

## General Psychology

### Human Memory

#### Before Ebbinghaus

##### Gods of memory

Egyptian = Thoth

Roman = Minerva

Greek = Mnemosyne  
mother of Muse

(Aristophanes, 450-385 BC)

“If I’m owed anything, I’m mindful, very. But if I owe, forgetful, very.”

#### Ancient Models

wax tablet model

aviary model (memory like a bird)

scribe model (memory like writing things down)

#### Roman period

1<sup>st</sup> mnemonic technique: method of loci (Cicero)

method of loci imposes a “double task:” must remember things and places  
(Quintilian)

#### Ebbinghaus’ Contemporaries

(Sir William Hamilton)

1859

Single glance of marbles

Hard to see more than 6 or 7

If group in twos and threes, can see 6 or 7 groups

#### Sir Francis Galton

Pioneered use survey questionnaires

Suggested Scotland Yard use fingerprints

Introduced

scatterplots

“co-relation” (correlation)

“regression toward the mean”

1<sup>st</sup> to use weather charts; use of “high”, “low” and “front”

1<sup>st</sup> to study twins

1<sup>st</sup> word association test

Darwin’s cousin

Applied the concepts of evolution to the mind

Survey of rich families (law, medicine, kings);

Concluded success was a function of family heredity, not environment

Survival of the intellectually fittest

Memory is the “antechamber of consciousness”

Autobiographical memory (episodic memory)

Stories about your life

Not all that accurate

Vividness of visual imagery

Recall their breakfast table

People vary greatly

## Ebbinghaus (1850-1909)

### Firsts:

1st to study memory experimentally

1st to study memory as it occurred

### Distributed practice

Teaching Typing

Distributed practice is more efficient

Not necessarily fastest

One 1-hour session for 5 days week

11 weeks                      55 hours

Two 2-hour sessions for 5 days week

4 weeks                        80 hours

Most efficient schedule is one 1-hour session per day

## Types Of Memory

Memory is not one system

### Everyday Memory (practical memory)

J McKeen Cattell (1895)

Do chestnut trees or oak trees lose leaves earlier in the autumn?

Do horses in fields stand with head or tail to the wind?

In what direction do the seeds of an apple point?"

What's on penny

recall 3 of 8 critical features

draw nickel, dime and quarter, both sides

Design a new coin

general schema for a US coin; not specific recall

drawings tended to resemble each other

had features most commonly on coins

Field study of 300 blue- & white-collar jobs

Watched blue collar tasks

product assembly, inventory, & pricing delivery tickets at a dairy

created problems based on observations

Dairy warehouse workers loading trucks

Preloaders task was to pack a given amount of milk by putting together containers of different sizes

Almost always chose most efficient way to fill an order

(add or take from partial cases, etc.)

Few errors, high cognitive demands

More efficient than novice preloaders or a 9th grade control group

Optimal solution

Preloaders                      72%

Inventory people              65%

Clerks                            47%

Graders                         25%

## Conclusions

- Novices used single algorithm solution

- Relied heavily on numerical solutions & counting operations

- Experts shortcut the arithmetic

- worked directly from the “visual display”

## Brazilian street vendors (children)

- 98% accurate with real life problems

- 37% correct with abstracted problems

- Used own counting systems to solve problem

- Knowledge obtained in everyday practice is not portable to formal contexts such as school

- Used most familiar strategy in school

## Prospective memory

Prospective Memory = what going to do

Remembering (forgetting) to do things

### Characteristics

- structure of normal day

- cueing effect (read story, reminds to do something)

- embarrassed when system fails (social importance)

- “when” memory = do this at that time

- low information content (not a great deal of detail)

- One of most sensitive memory parts to aging

- Easier to remember an appointment with others

- harder to do something to an object (collect a document),

Simulate taking pills 4 times a day (Bad

- press button on little box 3 times a day

- 2 groups:

- Good free recall of lists

- Bad free recall of lists

- Good verbal memory group was less accurate = “absentminded professor effect”

2 types of memory demands (Ellis, 1988)

