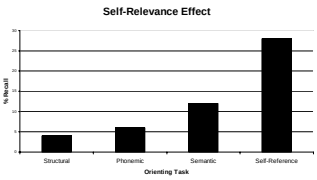
Levels of Processing

- Craik & Lockhart
  - Continuum of Processing
    - Shallow: surface, perceptual features
    - Deep: processed, meaningful interpretation
  - Level or "depth" of processing affects its memorability
  - Deeper encoding produces more elaborate, longer-lasting memory traces

Doubts about Depth

- Levels of Processing doesn't account for all factors that affect memorability
  - Importance of Organization
  - Memory for Personally Relevant Information
  - Self-Generation Effect
  - Elaboration
  - Distinctiveness

Memory for Personally Relevant Info



- Self-Relevance Effect – finding that judgments about self-relevance lead to better recall than other common encoding tasks

What causes the self-relevance effect?

- Self-schema (Rogers et al.)
- Well-Known Topic
- Bower & Gilligan
  - Self-relevance vs. Other-person relevance
  - Almost equally effective

Self-Generation Effect

- Generation Effect (Slamecka & Graf)
- Subs who generate their own associations for words remember more than those who take the experimenters'
  - Rhymes with 'sow' and begins w/a 'b'
  - Sow—Bow

Slamecka & Graf

- Read
  - Opposite
  - Associate
  - Same-Category
  - Synonym
  - Rhyme
- Generate
  - Opposite
  - Associate
  - Same-Category
  - Synonym
  - Rhyme

- Memory depended on relationship between words
  - Rhymes worse than semantic conditions
- Generate condition led to better recall & recognition
  - Magnitude of difference roughly equal for all 5 rules!

Generation Effect

- Replicated many times
  - Free recall, cued recall, recognition
- Generation effect does not occur
  - When items are meaningless
  - When relationships haven't been thought out
  - When non-generated items (in control condition) processed slowly

Elaboration

- Levels of processing not full account
  - Some deep encoding tasks work better than others
- Craik & Tulving
  - She cooked the _____
  - The great bird swooped down and carried off the struggling _____
- *Kind* of elaboration matters
- Bransford & colleagues
  - A mosquito is like a doctor because they both draw blood.
  - A mosquito is like a raccoon because they both have heads, legs, and jaws.

Self-generated elaboration not always best encoding technique

Stein & Bransford

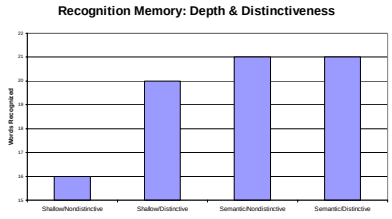
- Base
  - The fat man read the sign.
- Self-Generate
- Imprecise Elaboration
  - The fat man read the sign that was 2 feet tall.
- Precise Elaboration
  - The fat man read the sign warning about the ice.

- Fill in the missing adjective
  - The ? man read the sign
- Base
  - 4.2/10
- Self-Generate
  - 5.8/10
- Imprecise Elaboration
  - 2.2/10
- Precise Elaboration
  - 7.8/10

Doubts about Depth

- Distinctiveness
- Eysenck & Eysenck
  - Distinctive (comb) vs. Nondistinctive (brush) Pronunciations
  - Shallow Orienting Task
    - Pronounce as if it were regular
  - Semantic Orienting Task
    - Is it an animal?

Eysenck & Eysenck Data



Distinctiveness

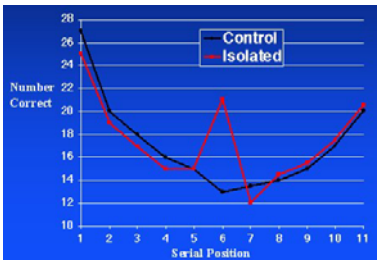
- Material incongruent with an active conceptual framework
- Influences memory by:
  - Processing: increased attention to distinctive items
  - Representation: distinctive items stand out, more easily retrieved

Primary Distinctiveness

- Incongruity defined with respect to immediate context
- Von Restorff Effect
  - Finding that an item that differs in color or size from other items on a serial recall test will be more likely to be recalled than the when the same item resembles the others in color or size

- Apple
- Railway
- Magazine
- Leather
- Tower
- BOTTLE
- Pupil
- Sailor
- Diamond
- Library
- Ticket

Von Restorff Effect



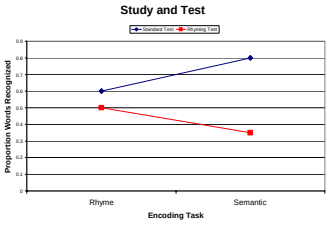
Secondary Distinctiveness

- Incongruity defined with respect to past experience
- Life Experiences
  - First day at college
  - First time in a big city
- Orthographic Distinctiveness
  - Words with unusual spellings well remembered
  - Llama, khaki, afghan
- Unusual Faces
  - Faces rated unique easier to recognize than faces rated typical (Going & Read)

Distinctiveness

- Explains memory performance above and beyond elaboration
- Increases memory by
  - Increased attention at encoding
  - Increased retrievability
- 2 major types of distinctiveness
  - Primary – wrt immediate context
    - Von Restorff effect
  - Secondary – wrt expectations, experiences
    - unusual faces, firsts, etc.

