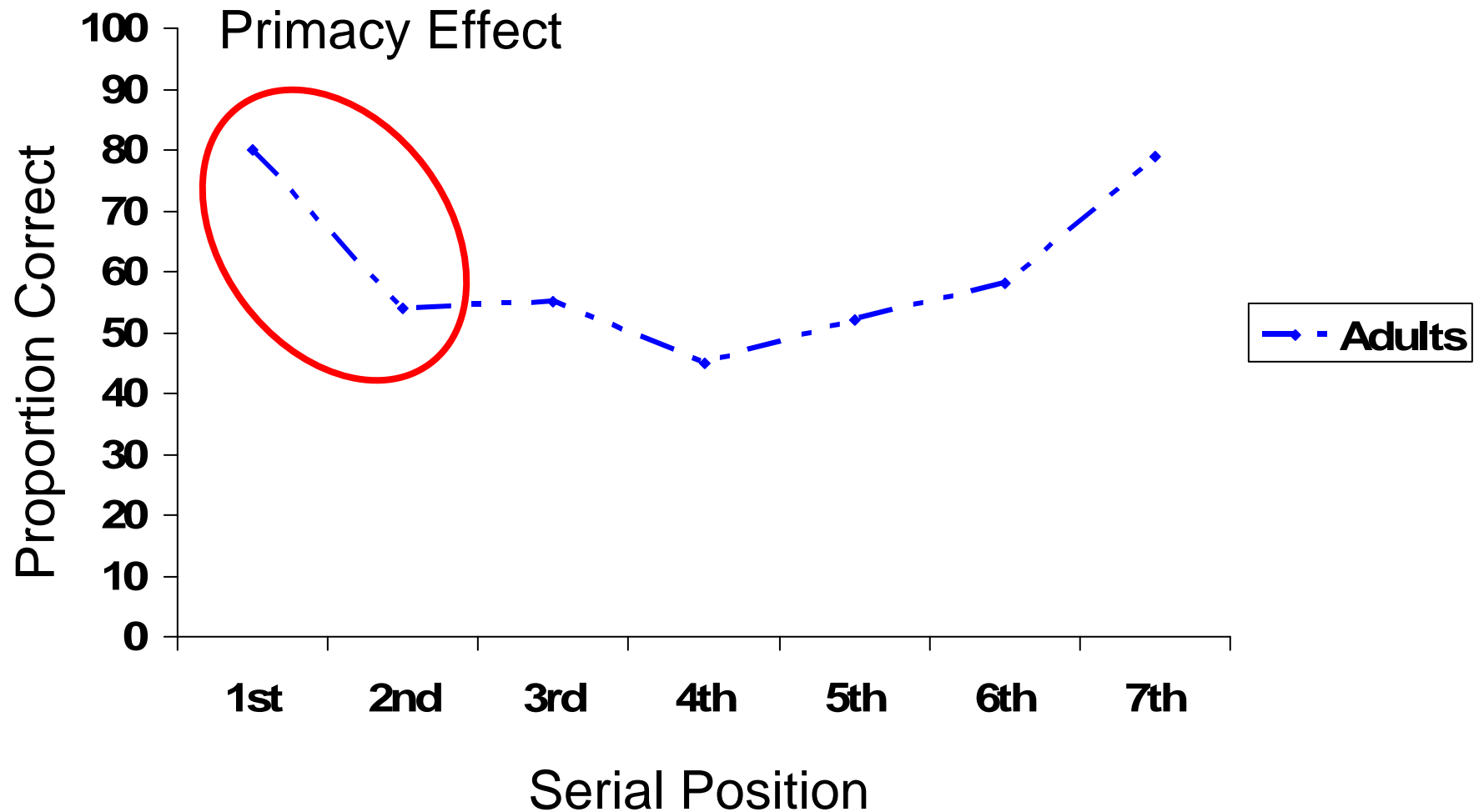
Serial Position Effect in Recall



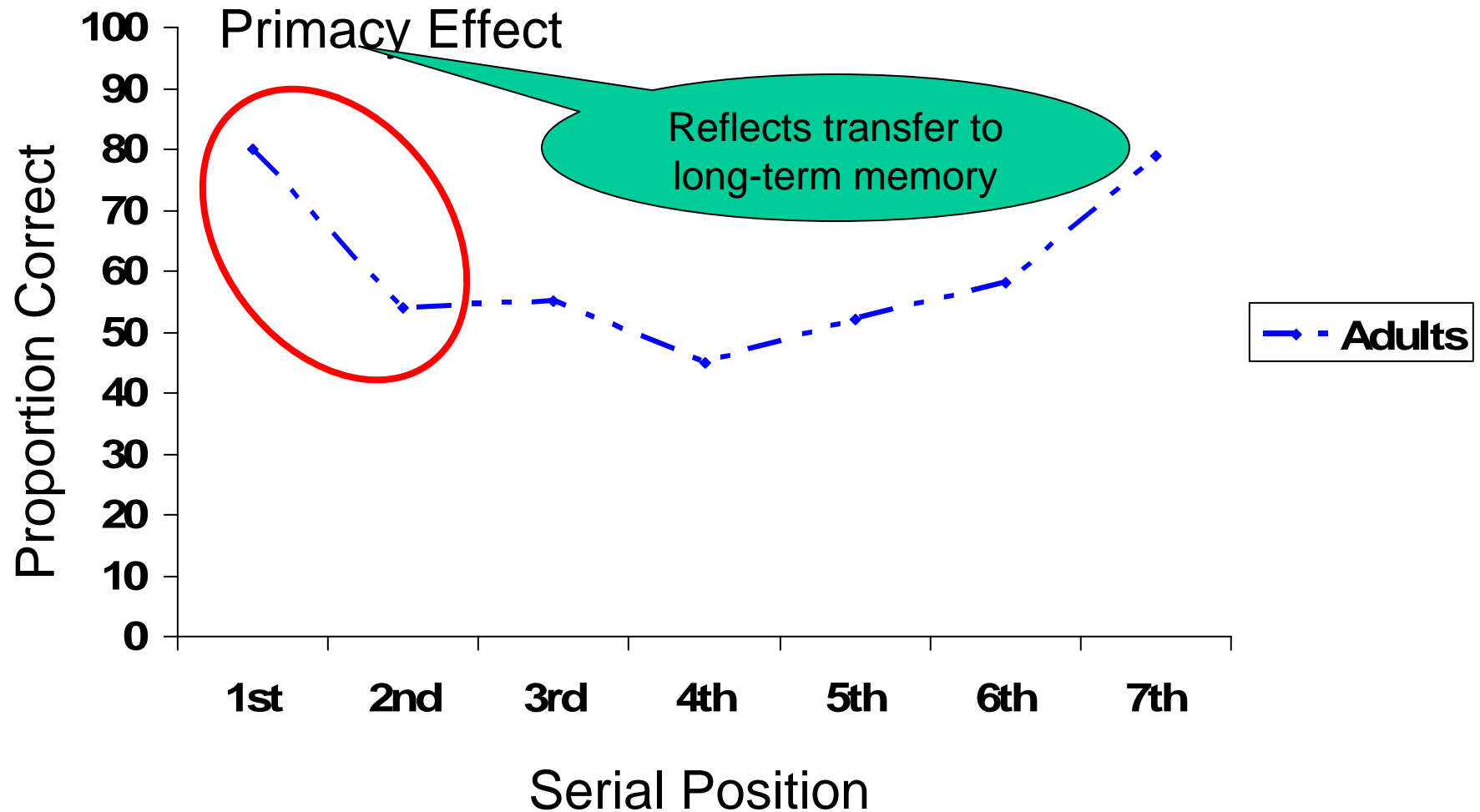
