

A photograph of a classroom scene. In the foreground, a young boy with dark skin and short hair is sitting at a desk, looking towards the right. He has a pencil in his mouth. To his right, another child is leaning over a desk, with their hand raised. In the background, a girl with long red hair is standing and looking towards the camera. Behind her is a chalkboard with some faint writing and numbers. The overall scene is brightly lit and shows a typical classroom environment.

Chapter 8

***Information
Processing
Theory***



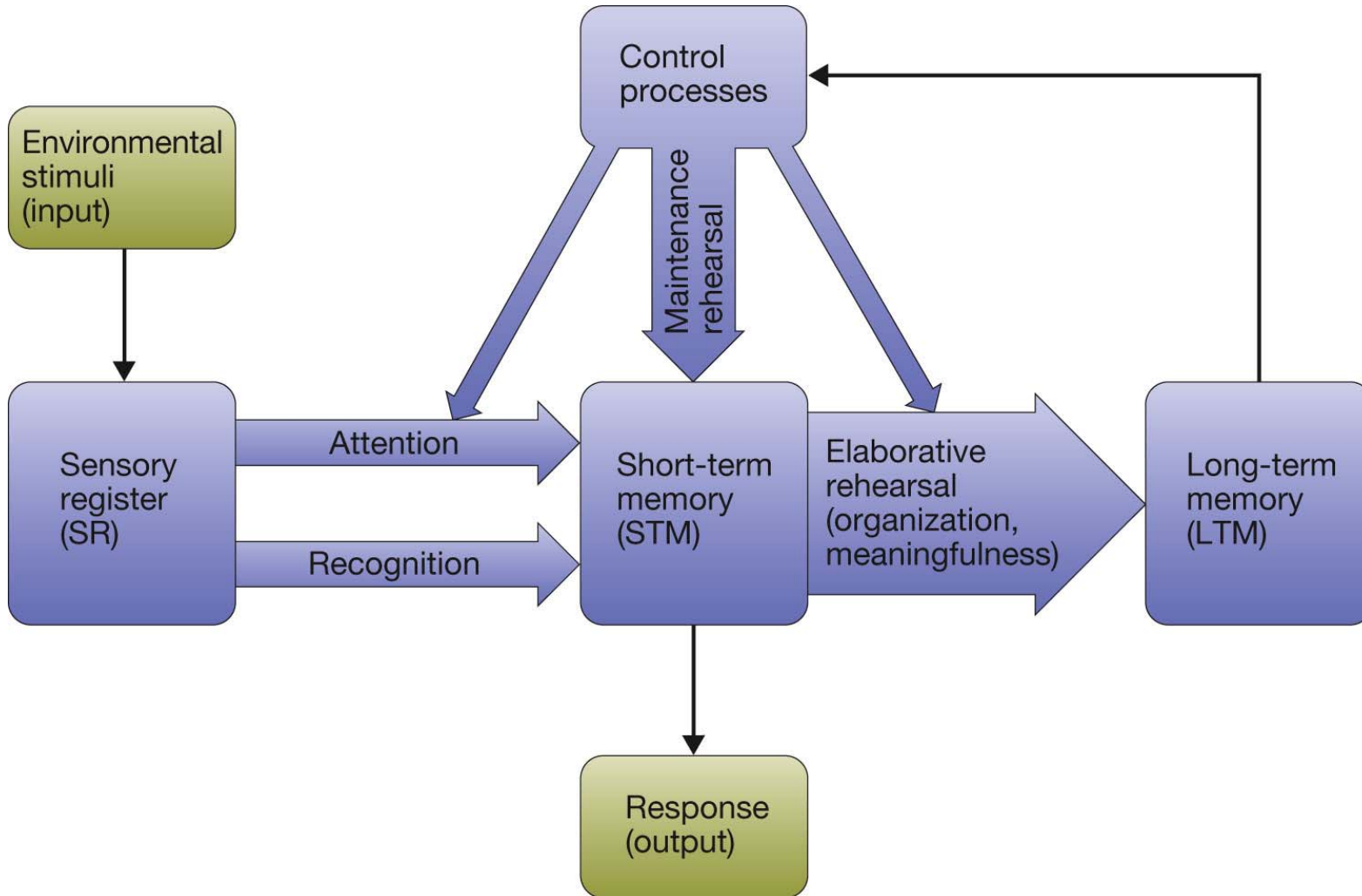
Overview

- The Information Processing View of Learning
- A Model of Information Processing
- Metacognition
- Technology As an Information-processing Tool

