

Human Abilities 2

How do people think?

Universal Design



Overview

I. Senses

- A. Vision
- B. Hearing
- C. Touch
- D. Smell?

II. Information processing

- A. Perceptual
- B. Cognitive
 - 1. Memory
 - a. Short term
 - b. Medium term
 - c. Long term
 - 2. Processes
 - a. Selective attention
 - b. Learning
 - c. Problem solving
 - d. Language
- C. Motor system

III. Motor system

IV. Motivations

V. Social Attachments

TODAY



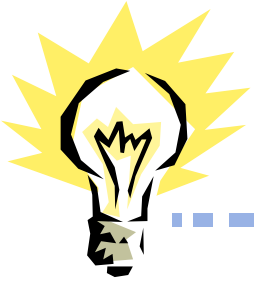


II. Information Processing

➤ Three major systems of human information processing:

- ❖ Perceptual (read-scan)-->memory
- ❖ Cognitive (think)
- ❖ Motor system (respond)

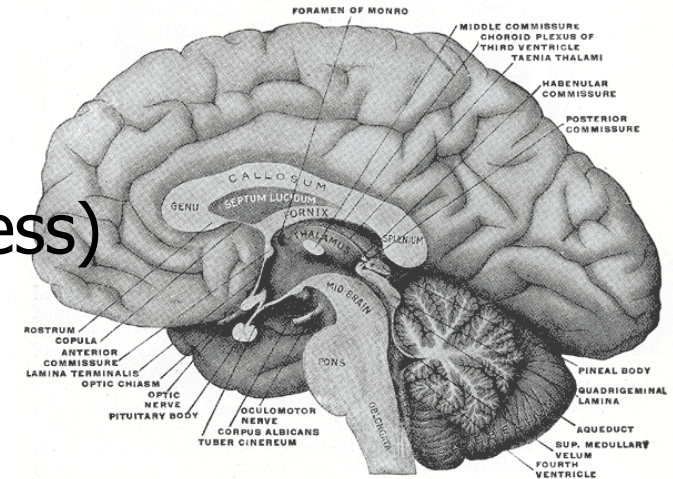


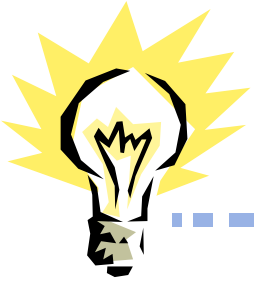


Memory

➤ Four “types”

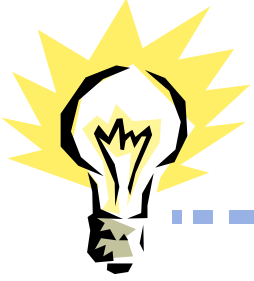
- ❖ **Perceptual “buffers”** (e.g., chess)
- ❖ **Short-term memory**
Conscious thought, calculations
- ❖ **Intermediate**
Storing intermediate results, future plans
- ❖ **Long-term**
Permanent, remember everything ever happened to us





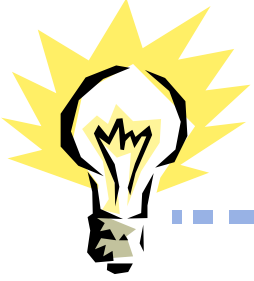
Perceptual Store

- Visual and auditory impressions
 - ❖ visuospatial sketchpad, phonological loop
- Very brief, but veridical representation of what was perceived
 - ❖ Details decay quickly ($\sim .5$ sec)
 - ❖ Rehearsal prevents decay
 - ❖ Another task prevents rehearsal



Short-term memory

- Use “chunks”: 4-5 units (not 7 ± 2 !)
- Display format should match memory subsystem used to perform task
- New info can interfere with old info



Chunking Examples

- CBNCBASBC? ASANSICIBFASN?
- CBSABCNBC? NSAFBICIANASA?
 - ❖ CBS ABC NBC
 - ❖ NSA FBI CIA NASA

- Phone numbers
 - ❖ 34617657322 vs. 34 617 657 322
 - ❖ 4048948265 vs. 404 894 8265



Design Implications?