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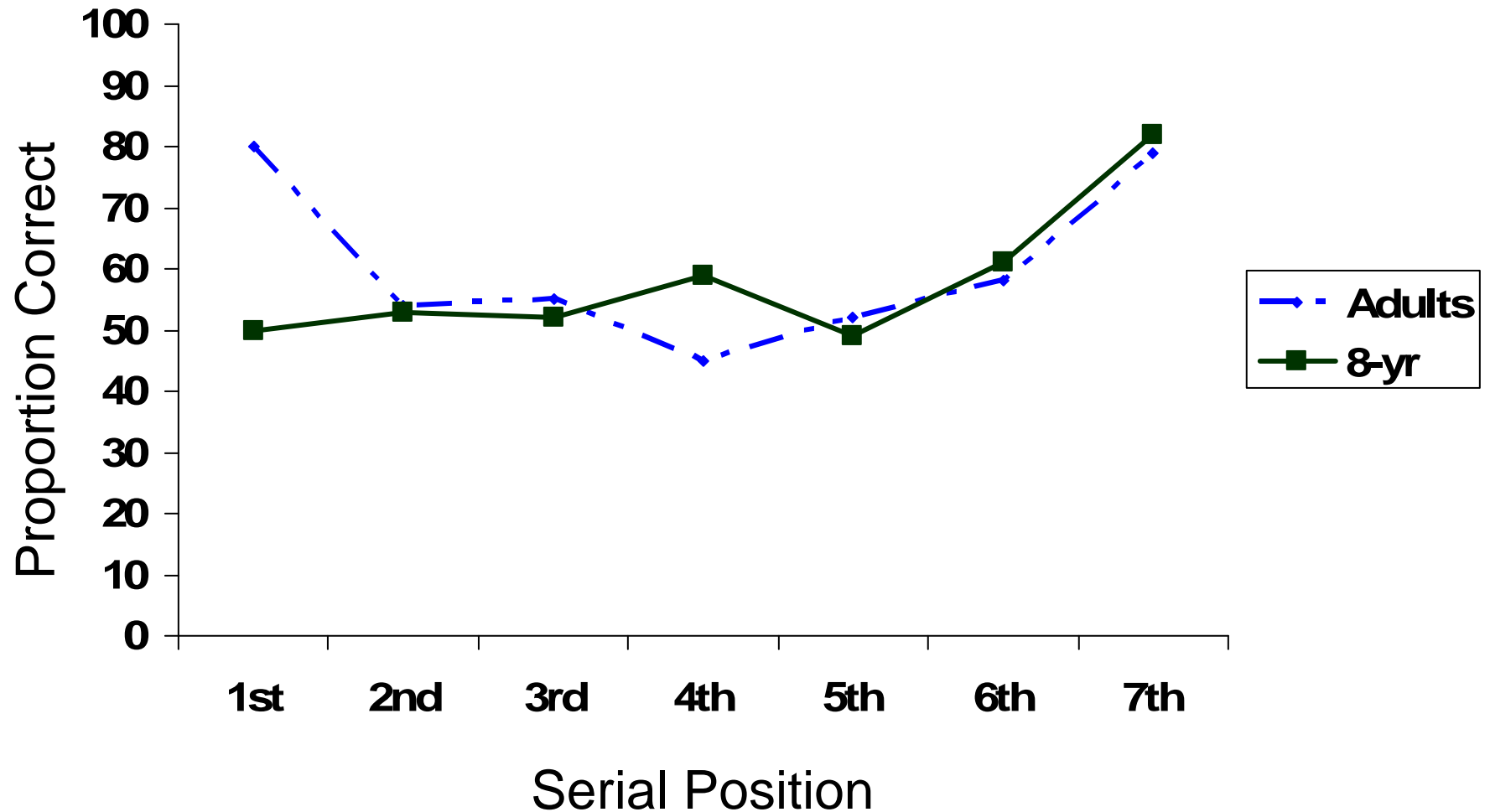
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