The Information Processing View of Learning

- Assumptions
 - Information is processed in steps or stages
 - There are limits on how much information can be processed at each stage
 - The human information processing system is interactive

A Model of Information Processing



A Model of Information Processing

- The Sensory Register
 - Capacity
 - Very large
 - Duration
 - 1 to 3 seconds
 - Contents
 - Raw sensory data (encoded in same form as perceived)

A Model of Information Processing

- The Nature of Recognition
 - Noting key features of a stimulus and relating them to already stored information
- The Impact of Attention
 - Selective focusing on a portion of the information currently stored in the sensory register
 - What we attend to is influenced by information in long-term memory

A Model of Information Processing

- Short-Term Memory
 - Capacity
 - 7 +/- 2 chunks of information
 - Duration
 - 20 to 30 seconds
 - Contents
 - What you are currently thinking about (information from the sensory register and information from long term memory)

A Model of Information Processing

- Rehearsal
 - Maintenance Rehearsal (rote rehearsal, repetition): Information is repeated over and over again with no effect on long-term memory storage
 - Elaborative Rehearsal (elaborative encoding): New information is related to knowledge already stored in long-term memory

Video: Cooperative Learning in the Elementary Grades: Jigsaw Model



A Model of Information Processing

- Organization
 - Putting interrelated pieces of information into chunks
- Meaningfulness
 - When new material can be related to information in long-term memory
- Visual Imagery Encoding
 - Generating images in your mind of objects, ideas, and actions
 - Dual coding theory

Implications for Instruction: Short-Term Memory and Its Control Processes

Research Findings	Implications
<p>Rehearsal prevents the quick disappearance of information from short-term memory. Most children do not begin to rehearse on their own until about age seven.</p>	<p>All children, especially younger ones, can benefit from being taught rehearsal techniques.</p>
<p>Organization of material into chunks makes it much easier to remember.</p>	<p>Teachers can aid students by presenting material in logical chunks and by showing students how to organize information on their own.</p>

Implications for Instruction: Short-Term Memory and Its Control Processes

Research Findings	Implications
<p>Meaningful learning occurs when the learner relates new information to prior ideas and experiences.</p>	<p>Teachers should mediate learning by relating new information to students' cultural knowledge and by helping students to learn techniques of self-mediation.</p>
<p>Visual imagery is easier to recall than abstractions.</p>	<p>Teachers should help students develop learning skills that incorporate visual imagery and other memory-aiding techniques.</p>

A Model of Information Processing

- Long-Term Memory
 - Capacity
 - Unlimited
 - Duration
 - Permanent, long-term
 - Contents
 - Schemata

A Model of Information Processing

- How Information is Organized in Long-Term Memory
 - Schemata
 - Interrelated networks of associated ideas into which new knowledge is assimilated

