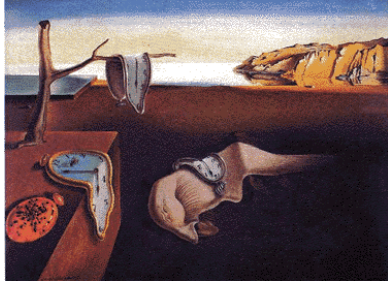


## Human Memory: Encoding



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## Forming Memories

- History is sometimes determined by what people can remember about events
- Watergate
  - John Dean
    - "Human tape recorder"
  - Recollection of essentials correct
  - Recollection of details poor
- Need a model of memory



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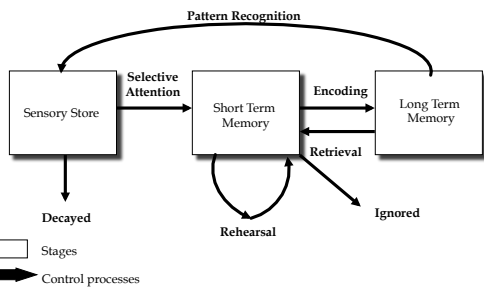
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## Information Processing



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### Automatic Processing

- Information
  - Space, Time, Frequency
  - Practiced tasks
- Characteristics
  - Occurs with little or no effort
  - Occurs without awareness
  - Occurs without interfering with other tasks

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### Stroop Task

- Used to assess automatic processing
- Name color a word is printed in
  - Words processed automatically
  - Naming word colors effortful
- Conflicts arise because both systems are using the same processes
  - Interference

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### Effortful Processing

- Information we remember only with effort and attention
- Rehearsal
  - Ebbinghaus (1850 –1909)
  - Nonsense syllables
    - JIH, BAZ, FUB, YOX, SUJ, DAX, LEQ, VUM
  - Tested retention

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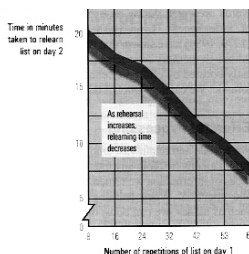
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### Retention Curve

- Recalled few syllables the following day
- Relearned
  - More frequent repetitions on Day 1
  - Less repetitions to learn on Day 2
- Time spent learning




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### Spacing Effect

- Retain information better when rehearsal is distributed over time
- Bahrick & Hall (1991)
  - Memory of high school algebra
- Bahrick & family members
  - Foreign language word translations
- Memory system is optimally designed to support our functioning and survival

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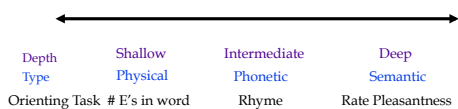
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### Levels of Processing Theory

- Memory depends on processing
- Deeper processing results in a stronger memory trace
- Encode physical – poor retention
- Encode meaning – good retention




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## Encoding Meaning

- Repetition frequently is insufficient for storing information in LTM
- Memory is best for meaning
  - Tie in new knowledge with rest of knowledge base

The procedure is actually quite simple. First you arrange things into different groups. Of course, one pile may be sufficient depending on how much there is to do....After the procedure is completed, one arranges the materials into different groups again. Then they can be put into their appropriate places. Eventually, they will be used again and the whole cycle will then have to be repeated. However, that is part of life

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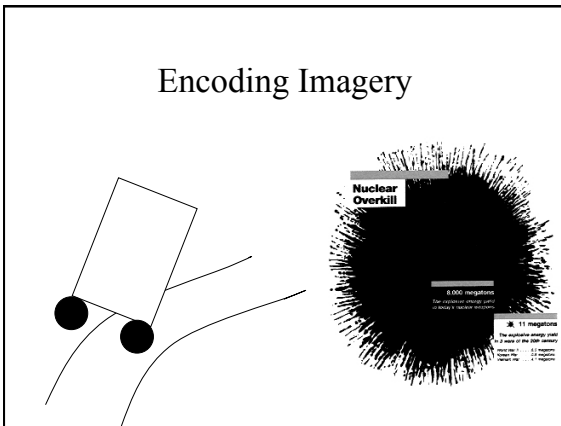
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## Encoding Imagery




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## Dual Coding Hypothesis

- Paivio (1986)
- Memory for concrete nouns better than memory for abstract nouns
- Concrete nouns – dual code
  - Image and verbal encoding
- Abstract nouns – single code
  - Verbal encoding

Item	Memory code
FISH	 + "FISH"
TRUTH	"TRUTH"

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## Chunking

- Organization aids in memory storage
  - Meaning and imagery enhance organization
- Organization can increase the number of items stored in short term memory
  - Chunking
  - Typical capacity of STM is 5-9 items
  - Chunking can increase this capacity

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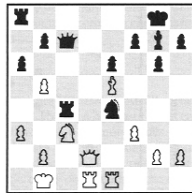
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## Chunking (de Groot, 1965)

- Experts vs. novices
  - Ss shown game half way in progress.
  - Board cleared and Ss had to replace the pieces



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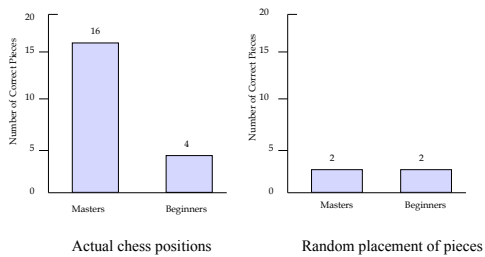
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## Expert Knowledge and Short Term Memory



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## Encoding: Review

- Encoding – Repetition
  - Incoming information gets stored in LTM through repeated exposures to the information
- Encoding – Meaning
  - Store information in LTM based on meaning
- Encoding – Images
  - Store information in LTM based on images
- Encoding – Chunking
  - Store information in STM using organization of LTM

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