Psychological Mechanisms

- The information processing system
- Central issues in language processing
- Development of the processing system

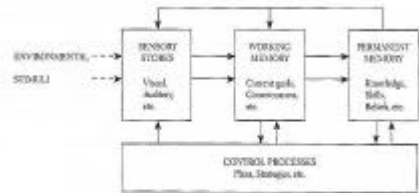## A general model of information processing

Figure 3-1. A general model of information processing.

Sensory store

- rich in information
- short in life (visual 1s; auditory 4s)

1 4 1 4 9 6 8 3 2 0 9 0 2 9 9 4 0

Working (short term) memory

- Small processing capacity
- Chunking
- Relatively short life (maybe up to 30 minutes)

Permanent (long term) memory

- Episodic memory: memory of specific events, linked to a time and a place
- Semantic memory: knowledge not linked to a time and a place

Language processing

WORKING MEMORY
- store in the auditory sensory store for 2-4 seconds.
- **Pattern recognition**
- Organize sounds→ syllables → words→ constituents

PERMANENT MEMORY
- Semantic memory
- Episodic memory

Serial and parallel processing

- Serial processing– a group of processes takes place one at a time

- Parallel processing– two or more of the processes take place simultaneously
- Parallel distributed processing (PDP)– simultaneously process a large amount of information
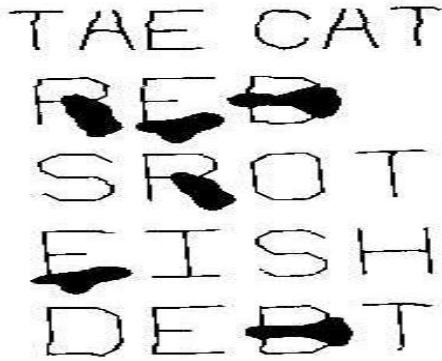
Top-down and Bottom-up Processes

- Bottom-up processing– proceeds from the lowest level to the highest level
- Top-down processing– information at the highest levels may influence processing at the lower levels

Automatic and controlled processes

AUTOMATIC PROCESS	CONTROLLED PROCESS
- Do not require much processing capacity	- Require extra processing resources
- Unrelated to the age of the individual and the strategy employed	- more sensitive to development and strategy effects
- Biologically built or consequence of practice	

Modularity

- Independence of the language processing system, taken as a whole, from the general cognitive system
- Linguistic subsystems, such as semantics and syntax operate independently rather than interactively.

Defining properties (Fodor 1983)

- Automatic: fast, computationally efficient, obligatory
- Domain-specific: only deal with one kind of information
- Informationally encapsulated: there are only very limited ways of getting information into and out of each module
- Neurologically distinct: a module is realized in brain by a distinct neural subnetwork

Is language a module?

- Automatic: native speakers process their language fast and efficiently.
- Domain-specific: language processors can only process language, not other kinds of sounds or structures… ?
- Informationally encapsulated: beliefs don't affect language structure, or vice versa… ?
- Neurologically distinct: there are people who show double disassociations between language and intelligence, e.g.,

specific language impairment affects only language, not other cognitive skills

Williams Syndrome results in mental retardation while language skills are actually enhanced.

Examples of language processing

- I was afraid of Ali's powerful punch, especially since it had already laid out many tougher men who had bragged they could handle that much alcohol.

  (from Clark & Clark, 1977, p.81)

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Development of the processing system

1. Perceptual processing
- Infants prefer human faces and human voices
- Infants can distinguish phonetic contrasts in all the languages of the world.
- Habituation /dishabituation

Working memory

- There is no substantial increase in overall working memory capacity with development at least from 6 years to adulthood.

Sensorimotor development

- Object permanence (18-24months)

4 months or younger "out of sight, out of mind."
8 months search for objects partially covered.

- Pretend play: use an object in playful and unconventional manner.
- Deferred imitation: imitate a behavior seen sometime before.

Transition from sensorimotor to preoperational period