

# The Cognitive Approach II

## Sensory Memory

Iconic Memory (visual): 250 to 300 msec

R G C P

L X N F

S B J Q

Whole Report: 4 or 5 items

Partial Report

All 12 items

Blinking Eyes Creates Error in Iconic Memory

Example: Perceptual Identification

Echoic Memory: Auditory “Echo” lasting several seconds

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## Working Memory

Limited Capacity

7 +/- 2 items (7 - 2 = USC, 7 + 2 = UCLA)

Rehearsal keeps items fresh in working memory

Digit span often used to test

Forwards = about 8

Backwards = about 7

Demo: Working memory of 12!

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## Working Memory and Chunking

F BIV IPG NPC BSCIA

FBI VIP GNP CBS CIA

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## Experimental Evidence: Chunking

Chase and Simon studied memory for chess

Start with a “snapshot” of a game in play, quick glance, then memory test

Grand masters much higher memory score

But wait - aren't these guys smart? (Big memories)

Used random positions -- no advantage for masters

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## Searching Working Memory

Visual Search is self-terminating

Given list (e.g. 4,8,0 and 9)

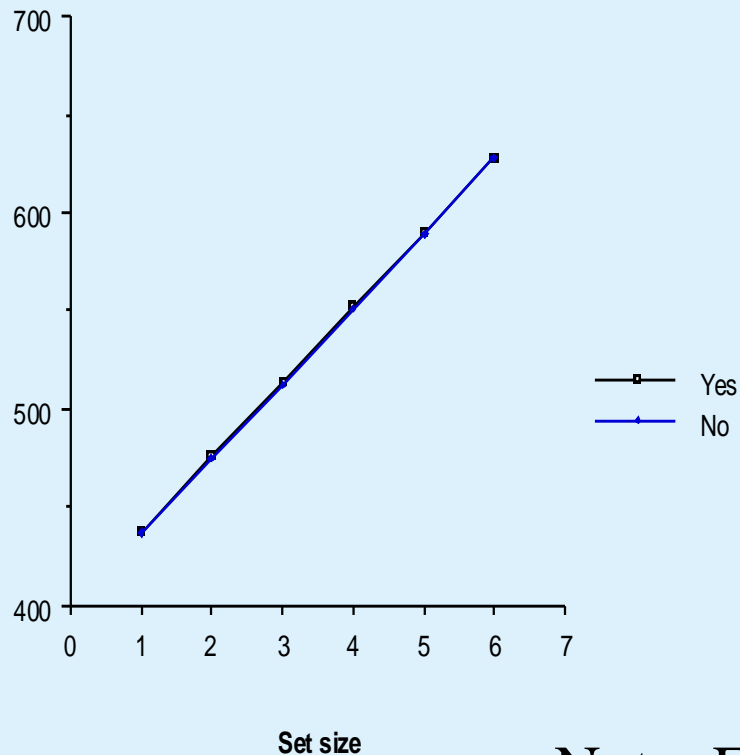
Asked if item is in (e.g. 3)

If self-terminating, then shorter times for “yes” than “no”

If exhaustive then both the same - depending upon list length

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## Searching Working Memory



Note: Figure 5.2 in Book is **WRONG**

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## Baddeley's Model of Working Memory

### Phonological Loop

Auditory “loop” used to rehearse items in working memory

Example: Remember 3,2,5,4,1,7,8,9,6

### Visuospatial Sketchpad (Visual Working Memory)

Example: remember object shapes and/or locations

### Central Executive (Controls processes)

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## Phonological Loop : Evidence

Interference with rehearsal with repeated word  
(e.g. “The”) impairs performance

Phonological confusion(P,G,T,C,V,D get confused)

Word length effect (digit span greater in Chinese  
shorter words)



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## Visual Working Memory Experiments

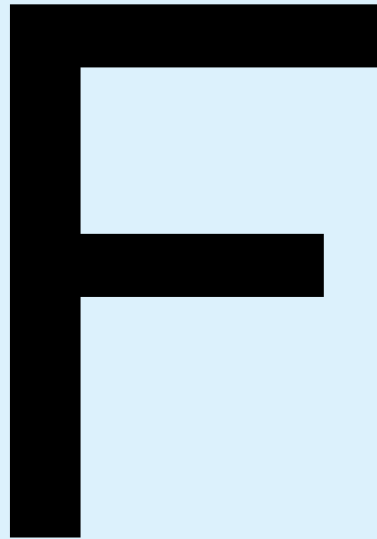
See display of 4 items (Color, orientation, size, gap)  
very briefly

Display goes away - must identify which item  
changed

Working memory holds whole item, not individual  
attributes (e.g. color)