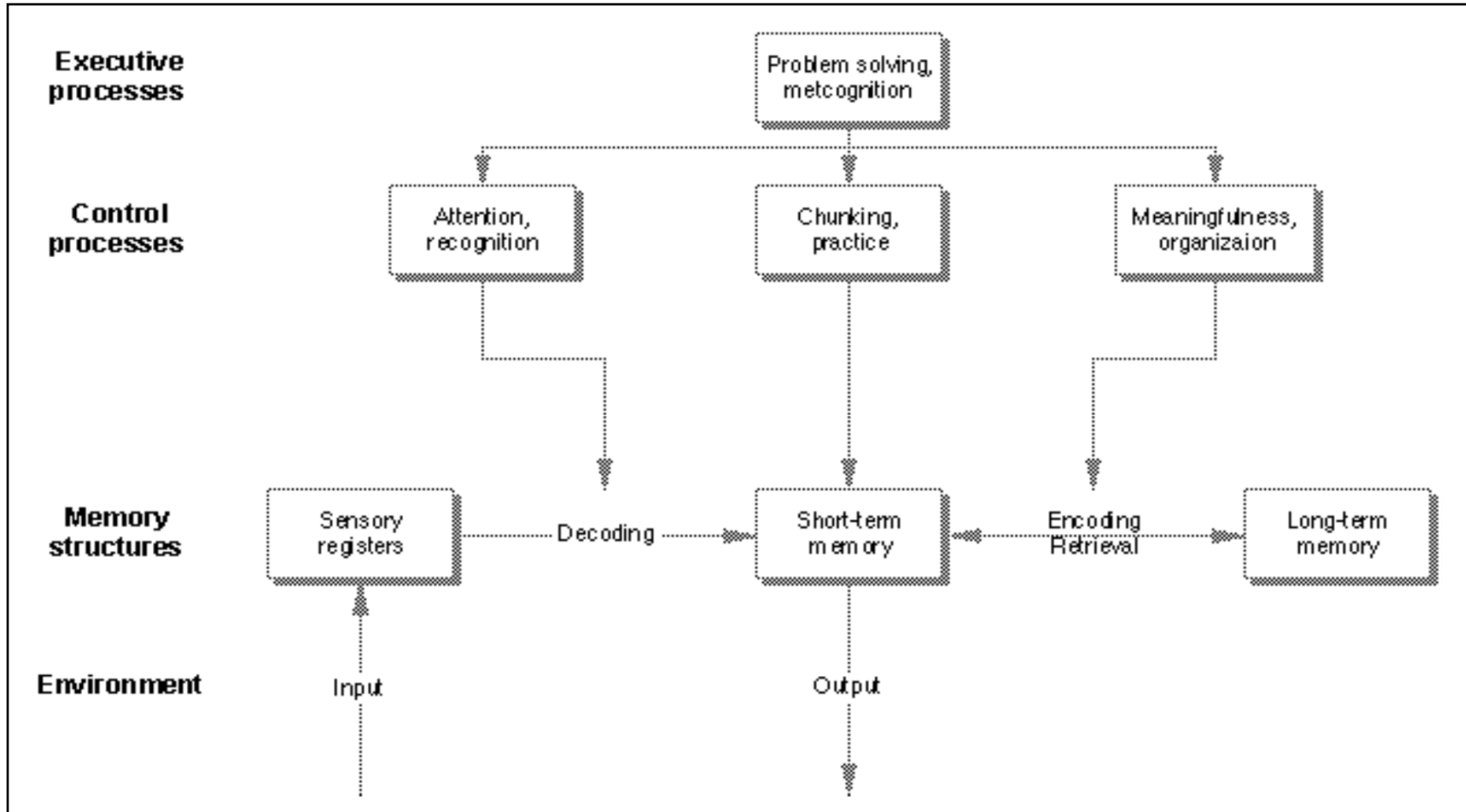
A Model of Information Processing

- How Well Do We Remember What We Learn in School?
 - More than 7 out of 10 studies reported less than a 20% loss of what was learned.
 - Subject matter that had a higher than average level of unfamiliar facts and for which students would have little relevant prior knowledge was associated with increased levels of forgetting.
 - Most of the forgetting of information occurred within 4 weeks after the end of a unit of instruction.

A Model of Information Processing

- How Well Do We Remember What We Learn (cont'd)?
 - Less forgetting occurred among students who learned the material to a high level either by being required to achieve a high score, teach it to less knowledgeable students, or take advanced courses.
 - Less forgetting occurred in classes where students were more actively involved in learning.

The Governance of Memory



Metacognition

- The Nature and Importance of Metacognition
 - Metacognition is our knowledge about attention, recognition, encoding, storage, and retrieval and how those operations might best be used to achieve a learning goal

Metacognition

- The Nature and Importance of Metacognition
 - contains what we know about how person variables, task variables, and strategy variables affect learning
 - thus determines the extent to which students can be strategic learners

Metacognition

- Age Trends in Metacognition
 - Primary grade children have limited knowledge of:
 - their memory capability
 - factors that affect reading comprehension and recall
 - the need to tailor learning tactics to task demands
 - when they have learned something well enough that they can pass a test
 - Metacognitive knowledge develops with age, experience, and instruction

Technology as an Information-Processing Tool

- Technology Tools for Writing
- Technology Tools for Reading
- Technology Tools for Science and Math
- Technology Tools for Art and Music
- Multimedia, Hypermedia, and Virtual Environments