- steps = anytime between now & end of day

- remember periodically over the day

- pulses = do something at a specific time

- easier to remember

- judged more important

- either remember it once or aware of all day

- more likely to note in external memory aid

### Attentional Resources

- Requires attention to identify a cue

## External Memory Aids

1. Non-prospective memory

- No future task to remember

- Photo albums

- Biographies
- Class notes
- Hobbies
- 2. Prospective memory
  - Future task to remember
    - meet someone for lunch, go to doctor, buy food
    - automatic sprinkler system
    - whistle on teakettle
    - appointment book
    - microwave “dings”
    - watch “beeps”
  - Post-it notes
  - clock radio

## Semantic Memory

### Models of Semantic Memory

1. Feature comparison models
  - 2 sets of features
    - a. defining features: necessary; has 4 legs, tail
    - b. characteristic features: optional; had one as a pet

### Problems

- Assumes natural categories have defining features
  - not well supported by data
  - category membership seems to be based more on family resemblance
  - Can't distinguish between statements: A robin is a bird vs. A bird is a robin
  - Using speed of judging may not generalize well
2. Semantic network models
  3. Spreading activation models
  4. Category search models
    - Two empirical findings:
      1. prototypical items are identified faster
        - begin with most typical items
        - longer to identify collie as animal than as dog
        - faster verifying most prototypical items in a given category
        - robin faster than ostrich for BIRD
        - category generation task: list all BIRDS
        - what list first (robin)
      2. negative items are identified slower
        - takes longer to reject negative items from a similar category than from a dissimilar category
        - longer to reject potato than reject ruffle
- Self-terminating for positive (in category)
  - Exhaustive search for negative (not in category)

## Episodic Memory

Episodic Memory = what you did today

## Autobiographical memory

### Working Memory = RAM

Alan Baddeley

#### 1. Phonological Loop

Speech coding system

Phonological store

Stores sounds for about 2 seconds

Refresh with subvocal rehearsal

Articulatory control process

Converts visual info into speech code

#### 2. Visuo-Spatial Sketchpad

Originally called visuo-spatial sketch pad

Later changed to the visuo-spatial scratch pad

Not just pictorial info

Includes word shape, letter shape, etc.

Use for

Geographical orientation

Planning spatial tasks

Abacus use

2 separate processes

Spatial information (where things are)

Visual information (what they look like)

Imagery in working memory is spatial, not visual

Previous research findings

Imagery is involved in memory

Images come from the activation of perceptual systems, even in the absence of sensory input

Eye movements or their control systems might play a role in imagery

Visual-Spatial & Concurrent Tasks

Brooks' matrix

Spatial material

Conclusion

Sketchpad relies on spatial coding

Both Baddeley and Brooks both found

Spatial messages were easier than nonsense

Reducing the length of the nonsense messages from eight to six items made the probability of correct reproduction approximately equal for the two sets

(Shepard & Metzler, 1971)

2D representations of 3D shapes

Measured time needed to rotate figure

Imagery is based on an analog medium: gradual manipulation of the image

not a series of discrete jumps

not an all-or-none system

(Cooper & Podgorny, 1976)

Rotation rate was not a function of how complex figures are

(Kosslyn, 1980)

Series of studies

Picture of boat, remove picture, ask questions

When a question about the bow was followed by a question about a distant part of the boat such as the rudder

It took longer to answer than question about portholes

Conclusion

Ss were physically scanning the image

Read info from mental images

Time to scan along a mental image is a function of distance

When walk toward an object, it expanded to fill their visual field

(Baum & Jonides, 1979)

Similar effect on geographical mental representation

Distance between location on university campus

(Kosslyn, Pick & Fariello, 1974)

Imagine a barrier between 2 objects in a mental image

Distance was judged as farther

(Byrne, 1979)

Distances within town centers judged as further than distance in the suburbs

(Thorndyke, 1981)

Ss taught fictitious maps

Estimated distances between locations

Estimated distance longer as more intervening places included

Smaller effect when Ss reading an actual map

(Intons-Peterson & Roskos-Ewoldsen, 1988)

Ss took longer to imagine traversing a familiar route when told they were carrying a cannonball

## Mnemonics

### Naive Mnemonics

People naturally use them

#### Rhymes

I before E, except after F?

