

# Cognitive Psychology: Attention, Memory, and Multitasking

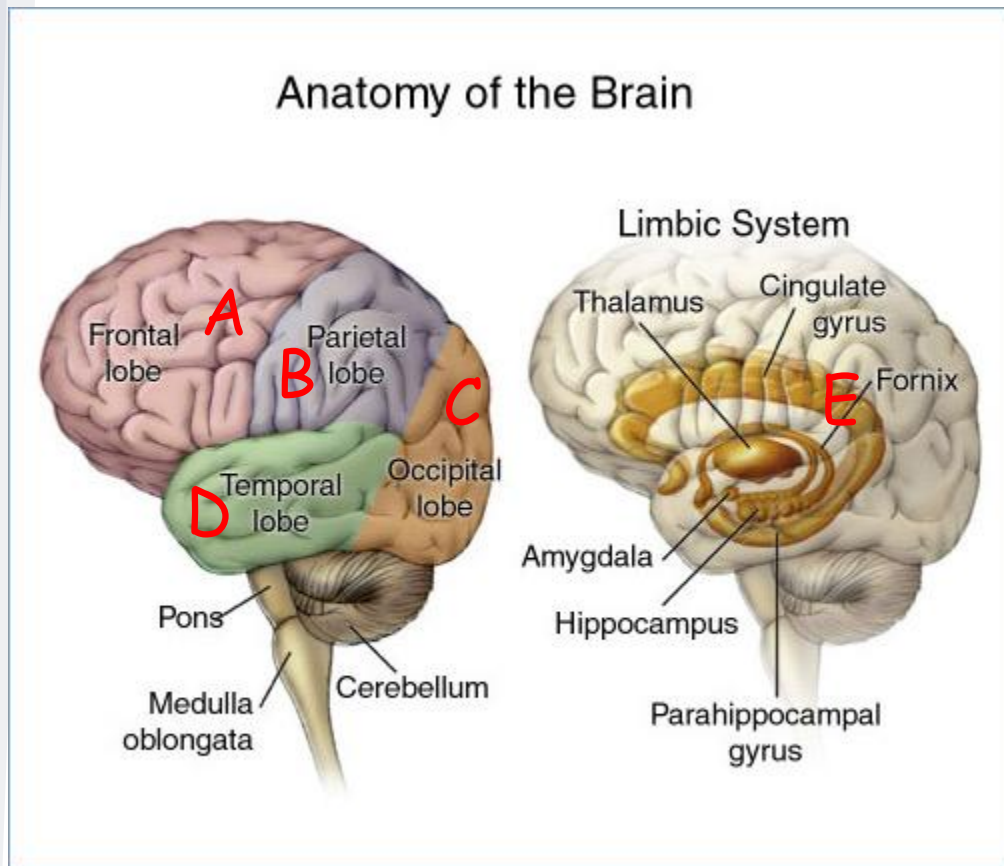
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# What is Cognitive Psychology?

Cognitive Psychology is the study of how people perceive, remember, think, speak, and solve problems.



# Brain Diagram



Part A is called the frontal lobe  
The prefrontal area is  
towards the front of the  
frontal cortex

Part E is called the Basal Ganglia

The brain works together as a  
whole to control our actions,  
so we look at certain parts  
of the brain to understand  
the thought processes of  
both people and animals.

# Introduction:Continued

## Attention

The mind's ability to focus on what is going on in its surroundings

### Manipulation of Attention

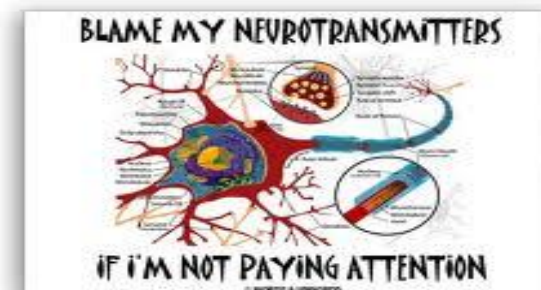
Top-down attention - the brain actively ignores or doesn't focus on something

Bottom-up attention- the brain directly focuses on something

Z

**Change blindness:** When people fail to notice changes to objects and scenes in their environment

**Inattention blindness:** Failure to perceive objects and notice a change in environment because of the brain's focus on one thing at a time



# Introduction: Continued

## What is Multi-Tasking?

The brain is never actually focusing on two tasks at the same time, instead it is switching focus back and forth between two tasks; therefore it is actually split.

Split attention can be detrimental to quality, memory, performance, and accuracy.

### Multitasking can lead to:

Dual-task interference: which takes place when two cognitive tasks are done at the same time.

And/Or

Continuous partial attention: when focus is continuously split between two or more tasks.





# Effects of Divided Attention on Motor Skills and Subsequent Memory

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"Mr. Bennet! Of course I can!  
Just let me finish texting,  
emailing, skypeing and balancing  
this ball on my nose."

Prior work shows that multitasking often leads to slower and less accurate performance than doing either task alone

People believe they are good at doing both

Evidence suggests they are not as good as they believe

How often do people multitask and how good do they think they are at it?

Attempting to engage in two non-related tasks at once can have a detrimental impact on learning (Wood et al., 2011)

Is there congruence between subjective and objective reports of attentiveness?



