Overview
- Information Processing Approach
- Store Model
- Connectionism
- Developmental Theories
  - Case's Neo-Piagetian Theory
  - Siegler's Model
- Attention
- Memory
- Metacognition
- Applications
- Evaluation

Information Processing: The Cognitive System

Planning
- What is it?
- Development of Planning
  - Origins in infancy (left-right sequence)
  - Related to Attention & Inhibition
    - Post-pone action
    - Consider various actions
    - Organize materials
    - Remember steps
  - Demands WM capacity (so young children often forget crucial steps)
  - Importance of Culture/Environment

Recall versus Recognition

Recall
- Generating a mental representation of an absent stimulus
- More difficult than recognition

Recall
- Noticing that a stimulus is identical or similar to one previously experienced
- Easier than recall

Information Processing: The Cognitive System

Memory Strategies
- Rehearsal
- Organization
- Chunking
- Hierarchy
- Elaboration

Constructive Processing
- To remember complex, meaningful information...
  - We select and interpret information as it is encoded, stored, or retrieved.
  - Can happen deliberately or due to “fuzzy trace.”

Attention – Development of Strategies
- (4 phases)
  - Preschool: Production deficiency
  - Kindergarten: Control (execution) deficiency
  - Early Elem: Utilization deficiency
  - Mid-Elem: Effective use strategy

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**Verbatim vs. Gist Memory**

<table>
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<tr>
<th>Mean Memory Score</th>
<th>Preschoolers</th>
<th>Second Graders</th>
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<tbody>
<tr>
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<td>Purple</td>
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</tbody>
</table>

**Expertise and Memory**

- Children
data
- Adults
data

**Semantic Memory**
- General, factual knowledge about world/language
- Vast
- Organized
  - Taxonomically
  - Hierarchically
- Grows from episodic memory
- Repeated events form scripts (reconstructive memory)

**Autobiographical Memory**
- Long-lasting representations of one-time events
- Personal meaning
- Develop basis after age 2
  - Self-image
  - Time-oriented life story
- Parents help develop narrative
  - Elaborative
  - Repetitive

**Eyewitness Memory**
- Preschoolers’ testimony less reliable than school-age children’s
- Less-developed language skills
- Desire to please
- Poorer source-monitoring
- Bias toward verbatim; less gist memory
- Less skill with autobiographical narratives - may leave out details
- Suggestibility

**Biased Interviewing and Eyewitness Memory**

- Mean Number of Suggestible Responses
- Low pressure
- High pressure
- Interview Condition

- 10
- 9
- 8
- 7
- 6
- 5
- 4
- 3
- 2
- 1
Metacognition

- Awareness and understanding of various aspects of thought
- Develops with:
  - Theory of Mind → people as mental beings
  - Knowledge of Mental Activity
    - Cognitive capacities
    - Strategies
    - Task variables

Self-Awareness of Mental Activity

Implications to teaching, parenting, & clinical work???

Applications of Information Processing to Academics...

Early Childhood:
Fostering Emergent Literacy

- Spoken language skills
  - Phonological awareness
  - Adult conversations
- Informal literacy experiences
  - Interactive reading
  - Games
  - Writing
- Training, books for low SES families

Middle Childhood Literacy

- Combines Information-Processing Skills
  - Phonological awareness
  - Processing speed

- Balanced reading instruction combines
  - Whole language
  - Phonics
Early Childhood Mathematical Reasoning

- Ordinality
  - Relationships between quantities
  - 14 to 16 months

- Cardinality
  - When counting, last number is the total
  - 3-1/2 to 4 years
  - Order is universal, but timing can vary

Mathematics and Middle Childhood

- Math instruction in school should combine
  - Extensive practice
  - Number sense
  - U.S. schools often overemphasize drill

Hypothetical Thinking Task

- Coordinating Theory with Evidence
- Improves with Age
  - From childhood through adulthood
  - Individuals vary
- Contributing factors
  - Working memory capacity
  - Exposure to complex problems
  - Metacognitive understanding
  - Open-mindedness

Scientific Reasoning

Nature/Nurture Revisited

- Quality of Experiences
- Parenting
- Childcare
- SES

Evaluation of Information-Processing Approach

**Advantages**
- Breaks complex cognitive activities into precise components
- Provides details of age- and skill-related differences
- Describes precise mechanisms of cognitive development

**Limitations**
- Components hard to combine into broad picture
- Computer metaphors simplify real-life experience; overlooks nonlinear aspects, interaction with others
- Slow to include biology, evolution
Questions???

I never learn anything talking. I only learn things when I ask questions.

~Lou Holtz~