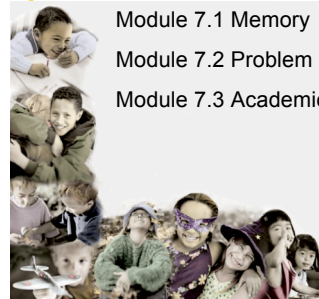


## Cognitive Development

IIE 366: Developmental  
Psychology  
Greg Francis  
Lecture 16

## Chapter 7: Cognitive Processes and Academic Skills



Module 7.1 Memory

Module 7.2 Problem Solving

Module 7.3 Academic Skills

Children and Their Development, 4/e by Robert Kail

### 7.1 Memory

Origins of Memory  
Strategies for Remembering  
Knowledge and Memory

### 7.1 Origins of Memory

- Infants remember and forget, and can be prompted to remember things that they've forgotten
  - Tie a ribbon to leg: kick makes a mobile move
  - Remove ribbon for a week
  - Re-attach: infant does not kick
  - Give hint: move the mobile (without the ribbon)
  - Re-attach: infant kicks
- Improvements in memory are related to growth in the brain
- Amygdala and hippocampus are related to the initial storage of memories
- Frontal cortex is related to retrieval of stored memories

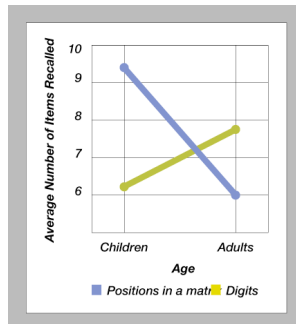
### 7.1 Strategies for Remembering

- Memory *strategies*: activities that improve remembering
- Preschoolers use simple strategies like looking and touching
- Older children and adolescents use *rehearsal*, *organization*, and *elaboration*
  - Not always the *best* strategies
- *Metacognition* improves with age

### 7.1 Knowledge and Memory

- Knowledge helps to organize memory but can distort our recall
  - E.g., memory for lists of words

### Effects of Knowledge on Memory

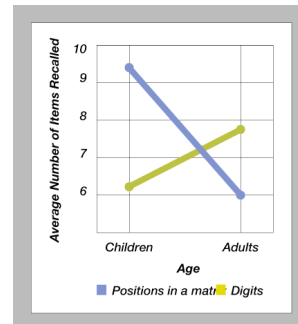


7.1: Knowledge and Memory

### Effects of Knowledge on Memory

Children were chess players. Adults were not.

Positions were locations of pieces on a chess board for actual games



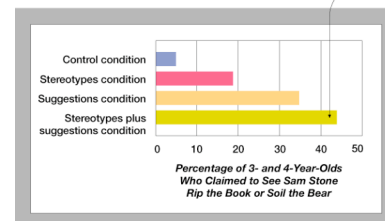
7.1: Knowledge and Memory

## 7.1 Knowledge and Memory

- Knowledge helps to organize memory but can distort our recall
- Scripts are memory structures that describe the sequence in which events occur
- People's memory of their own lives is *autobiographical memory*
- *Infantile amnesia* denotes forgetting of events from early in life
- Preschoolers' testimony can be distorted by adults' suggestions
  - Misleading questions, stereotypes
  - Clumsy Sam

### Effects of Stereotypes and Suggestions on Memory

This bar shows that nearly half the children in the stereotypes plus suggestions condition "recalled" events that never happened!



7.1: Knowledge and Memory

## 7.2 Problem Solving

Developmental Trends in Solving Problems  
Features of Children's and Adolescents' Problem Solving  
Scientific Problem Solving

## 7.2 Developmental Trends in Problem Solving

- Children tend to become more effective problem solvers as they age
- Research shows that even young children sometimes show remarkable skill
- Adolescents often prone to error

## 7.2 Features of Children's and Adolescents' Problem Solving

- Young children sometimes fail due to inadequate *encoding processes*
- Young children don't plan ahead
- Successful problem solving depends on knowledge specific to problem and general processes
- Collaboration often enhances problem solving

## 7.2 Scientific Problem Solving

- Children and even adolescents exhibit faulty scientific reasoning as they confound variables and reach conclusions prematurely
  - Often look for explanations that are consistent with what they already know
- Also have difficulty integrating theory and data
- Even young children can be trained to think more scientifically

## 7.3 Academic Skills

Reading  
Writing  
Knowing and Using Numbers

## 7.3 Reading

- Sounding out and whole word recognition are used in reading
- Prereading skills: knowing letters and letter sounds (*phonological awareness*)
- Changes in working memory, knowledge, monitoring, and reading strategies improve comprehension

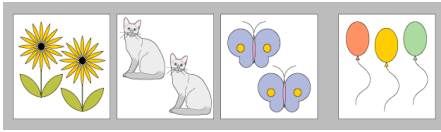
## 7.3 Writing

- Older writers have more to tell
- Older writers know how to organize their writing (*knowledge telling vs knowledge transforming strategies*)
- Older writers are better able to deal with the mechanical requirements of writing
- Older writers are better able to revise

## 7.3 Knowing and Using Numbers

- Origins: infants can distinguish small quantities such as two and three

### Distinguishing Small Quantities



Infants find repetition of the same number of objects boring: infants habituate

A change in number is interesting: infants look longer

7.3: Knowing and Using Numbers

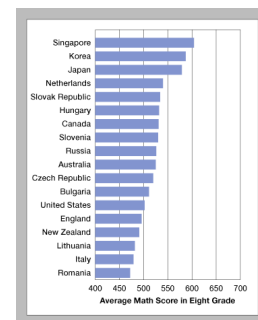
### 7.3 Knowing and Using Numbers

- Infants can distinguish small quantities such as two and three
- Early counting follows 3 basic principles: the *one-to-one principle*, the *stable-order principle*, and the *cardinality principle*
- Children use many different strategies to add and subtract

### 7.3 Knowing and Using Numbers

- Math skills lower in US than other countries
- In other countries, children spend more time in school, have more homework, parents have higher standards, and parents emphasize effort

### Average Math Scores by Country



7.3: Knowing and Using Numbers

### Next time

- Focus on aspects of memory
- Infantile amnesia
- Memory skills