Memory: How Do We Remember What We Know?

Chapter 3

Psychology of Intelligence Analysis

Intro

- Time travel possible?
- Alzheimer's disease
- All because of memory
  - Free trials at one cost
  - Learn from mistakes without making them
  - Predict future

Three Memory Processes

- Sensory Information Storage (SIS)
- Short-term Memory (STM)
- Long-term Memory (LTM)
- Differs in
  - Functionality
  - Capacity
 - Content
  - Strength

Sensory Information Storage

- Tenths of seconds
- Visual trace: 0.25 seconds
- Movie films 16 fps, continuous
- Not possible to extend
- Complete image

Short-Term Memory

- Seconds or minutes
- Only interpretation is retained
- Limited capacity
  - 5-6 items
- Direct access
- Permanent storage via rehearsal

Long-Term Memory

- No storage limitation
- Need process and retrieval
- Key issues:
  - Memory organization
  - Methods of storing and retrieving
    - Experiments via fMRI
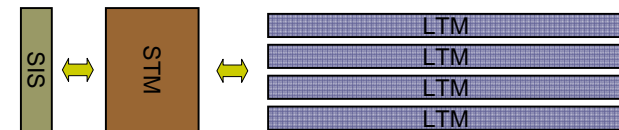
Brain Physiology

"In a matter of seconds, new circuits are formed that can change forever the way you think about the word"

Memory Retrieval

- Interconnected network
- Retrievability
  - Location numbers
  - Interconnection numbers and strength
- Frequent thoughts strengthen paths
- Mental ruts: different perspectives

Memory Organization

- Schema: *any pattern of relationships*
  - A group of nodes and connections
  - Retrieved and used as a single unit
  - Could be either concrete or abstract
  - Connections to multiple schemata for any point
  - Content determines analytical ability

How to Learn

- Continuous repetition does not guarantee
- Two factors
  - How close the new info is related to existed schemata
  - Level of processing (effort)

  bread, eggs, butter, salami, corn, lettuce, soap, jelly, chicken, coffee

  juice, cereal, milk, sugar, bacon, eggs, toast, butter, jelly, coffee

Methods of Learning

- Rote
  - Separate schema, not connected with previous
  - Least efficient
- Assimilation
  - Linked to existing schemas
  - Retrieve old and reconstruct
  - Desirable but rely on previous experience
- Mnemonic device
  - Organize and encode info
  - Acronyms, story lines, imaginary scenes…
  - Good for new concept structures and schemas

Memory and Intelligence Analysis

- Stretching the limits of working memory
  - Externalizing
    - Due to the limited "working memory"
    - Write down all components, show connections
    - View it out of the head
  - Initially artificial
  - Integrated for later assimilation