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## In-Class Demo: Separation of systems



A bird in the hand is worth two in the bush

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## In-Class Demo: Results

Spatial interference (pointing) hurts visual working memory (imagery)

Verbal interference hurts verbal working memory

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## Central Executive Dysfunction

Inability to control and direction resources

Example: Wisconsin card sort

Colors, Shapes and Number

Sort changes - need to update criteria

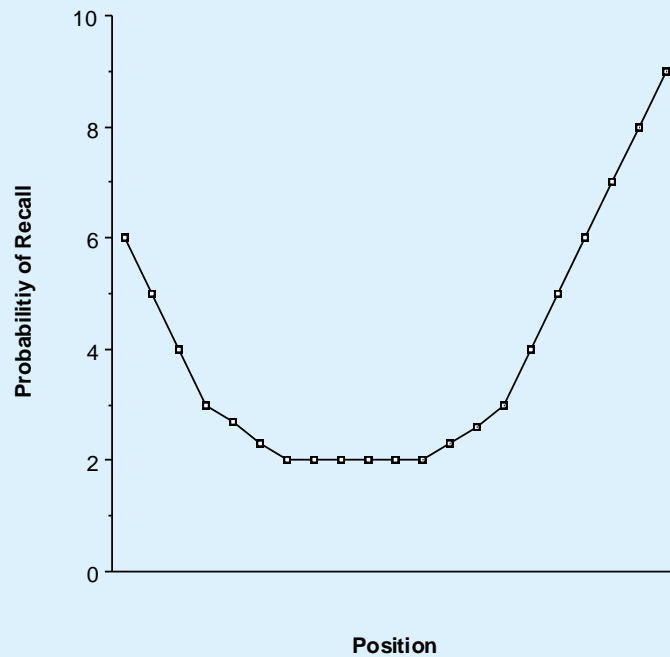
# **The Cognitive Approach II**

## **Memory Systems**

In Class Experiment: Remember 25 words

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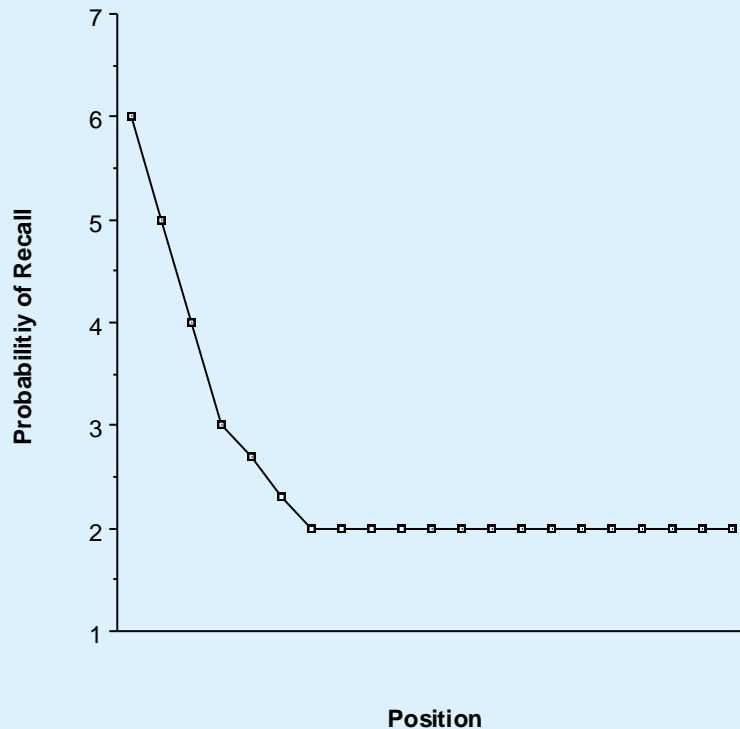
## Memory Systems



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## Memory Systems

When subjects are distracted after studying the words for 30 seconds



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## Memory Systems

### Retroactive

New learning interferes with old learning

Example: I remember where I parked my car,  
but I forget how to walk and fall down

### Proactive

Old learning interferes with new learning

Example: I search in lot 2 where I parked my  
car yesterday (not today)



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## Memory Systems

Doctor: Good morning, I'm doctor X, I'm here to test your memory

H.M. Hi, nice to meet you. Anybody ever tell you that you look just like Frank Sinatra?

Doctor: I get that a lot. I'm going to start by showing you some pictures and I want you to name them as fast as you can and then try and remember them because I will ask you later about them. OK?

H.M. OK.