- Minimize pipeline between info presentation and taking action
- Larger intervals for complex info



Long-term Memory

- Seemingly permanent & unlimited
 - ❖ Access is harder, slower (Activity helps)

- Episodic memory
 - ❖ Events & experiences in serial form
 - Helps us recall what occurred

- Semantic memory
 - ❖ Structured record of facts, concepts & skills
 - One theory says it's like a network
 - Another uses frames & scripts



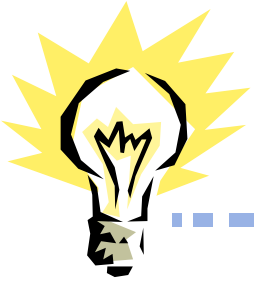
Recognition vs. Recall

- Which is easier?
 - ❖ Acronym lists from earlier?
 - ❖ What color is this text?
- Design implications?



Cognitive Processing

- Four main processes of cognitive system:
 - ❖ Selective Attention
 - ❖ Learning
 - ❖ Problem Solving
 - ❖ Language

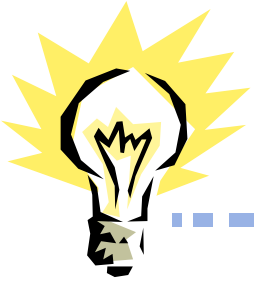


Selective Attention

- We can focus on one particular thing
 - ❖ Cocktail party chit-chat

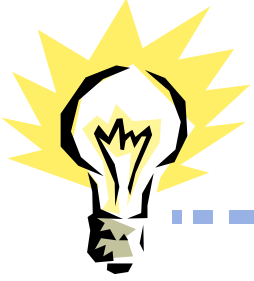
- Salient visual/auditory cues facilitate this
 - ❖ Examples?
 - Boldface, blinking and beeping

- Visual or Auditory Streams form after a few seconds



Learning

- Procedural Learning
 - ❖ How to do something
- Declarative Learning
 - ❖ Facts about something
- Involves
 - ❖ Memorization
 - ❖ Understanding concepts & rules
 - ❖ Acquiring motor skills
 - ❖ Automatization



Learning

- Facilitated
 - ❖ By analogy
 - ❖ By structure & organization
 - ❖ If presented in incremental units
 - ❖ Repetition

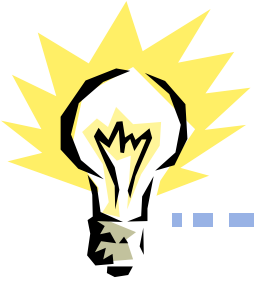
- Use user's previous knowledge in interface



Where should you put a menu?



<http://www.hollistercreative.com/dont-put-your-websites-main-navigation-on-the-bottom/>



People

➤ Good

- ❖ Infinite capacity LTM
- ❖ LTM duration & complexity
- ❖ High-learning capability
- ❖ Powerful attention mechanism
- ❖ Powerful pattern recognition

➤ Bad

- ❖ Limited capacity STM
- ❖ Limited duration STM
- ❖ Unreliable access to LTM
- ❖ Error-prone processing
- ❖ Slow processing

Computer is opposite!
Allow one who does it
best to do it!
(Function allocation)



Recap

➤ Know your user!

I. Senses

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- B. Hearing
- C. Touch
- D. Smell?

II. Information processing

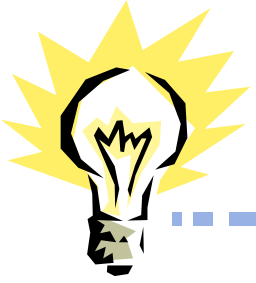
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IV. Motivations

V. Social Attachments

Design Implications?!



Assignments

➤ D1

❖ Questions?