

Cognitive Psychology

PSYC230

Lecture # 7

Review

Primary memory

(aka short-term memory or working memory)

Four types of memory task

cued recall, serial recall, free recall, & recognition

Recognition tasks easiest

Serial recall hardest

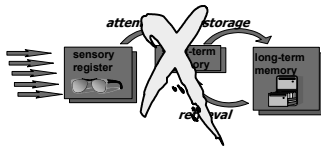
Cued recall may be easier than Free recall
(depending on the cue)

The Traditional View of STM
and the Three Store Model (buffer model)

Review

Short-term memory as buffer or workbench with room for 7 ± 2 items didn't fit the research findings!

The concept of short-term memory
and the Three Store (buffer) model



Later models (e.g., *Levels of Processing & Working Memory*) focussed on **encoding processes** instead of separate memory stores

Encoding Processes

Simplest form of encoding is Maintenance

Rehearsal – untransformed information

Total time/Repetition Effect

The longer the rehearsal/more repetitions, the better the memory

Distributed Practice Effect

Spacing effect, better memory when rehearsal is distributed across multiple sessions

Distributed Practice Effect

Some types of repetition seem to help more than others

Greeno (1964)

Cued recall -- Paired associates task

Massed condition	Spaced condition	Results:
ice – brush	ice – brush	higher recall with spaced practice even with fewer repetitions
ice – brush	dog – bicycle	
ice – brush	car – apple	
ice – brush	floor – card	Optimal spacing was 10-20 items
dog – bicycle	ice – brush	
dog – bicycle	dog – bicycle	
dog – bicycle	car – apple	
dog – bicycle	floor – card	
car – apple	ice – brush	

Distributed Practice Effect

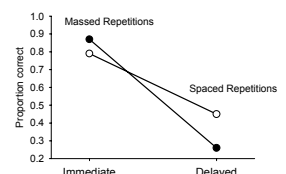
Peterson, Wampler, Kirkpatrick, & Saltzman (1963)

Cued recall -- Paired associates task

Manipulated the spacing of repetitions and the time between second presentation and test

Found that spaced repetitions were better for delayed (long-term) recall

Massed repetitions were better for immediate (short-term) recall



Distributed Practice Effect

The difference between the groups may have resulted from having a larger number of slightly different memory traces instead of a few strong ones

The spaced practice groups were processing the words a little differently on each trial, (because of adjacent pairs, fatigue, etc.)

The number of different memory traces is more important than the strength of any individual memory trace

Maintenance Rehearsal

Information is maintained in the same form it arrives
If items are similar there may be interference between them

Phonological Similarity Effect (Acoustic Interference Effect)

Free recall task -- Three lists

Maintenance Rehearsal

Another maintenance rehearsal effect is the Word Length Effect

A list of short words is easier to recall than a list of long words

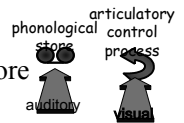
Ellis & Hennelly (1980)

Welsh digits take longer to say than English
Tested English/Welsh bilinguals & measured digit span in Welsh and English
Found Welsh digit span < English digit span

Maintenance Rehearsal

Just listening

Activates the phonological store (2 sec tape loop)



Just repeating

writes to the phonological store via articulatory control process

Subject to all these effects:

Total time/Repetition Effect, Word Length Effect
Distributed Practice Effect, Suffix Effect
and the Acoustic Interference Effect

Intentional vs Incidental Memory

Hyde & Jenkins (1973)

What is the effect of intentionally processing words on memory?

Presented participants with a list of words
measured percent of words recalled
3 types of instructions:

Count the number of letters in the word 39% recalled
(not told of any test, incidental memory)

Study words for a later memory test 69% recalled
(intentional memory)

Rate the Pleasantness of the words 68% recalled
(not told of any test, incidental memory)

Elaborative Rehearsal

Meaningfulness Effect

(Cieutat, Stockwell, & Noble, 1958)

Meaningful words in a paired associates task were easier to recall than nonsense syllables

NEGLAN - ROFNOL	<i>remembered worst</i>
NEGLAN - FEMALE	
CIRCLE - ROFNOL	
CIRCLE - FEMALE	<i>remembered best</i>

Elaborative Rehearsal

Meaningfulness Effect

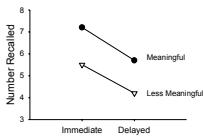
(Underwood, 1964)

Paired associates task

Presented participants with 2 types of letter pairs

Meaningful: VW, AB, TA, etc

Less meaningful: WS, DF, XF, etc



Elaborative Rehearsal

Levels of Processing Experiment

(Craik & Tulving, 1975)



SHARK

Orthographic: "Does the word start with S?"

Rhyme: "Does the word rhyme with park?"

Semantic: "Is the word a type of fish?"

Subsequent recognition test:

Orthographic: 17%, Rhyme 56%, Semantic 73%

Hits – False alarms, chance performance = 0; Craik & Tulving (1975)

Levels of Processing Framework

(Depth of processing model)

Craik & Lockhart (1972)

Memory is a continuum



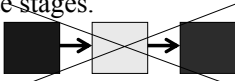
Physical

Maintenance rehearsal
Shallow processing
Poor memory

Meaning

Elaborative rehearsal
Deep processing
Good memory

...NOT discrete stages.



The more deeply something is processed, the better it will be remembered

Doubts about "Depth"

Why does semantic encoding produce a stronger memory trace (better recall)?

Because it was encoded at a deeper level

How do you know it was encoded at a deeper level?