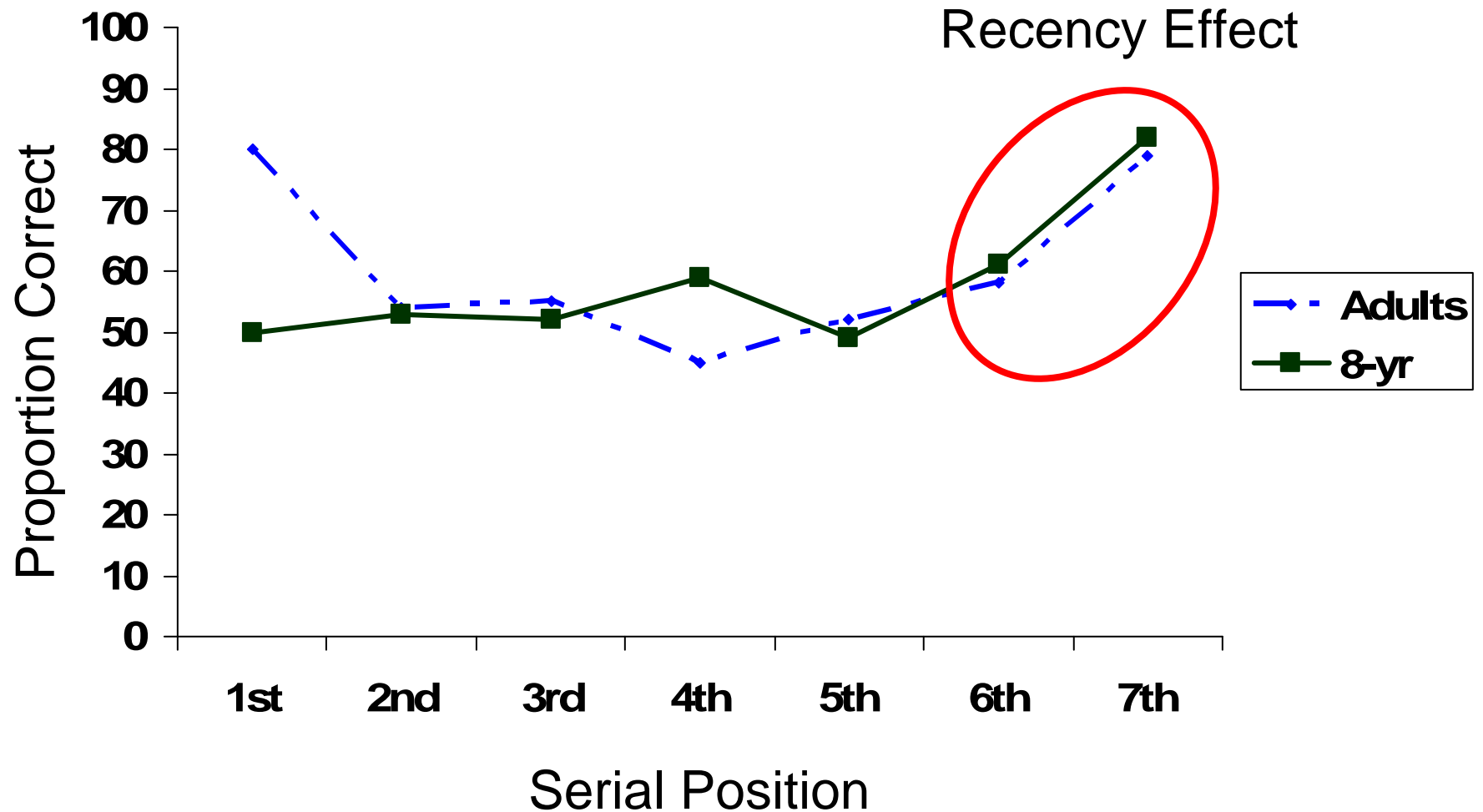
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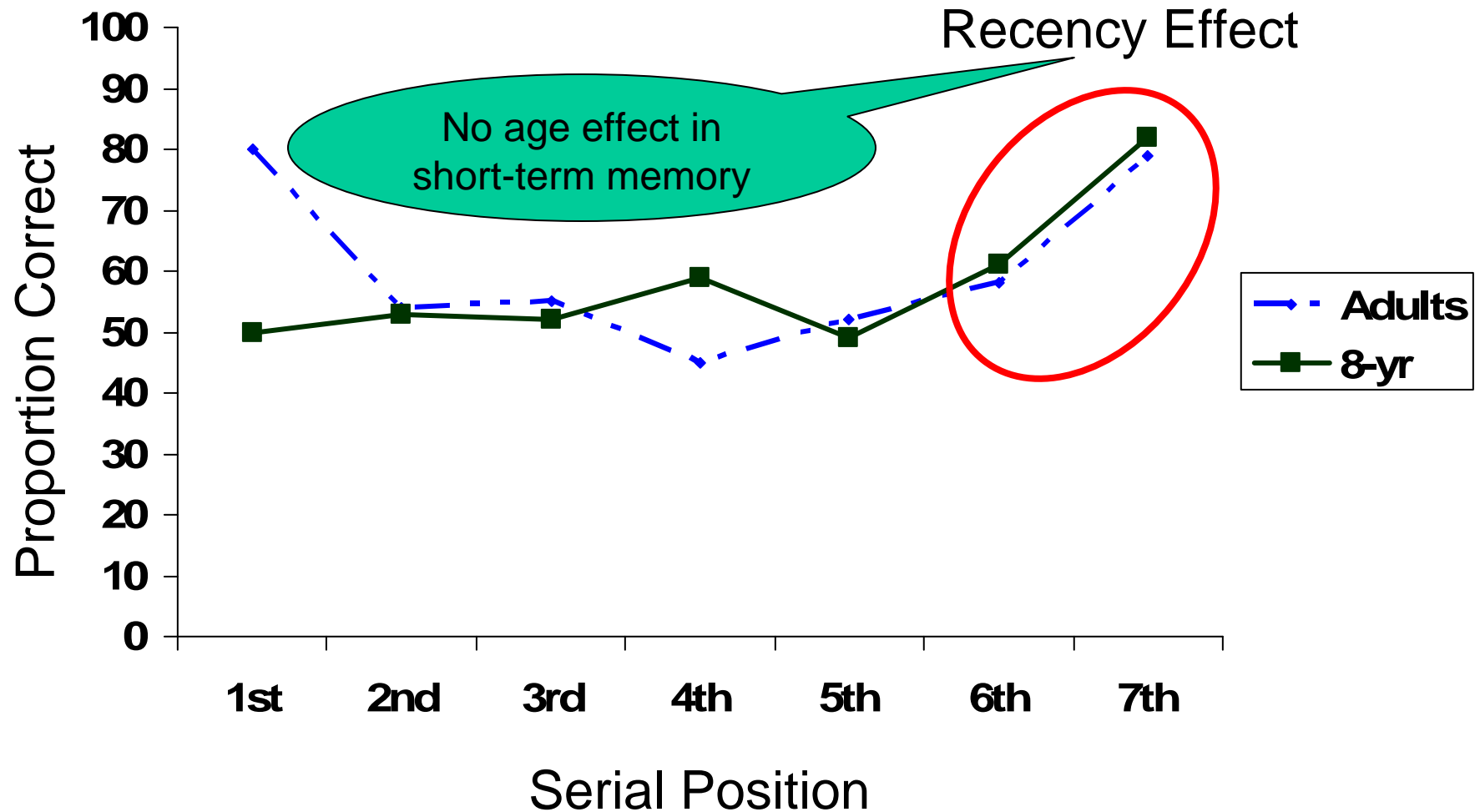