H.M. Slowly - Rhinoceros, Camel, Anchor, lamp

Doctor: good -- can you repeat those back to me:

H.M. Sure, Rhinoceros, Camel, anchor, and lamp

Doctor: that's very good (pager rings), I'm sorry, I'll be right back

H.M. No problem.

Doctor leaves room for 3 minutes and comes back.

Doctor: I'm going to ask you now if you remember any of the words I asked you to remember before.

H.M. What words? Anybody ever tell you that you look just like Frank Sinatra?

Doctor: I get that a lot. Do you remember any of the words I told you before?

H.M. What are you talking about? I've never met you before in my life,

Doctor: OK, I'm doctor X. I'm going to start by showing you some pictures and I want you to name them as fast as you can OK?

H.M. No problem. - quickly. (F)Rhinoceros, (S)car, (F) camel, (S) horse, (F) anchor.

Doctor: do you remember naming these pictures for me before?

H.M. Huh? I told you, I just met you, I've never seen these pictures before.

Doctor: Why do you think you named some of the pictures (like the rhinoceros) more quickly?

H.M. They're were easier to recognize

Doctor: Does it make sense that a rhinoceros would be easier to recognize than a car given that you see cars a lot more often than rhinoceroses?

H.M. No, not really -- something weird is going on.

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## **Explicit and Implicit Memory**

Memory is divided into two systems

Neurally separate

Behaviorally dissociable to some degree

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## Explicit Memory

Strongly related to “declarative” memory

“Conscious recollection”

Episodes (e.g. The trip I took to mars last year)

Facts (e.g. Paris is the capital of France)

\*\*\* Behavioral measure usually used - Recall

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## **Implicit Memory: All That's not Explicit**

Repetition priming (e.g. object recognition priming)

Savings upon relearning (relearning the psych 85 material 10 years from now)

Motor and skill learning (e.g. riding a bike)

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## Implicit Memory Example

package	grocery	architect
parked	history	psychology
bedraggled	parked	history
give	professor	money

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## Explicit vs. Implicit in Experiments

Study phase - subjects look at words that have common stems (e.g. market)

Test phase - cued recall:

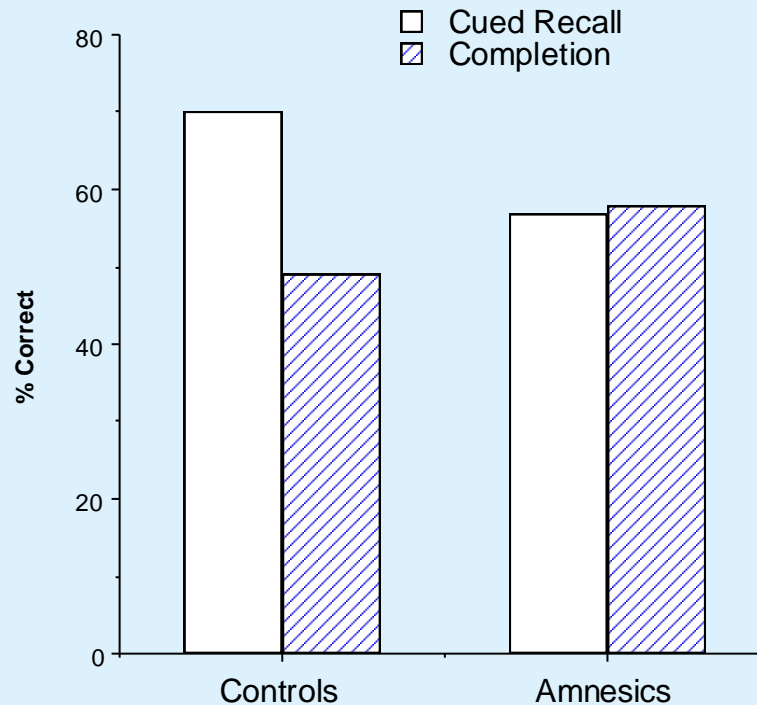
Given “mar”, say which word on previous list

Test phase - completion:

Given “mar”, say any word on which comes to mind

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## Explicit vs. Implicit in Experiments



# **The Cognitive Approach II**

## **Impaired Implicit Memory**

Right occipital lobe removed at age 14

Normal functioning (owner of computer software company)

Recognition Task: OK

Priming (perceptual identification): Impaired

Priming impairment specific to vision: Normal auditory priming



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## Explicit vs. Implicit in Normal Controls

Study phase - subjects look at words in 3 condition

Generate (hot - ????)

Context (hot - cold)

No context (xxx - cold)

Test phase - recognition - say if on old list

Test phase - perceptual identification  
(detect word very briefly presented)

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## Explicit vs. Implicit in Normal Controls