Because it was recalled better

Some circularity of definitions

Elaborative Rehearsal

Is semantic encoding the only type of meaningful encoding?

Self-reference Effect

(Rogers, Kuiper, & Kirker, 1977)

Added a new task to the Levels of Processing experiment

SMART

Orthographic: "Does the word start with S?"

Rhyme: "Does the word rhyme with HEART?"

Semantic: "Is the word a type of person?"

Self-reference: "Does the word describe you?"

Self-reference led to much higher recognition accuracy

Elaborative Rehearsal

Human Associative Memory (HAM) Model

(Anderson and Bower, 1973)

It isn't semantic processing *per se* that is important, but the extent to which new information is linked with other information

Participants told to remember sentences like:

"The doctor hated the lawyer"

1. Study alone - Just try to remember the sentence
2. Elaborate - Generate an elaboration of the sentence

"The doctor hated the lawyer because of the malpractice suit"

57% recall
72% recall

Cued recall test - "The doctor hated the"

Elaborative Rehearsal

Emotion & memory

Events with emotional significance produce memories that seem especially vivid

Flashbulb memories



Were these a different kind of memory?

Was strong emotion energising encoding?

Was the emotion stored with the memory making it stand out?

Elaborative Rehearsal

Effort Effect

(Henry C. Ellis, 1977)

The more *effort* spent encoding the better the memory

Identification of synonyms, backwards spelling, degraded typefaces...

Seat

elbaT

boot

"chair"

"table"

"boot"

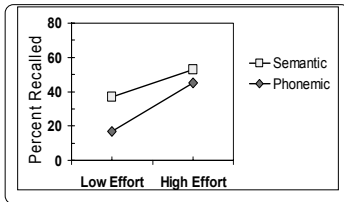
Effort improved recognition regardless of the type of encoding task: semantic, orthographic, or phonemic

Elaborative Rehearsal

Effort Effect

(Henry C. Ellis, 1977)

The more effort involved in encoding, the better the recall



Elaboration requires effort

Elaborative Rehearsal

Encoding Variability Effect

(Paivio & Csapo, 1973)

Compared rehearsal using one encoding process (constant condition) to rehearsal with two encoding processes (variable condition)

Cued recall -- paired associates task

constant

dog - lion

dog - lion

dog - lion

dog - lion

dog - ?

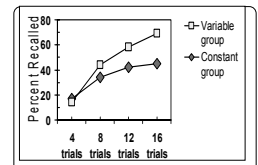
variable

dog - lion

dog - lion

dog - lion

dog - ?



Encoding Processes

Maintenance Rehearsal

Total time/Repetition Effect

Distributed Practice Effect

Acoustic Interference Effect

Word Length & Suffix Effects

Elaborative Rehearsal

Meaningfulness Effect

Depth of Processing & Self-reference Effects

Emotion Effect & flashbulb memories

Effort & Elaboration Effects

Encoding Variability Effect

Encoding Processes

Procedural Memories

(acquisition of skills)

Read these words aloud

8.5 seconds

Present the same list later &

measure again

6.4 seconds

Present new list

7.3 seconds

boog
ysbot
elgnisnt
tzed
ynsm
raiddur
vrev
bnisnt
ecnef
egnsro
vrvol
tzed

Why faster?

General Skill & Specific Benefit

General Skill =

$8.5 - 7.3 = 1.2 \text{ sec}$

Specific Benefit =

$7.3 - 6.4 = 1.1 \text{ sec}$

Amnesiacs show both components, implicit memory

Encoding Processes

Procedural Memories
(acquisition of skills)

A wide range of cognitive skills
may be encoded implicitly

Tower of Hanoi



	Session Number			
	1	2	3	4
Amnesics	47	42	38	33
Controls	48	42	39	34

Number of moves to solution

Multiple Memory Systems Model

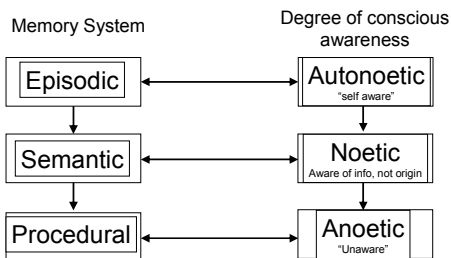
Endel Tulving (1972)



	Episodic	Semantic
Type of Information	Specific events, objects, people	General knowledge, facts about the world
Type of Organisation	Chronological or spatial	Schemas or categories
Source of Information	Personal experience	Generalization from experience, rules learned from others
Focus	Subjective, the self	Objective, the world

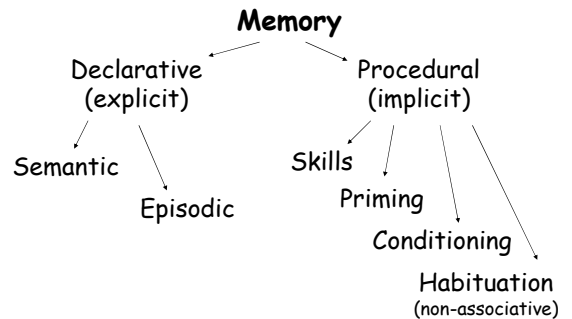
Models of memory (a preview)

Tulving's (1985) model



Squire's (1986)

Taxonomy of Memory



Encoding affects Storage
the control process affects the memory trace

Next time...

Stored information can also
affect how we encode new information

Organisation & Schemata

Integrating new information with
stored memories

Consolidation

Questions?