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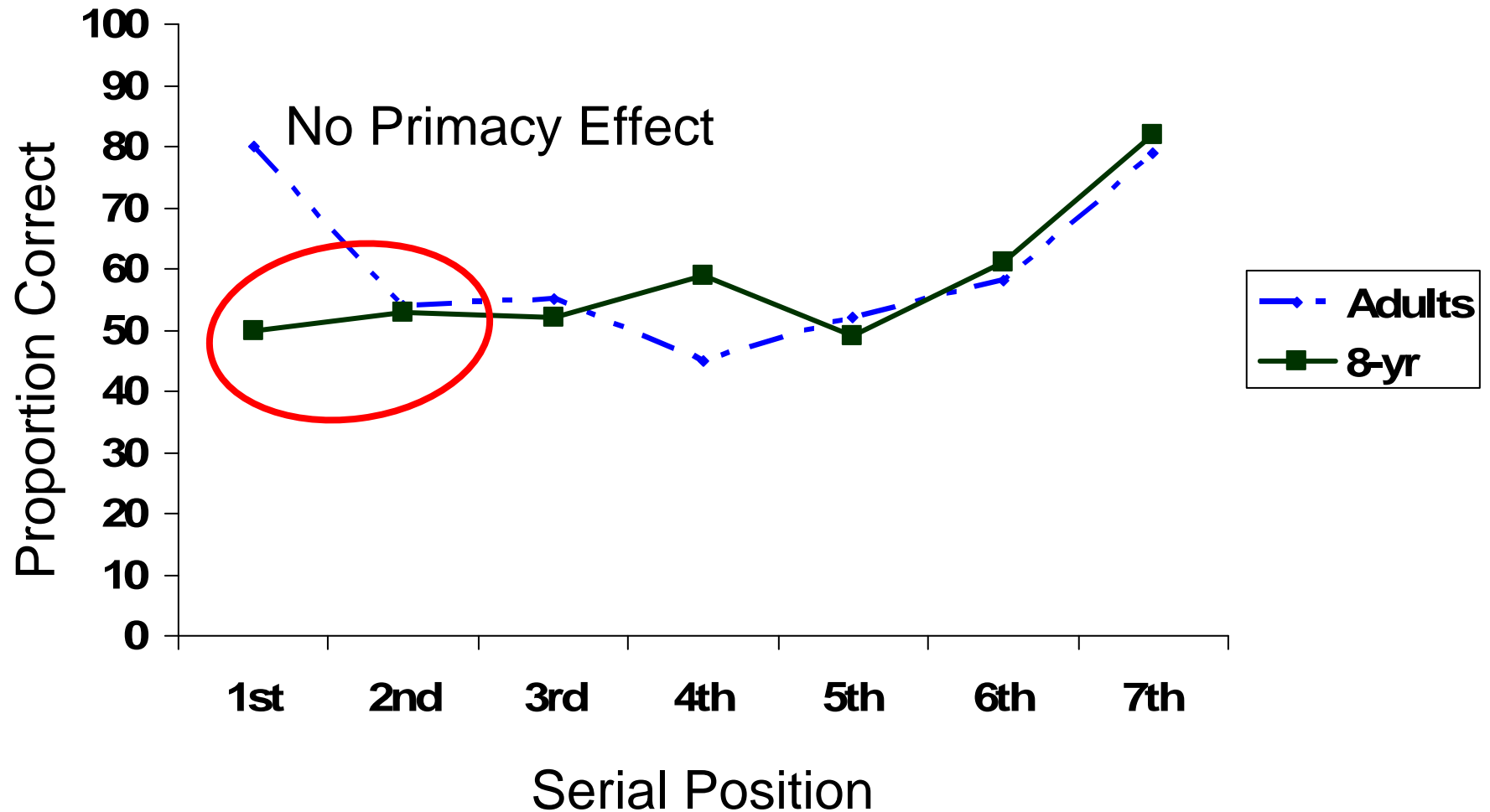
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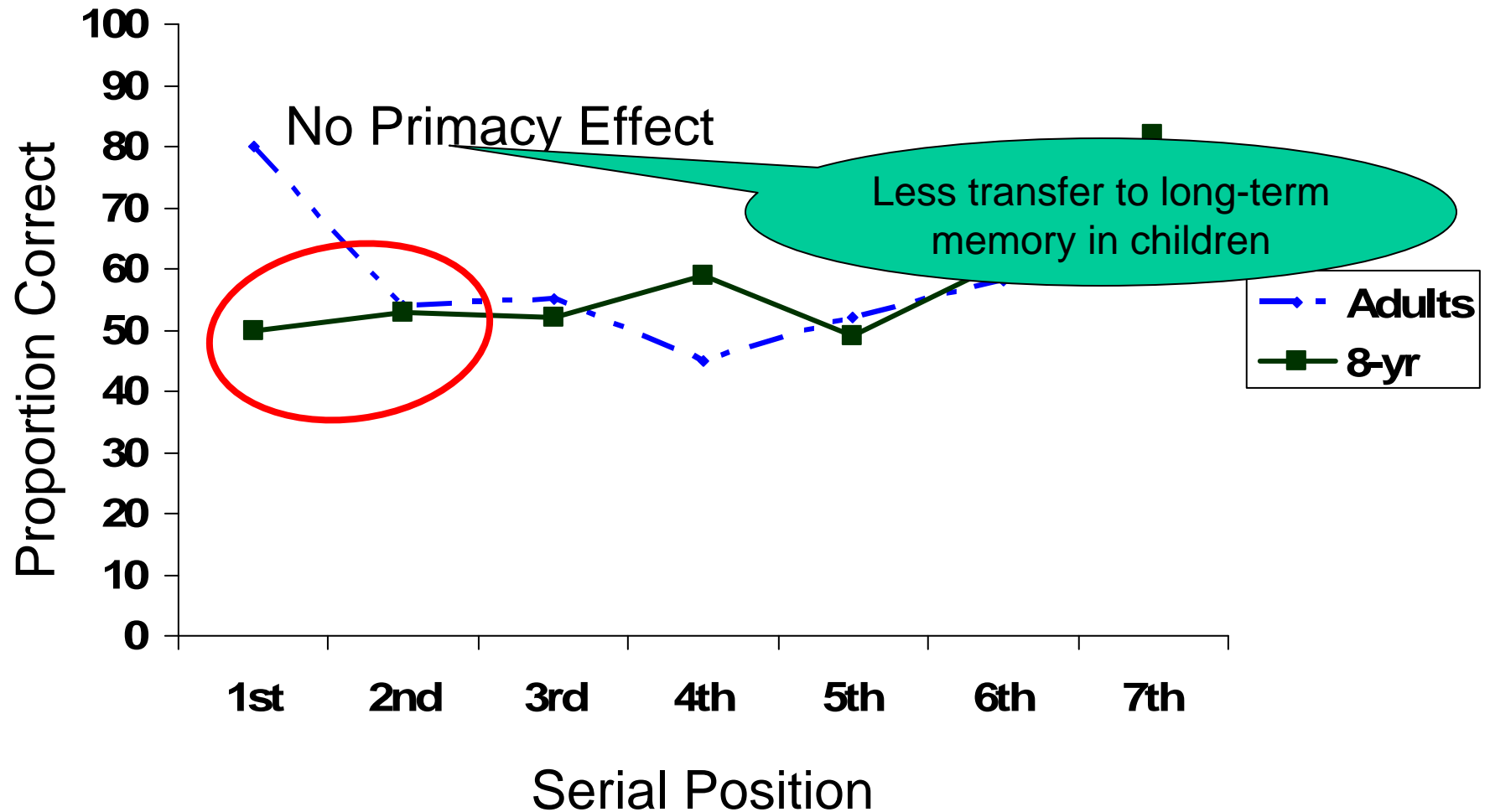