Doubts about Depth



- **Transfer Appropriate Processing**
- Morris and colleagues

Encoding Specificity

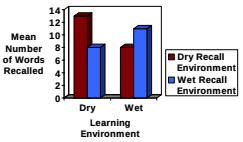
- The probability of recalling an item at test depends on the similarity of its encoding at test and its original encoding at study
- Thomson
  - Study: sky blue
  - Task: remember 2nd word
  - Recognition Test: blue vs. sky blue
  - 76% vs. 85%
  - Conceptual aspects of study context helpful in test context

Encoding Contexts Effects

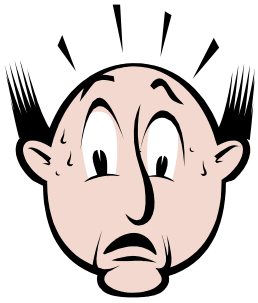
- Physical Context
  - Smith, Glenberg, & Bjork
  - Day 1: Learn paired associates in windowless room
  - Day 2: Learn paired associates in tiny room w/windows
  - Day 3: Recall associates in 1 of the rooms
  - 59% in same setting; 46% in other
  - Recall best if context at test matches study context

Context-Dependent Learning

- Divers learned 40 unrelated words
  - On shore
  - 20 feet underwater
- Recall list in same or different environment

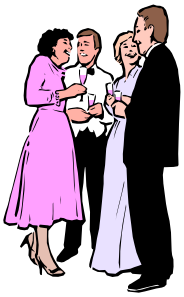


Emotional Context



- Bower, Monteiro, and Gilligan
  - Learn 2 lists
  - Hypnotically induced positive/negative state
  - Recall test under either (hyp. Ind.) positive/negative state
- Better memory when emotional state at test matched emotional state at study

State-Dependent Learning

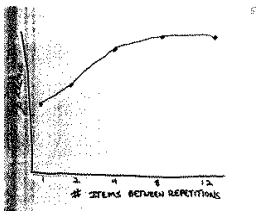


- Recall easier when in same physical/emotional state as learning
- Drunks
  - Where did I hide that gallon of scotch?
  - Where did I hide the last $10 from my paycheck?

State-Dependent Learning

- Eich et al.
- Study Phase
- Test Phase (4 hours later)
- MJ/CS
  - 12%
- CS/MJ
  - 20%
- MJ/MJ
  - 23%
- CS/CS
  - 25%

Spacing Effect



- Finding that memory better for repeated information if repetitions are spaced apart, rather than massed together
- Melton
  - Present words 2x per list w/repetition varying in number of intervening items
  - When # of intervening items increases, so does the probability of recall

Practice

- Both amount & distribution of practice matter
- Better to have less practice/day distributed across more days
- Better to have repetitions separated by other things to learn
- Best practice comes from retrieving the information at expanding intervals

Encoding: Practical implications

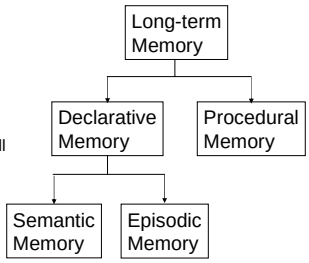
- Memory influenced by exhaustiveness of processing
  - Self-generation effect
  - Maintenance Rehearsal
    - Inefficient but it works!
  - Elaborative Rehearsal
    - Most Effective Strategy

Elaboration and Memory

- Subjects elaborate information they study
  - Connections to prior knowledge
  - Features from current context (internal & external)
- Elaboration improves memory
  - Increases redundancy of interconnections between incoming info
  - Imposes organization on info that helps guide retrieval
  - Increases number of contextual elements that can overlap between study and test

Types of Memory

- Declarative & Procedural
  - Episodic & Semantic
- Explicit & Implicit
  - Explicit coextensive with declarative
    - Episodic & Semantic
  - Implicit Memory includes Procedural Memory as well as others
    - Priming
    - Classical Conditioning
    - Nonassociative Learning



Declarative

- Static
- Knowing that…
- Examples
  - Mother's birthday
  - When you last put gas in your car
  - How to spell oxymoron

Procedural

- Dynamic
- Knowing how…
- Examples
  - How to tie your shoes
  - How to ride a bicycle
- Difficult to express

Episodic

- Specific episodes
  - Originate in individual's life
- Time stamp
- Association btw. Memory & its Source
- Truth of memory established by individual's belief

Semantic

- General information
  - Source not necessarily known
- No time stamp
- Source unknown ("I just know it.")
- Truth of memory established by cultural consensus

Implicit Memory

- Information expressed w/o conscious recollection
- Task-Based
  - Stem completion
  - Priming
- No single goal
  - No direct reference to past events

Explicit Memory

- Information expressed with conscious recollection
- Task-Based
  - Free recall
  - Recognition
- Goal-directed
  - Refer to past events