

# Psychology 2200

## Developmental Psychology I: Fundamentals

### Are Kids Just Like Computers?

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## learning objectives

- describe the four components of Information Processing Theory's mental system
- explain how each one works and how they work together
- explain how Information Processing Theory explains development of cognition (thinking)
- describe a study that presents evidence of the development of metacognition
- contrast Information Processing Theory and Piaget's Constructivism



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## the VP puzzle



Tim Cook, the CEO of Apple, is looking for a business partner to help him make Macs better. Apple Inc. makes about \$8 billion profit a year and Tim is willing to give half of his cut to whoever becomes his partner.

Apple's 3 best VPs are gathered into a room and seated, facing one another, and are shown 2 black hats and 3 white hats. You are one of the VPs. Each of you is blindfolded, and 1 hat is placed on each of your heads, with the remaining hats hidden in a different room. The blindfolds are then removed. You see 2 white hats on the other VP's heads.

▷CLICKER

I'd go back to work  
I'd say my hat is black  
I'd say my hat is white

Tim tells you that the first VP to guess the colour of your hat without removing it or looking at it will become his partner. A wrong guess will mean getting fired. As a third alternative, you may choose to not guess, and simply go back to work.

After some time you realize that the other VPs are unable to deduce the colour of their hat, or are unwilling to guess. Would you say or walk? If you say, what colour would you say?

Note: You know that your competitors are very intelligent and quick-minded (*almost* as quick-minded as you) and want nothing more than to become Tim's partner.



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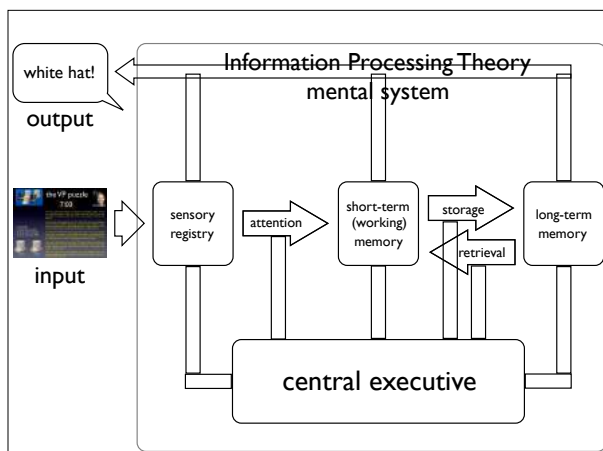
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## sensory registry

mouse



- computer analog: mouse, keyboard
- represents sights and sounds directly and stores them briefly
- when **attention** applied to these inputs, they arrive in short-term (working) memory

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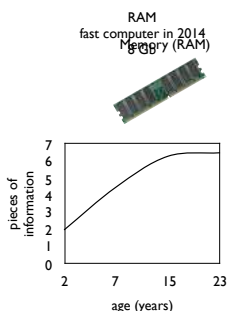
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## working memory

- computer analog: RAM (memory)
- holds limited amount of information that is worked on to facilitate memory and problem solving
- can **store** information to long-term memory



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## long-term memory

Hard Drive  
large computer in 2014  
1 Tb



- computer analog: Hard Disk
- stores information permanently
- information must be **retrieved** to enter working memory and therefore be useful

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## central executive

Hard Drive  
fast computer in 2012  
2.7 GHz



- computer analog: Central Processing Unit (CPU)
- conscious part of the mind
- oversees the whole process, telling the rest of the system what to do
- selects, applies, and monitors the effectiveness of strategies
- including metacognition - awareness and understanding of the various aspects of thought

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## How did we solve the VP puzzle?

- Piaget: "logical reasoning abilities"?
- Information Processing Theory
  - **attention** - keep on task, tune out distractions
  - **memory** - remember where we are in nested scenarios
  - **speed** - work through scenarios faster
  - **organization** - choosing, using, and switching strategies
  - **metacognition** - thinking about thinking, evaluate one's strategy
- each process develops on its own trajectory, continuously



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## metacognition

central executive

- Does metacognitive ability develop?
  - Markman (1977)
  - N = 36 children, 6-8 year olds
  - metacognitive tasks
    1. magic trick
    2. card game
  - children given insufficient information to play the game
  - dependent variable: How long would it take them to complain that the game's rules were insufficient to play?

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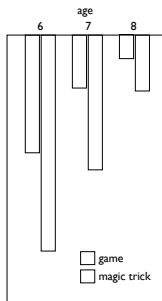
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## dependent measure

"hey, wait a minute!"



1. "That's it. Those are my instructions."
  2. "What do you think?"
  3. "Do you have any questions?"
  4. "Did I tell you everything you need to know to play the game?"
  5. "Did I forget to tell you anything?"
  6. "Can you tell me how to play?"
  7. "Did I tell you everything you need to know to play the game?"
- "Do you think you can play? Let's play; you go first."  
 "Did I forget to tell you anything?"  
 "Are you sure?"

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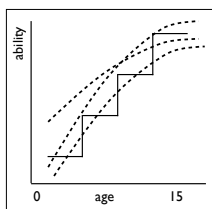
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## Piaget vs. Info. Processing

development is...	Piaget	Information Processing
continuous?	no	yes
global?	yes	no



- but agree that intellectual development finished by age 15
- after the midterm: epistemic development only begins then

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