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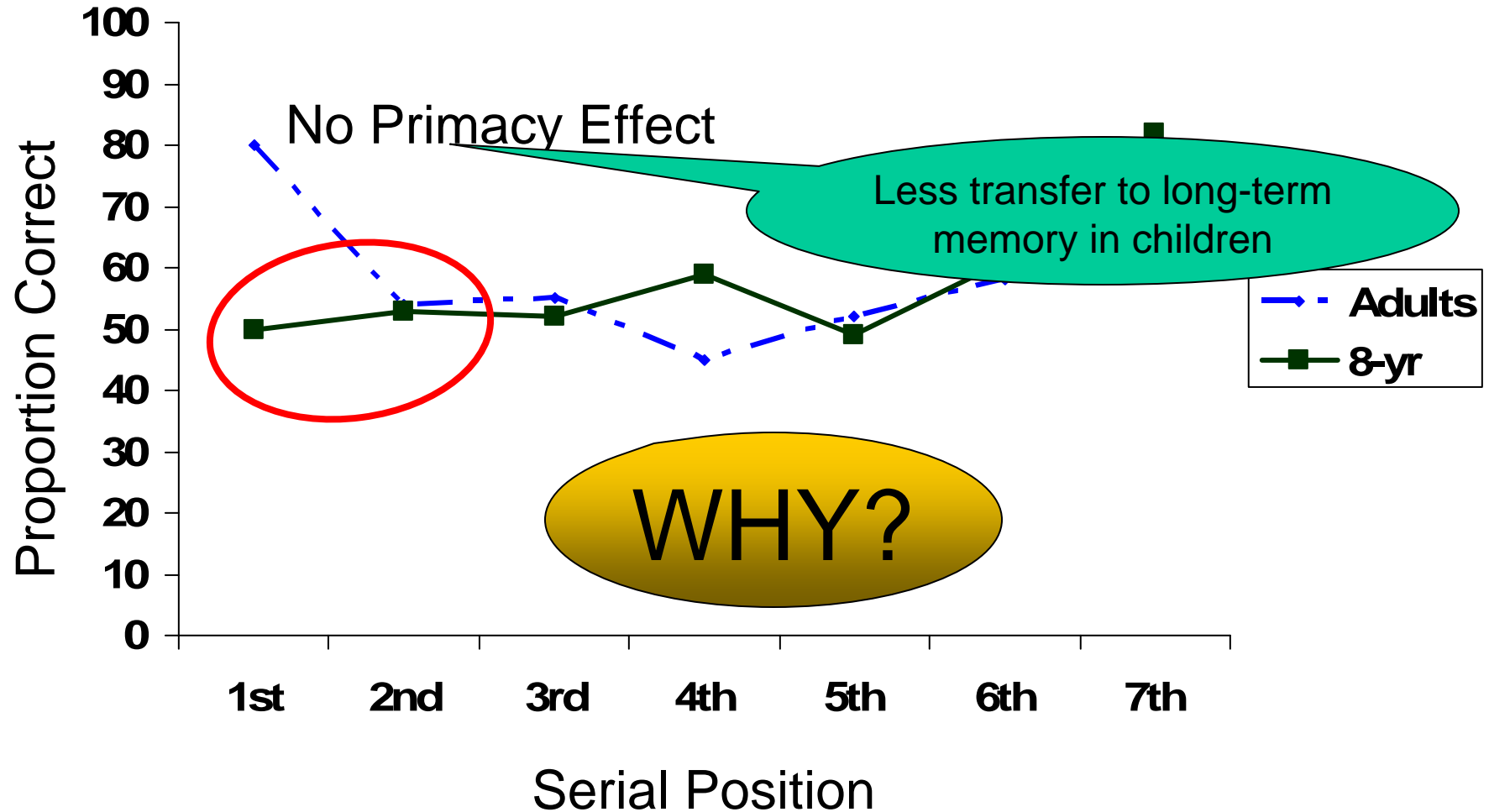
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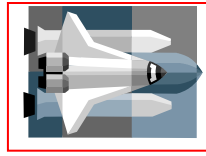
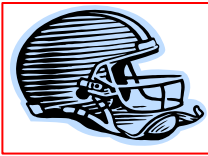
Serial Position Effect in Recall



