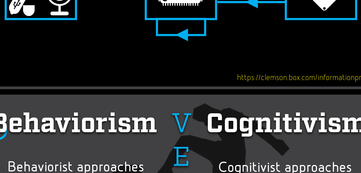
Information Processing



https://clemson.box.com/informationprocessing

Behaviorism VERSUS Cognitivism

Behaviorist approaches focus on the observable environment and ignores unseen mental processes

STIMULUS → ??? → RESPONSE

Cognitivist approaches claim that mediational (mental) processes can be studied using experiments

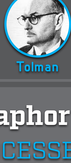
INPUT → MEDIATIONAL PROCESS → OUTPUT

Mediational Processing

Events take place between input and output:

- Varying degrees of paying attention
- Interpreting information from perception
- Relating new knowledge to old (problem solving)
- Encoding and retrieving valuable information

= We must understand mediational processes to understand behavior



Tolman

Piaget

*These two were integral to the rise of cognitivism

The Computer Metaphor

Essentially, humans interpret, code, store, and retrieve info similar to a computer

INPUT PROCESSES
Stimuli trigger attention and analysis

STORAGE PROCESSES
The brain interprets and manipulates data

OUTPUT PROCESSES
Important data is encoded to and retrieved from long-term storage for future use

EFFECTIVE TEACHERS SEEK TO ENCODE INFORMATION FOR LONG-TERM RETRIEVAL

Memory

SENSORY
Passive

Lasts .5 to 3 seconds
(longer for echoic than iconic stimuli)

Screens stimuli unconsciously for pertinent information

Affected by attention

WORKING
Active

Lasts 5–15 seconds
(unless mental rehearsal occurs)

Will experience interference:
- Any disruption to rehearsal/coding
- Creates decay

Holds 5–9 items at a time

LONG-TERM
Activated

Organized by Schemas

Considered unlimited in capacity and more-or-less permanent

Types:
- Declarative knowledge (knowing what)
- Procedural knowledge (knowing how)
- Episodic knowledge (individual memories)

Attention

Automatic – not intentional or voluntary

Selective – consciously chosen

Decays – stimuli that does not receive attention is lost

Incomplete – initial meaning is based on sensory perception

Activity
watch, listen, and recall

Cognitive Load

Means of improving cognitive load:

AUTOMATICITY
the ability to perform a task quickly from repeated practice

SELECTIVE PROCESSING
intentionally focusing on only things relevant to a task

TIPS

writing down information, creating acronyms/initialisms, finding and recognizing patterns, moving and seeking visual cues (visuospatial stimuli), writing and reciting songs or rhymes, etc.

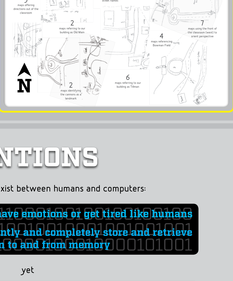
Mapping from Memory

Activity

On the paper provided, draw a map of how you will get from class to your car this evening.

Include landmarks and references that would help someone else understand your path.

Once you have finished your drawing, compare your visuospatial awareness and memory of Clemson's campus with those around you!



KEY CONTENTIONS

Important differences exist between humans and computers:

As of yet, computers don't have emotions or get tired like humans

Computers can more efficiently and completely store and retrieve information to and from memory

yet

A computer's central processor has limited capacity, and capacity limitations also affect the human attentional system

Computers were initially limited to serial processing, but modern computers parallel process (just differently from humans)

Implications for Education

K-12

An educator should try to engineer instruction in such a way that students encode all important information to their long-term memory.

The more information is dispersed across complementary modes and stimuli, the greater chance that a learner's memory will attach to the information.

Never underestimate the limits of attention.

Parallel processing ≠ conscious multitasking.

Cognitive load is not predetermined, it can be improved with various memory aids and devices.

Information committed to rehearsal is not nearly as long-lasting and influential as information that is encoded.

The human brain does not compute the answers to a problem like a computer does; it encodes and retrieves solutions from memory.

Encoded knowledge is the best outcome for instruction.

College

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Teacher

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