Face-down vs. Face-up

In muggings, muggers must attack

The victim's proper zone:

The belly if he's supine,

And the spine if he is prone.

#### Wives of Henry VIII

Divorced, beheaded, died

Divorced, beheaded, survived

#### Troubadours used rhyme

Until 14<sup>th</sup> century, everything except legal documents were written in rhyme

To remember business conduct, French merchants used a poem with 137 couplets

## Songs

### Alphabet

50 Nifty United States

Do Re Mi

Rehearsal

6<sup>th</sup> century BC

knew that rehearsal helps memory

rehearsal = repetition

keep things in STM

repeat number on the way to the phone

Reduction Mnemonics

Condense material

Acronyms

RADAR

MASH

HOMES

FACE

Elaboration Mnemonics

Add more things but make it simpler

Acrostics

On old Olympus towering top, a Finn and German viewed some hops

Every Good Boy Does Fine

Visualization

Dr Memory: Jerry Lucas

Bizarre Images

Review of 44 studies (Einstein & McDaniel, 1987)

Bizarre helps for tests with very short delays

If:

1. both bizarre & normal images are used
2. imagery instructions are emphasized
3. free recall task

Compare

bizarre interactive

bizarre not interactive

common interactive

common not interactive

Bizarreness didn't help or hurt.

Interactive was better than non-interactive.

Hands

Knuckles are months that have 31 days:

Chunking

Divide and conquer

3-4 items per chunk

7 chunks (plus or minus 2)

Technical Mnemonics

Not spontaneously used by people

Often an encoding technique

Examples:

1. Method of Loci

(Simonides of Ceos (556-468 BC)

Greek poet in 477 BC,

great banquet

roof collapsed

Named each person there by imagining where they sat

House or building

each room in a major point of the speech

walk through the speech

front door is the “opening”

Walls & ceiling painted dramatic scenes;

Bible stories

to help remember dates, names, events

Numbering each pew

use each pew to remember something

Canterbury Cathedral

windows (lites)

Winchester Cathedral

rows of chairs (pews)

2. Peg system

a set of memory hooks

1. learn the pegs

an image for each number from 1 to 10

2. find a list of words

3. match each word to a peg

Advantages

1. can recall items in any order

2. same pegs are used each time

Pegs to use

1 bun

2 shoe

3 tree

4 door

5 hive

6 sticks

7 heaven

8 gate

9 line

10 hen

3. Translation schemes

Number-letter mnemonic

digits from 0 to 9 each has a consonant

vowels don't count

1 t

tie = 1

2 n  
3 m  
team = 13  
0 = zoo  
10 = tie zoo or toes  
100 = disease

#### 4. Link & Story

##### Link

form visual image  
visualize link between them

##### Story

like a link mnemonic  
use sentences instead of images

The car drives to the post office and cruises by the bakery before stopping to get its  
brakes checked

### Improve Your Memory

#### Encoding Tips

Teach yourself

Teach others

Convert incidental learning to semantic

Multiple illustrations

Generate questions

Create test items

#### Retrieval Tips

Retrieve often

Retrieve in same order every time

Cluster

Even if items aren't clustered

Try to remember them by clusters

#### Tip of Tongue Phenomenon

"Nothing will come"

"Empty gap"

Often retrieve partial info

About once a week

#### When you don't remember

Recall from different perspectives

Real estate agent

Burglar

"Starts with the letter"

Lexical retrieval = search for a desired word

Can't find it by meaning

Try it alphabetically

"Sounds like"

What did you say?

Remember before the answer comes

I know I've heard that somewhere

Follow a script

Cognitive maps

Cultural rules

Ask for clues

Rest

Incubation = allowing a problem to "perk"

Why it might work:

Changes focus more details to more abstract representations

Memories consolidate over time

New stimuli may come along

Get more sleep

Practice effects: problem solving as skill