Rehearsal

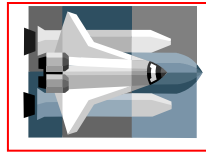
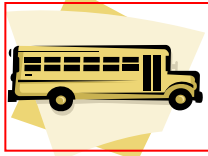
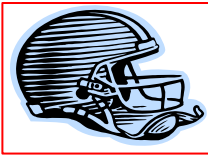
- A memory strategy that involves repetition of items to be remembered.
- Children learn that rehearsal promotes memory.

Flavell, Beach, & Chinsky, 1966



Kindergarteners:
2nd-graders
5th-graders

Flavell, Beach, & Chinsky, 1966

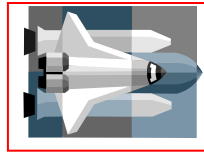
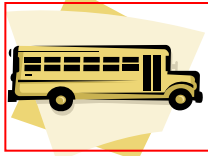
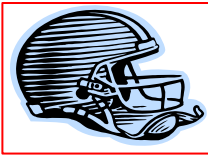


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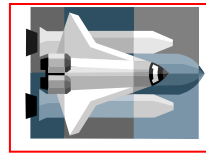
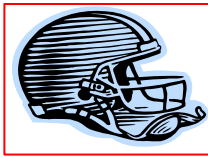
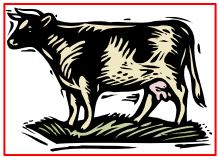
Delay



Kindergarteners:
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5th-graders

Flavell, Beach, & Chinsky, 1966

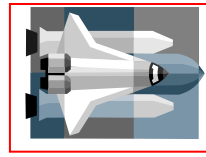
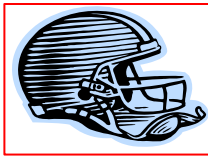
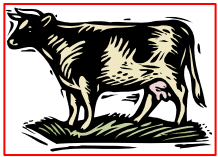
Recall?



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Flavell, Beach, & Chinsky, 1966

Recall?



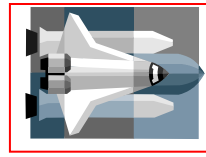
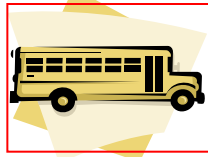
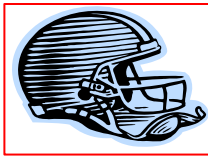
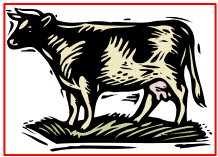
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Improvement

Flavell, Beach, & Chinsky, 1966

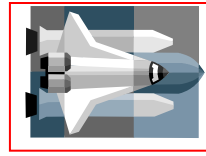
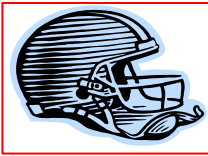
Rehearsal?



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Flavell, Beach, & Chinsky, 1966

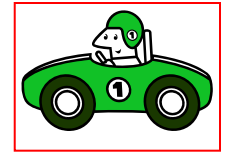
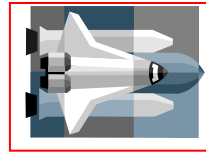
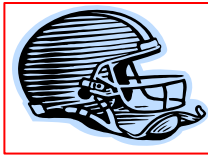
Rehearsal?



Kindergarteners:
2nd-graders
5th-graders: 85%

Flavell, Beach, & Chinsky, 1966

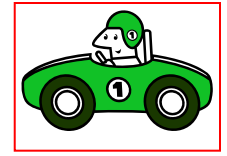
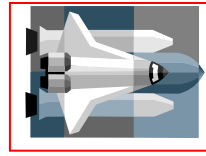
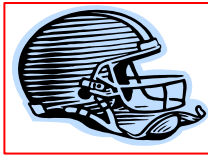
Rehearsal?



Kindergarteners: 10%
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Flavell, Beach, & Chinsky, 1966

Rehearsal?



Kindergarteners: 10%
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Rehearsal \leftrightarrow Better Recall

Rehearsal

- A memory strategy that involves repetition of items to be remembered.
- Children learn that rehearsal promotes memory.

Rehearsal

- A memory strategy that involves repetition of items to be remembered.
- Children ✓ learn that rehearsal promotes memory.
- Change in the nature of rehearsal?

Ornstein, Naus, & Liberty, 1975

Rehearsal Sets		
Word Presented	8 th -graders	3 rd -graders
Yard		
Cat		
Man		
Desk		

Ornstein, Naus, & Liberty, 1975

Rehearsal Sets		
Word Presented	8 th -graders	3 rd -graders
Yard	Yard, yard, yard	
Cat	Cat, yard, cat, yard	
Man	Man, cat, yard, man, cat...	
Desk	Desk, man, cat, yard, desk...	

Ornstein, Naus, & Liberty, 1975

Rehearsal Sets		
Word Presented	8 th -graders	3 rd -graders
Yard	Yard, yard, yard	Yard, yard, yard
Cat	Cat, yard, cat, yard	Cat, cat, cat, cat, yard
Man	Man, cat, yard, man, cat...	Man, man, man, man
Desk	Desk, man, cat, yard, desk...	Desk, desk, desk, desk

Organization & Elaboration

- Organization → A memory strategy that involves organizing list items into categories

Organization & Elaboration

- Organization → A memory strategy that involves organizing list items into categories

Dog, chair, cat, cow, table, horse

Organization & Elaboration

- Organization → A memory strategy that involves organizing list items into categories

Dog, chair, cat, cow, table, horse

10 & 11 yr-olds → Dog, cat, cow,
horse, table, chair

Organization & Elaboration

- Organization → A memory strategy that involves organizing list items into categories

Dog, chair, cat, cow, table, horse

10 & 11 yr-olds → Dog, cat, cow,
horse, table, chair

5 & 6-yr-olds → Dog, chair, cat...

Organization & Elaboration

- Organization → A memory strategy that involves organizing list items into categories: **Greater use in older children**

Organization & Elaboration

- Organization → A memory strategy that involves organizing list items into categories: **Greater use in older children**
- Elaboration → A memory strategy in which items are linked through use of an image or sentence

Organization & Elaboration

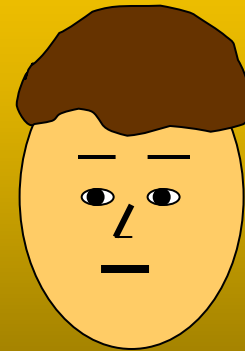
- Organization → A new strategy that involves

Woman, pink, computer

Organization & Elaboration

- Organization → A strategy that invol

Woman, pink, computer



Organization & Elaboration

- Organization → A memory strategy that involves organizing list items into categories: **Greater use in older children**
- Elaboration → A memory strategy in which items are linked through use of an image or sentence: **Greater use in older children**

Rehearsal

- A memory strategy that involves repetition of items to be remembered.
- Children ✓ learn that rehearsal promotes memory.
- Change in the nature of rehearsal?

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- A memory strategy that involves repetition of items to be remembered.
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Conclusions