# How much do we notice in our environment?

Prior work on inattention blindness has shown that although people often think they are observant and will notice changes in their environment, they are surprisingly unobservant (Simmons & Chabris, 1999)

# Prior Research Has Shown...



According to Simons & Chabris (1999):

"We perceive and remember only those objects and details that receive focused attention."

Hyman et al. (2009) found:

"Cell phone users were less likely to notice an unusual activity along their walking route (a unicycling clown)."

"Cell phone usage may cause inattention blindness even during a simple activity that should require few cognitive resources."

# Our studies focus on...

The relation between attention, multitasking and memory.

How subjects performance is impaired when multitasking and memory are combined together.

To determine whether performance is impaired by multitasking.

# Our Hypotheses

Motor task should take longer and memory for details should be more impaired under divided attention than under full attention

Based on prior work, fewer than half the participants should notice the change in the background during the inattentional blindness task

Do people who claim to be attentive detect changes faster in the change blindness task?

# Method: Materials

## Materials:

2 biographies from Wikipedia (Miles Davis and Herman Melville)

30 general knowledge questions (used during Divided Attention Motor Task)

A questionnaire on technology use and cognitive styles

Youtube video of inattention blindness

Change blindness picture

# Method: Motor Task

Participants were randomly assigned

Tasks focus: Attention and cognitive skills.

Individually tested

They were seated in front of a computer with a blank word document

Participants read given biographies

They were timed while reading and typing the biographies

# Method: Motor task continued...

During the full attention task:

participants were asked to type the biography word for word on the computer as it appeared on the paper, and were timed during the activity.

In the divided attention group:

participants were given the same instructions from the full attention task, except while typing, they were asked general knowledge questions, such as: what are the colors of the rainbow, in order?

participants were given the option to pass on a question they did not know the answer to and were asked to do so only if necessary

then we recorded the time it took for them to complete the motor task.

Next participants were then given a memory task of ten questions on the biographies they initially read in the full and divided attention tasks.

# Method: Inattentional Blindness

Participants were instructed to watch a video that showed two teams (black shirts vs. white shirts) playing basketball

Participants were asked to count the number of passes made to the team wearing white

After watching the video, participants were asked to report the number of passes and asked if they saw anything unusual

if so, they were asked to describe what they saw

How many noticed the dancing bear?





# Method: Change Blindness

Then, participants were shown two identical pictures of a fruit stand, with a mask in between them

one picture had a slight difference (there were more oranges in the second picture)

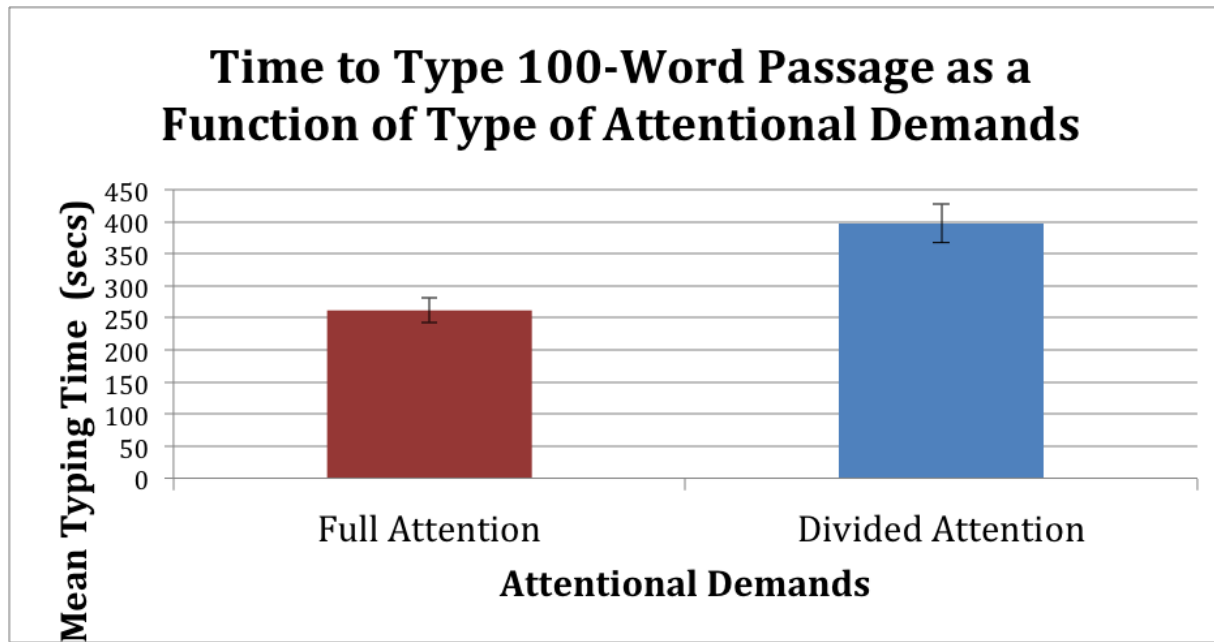
They were told to point and say stop once they found the difference

They were given 3 minutes to detect the difference

After three minutes if the participant did not find the difference, the task was stopped

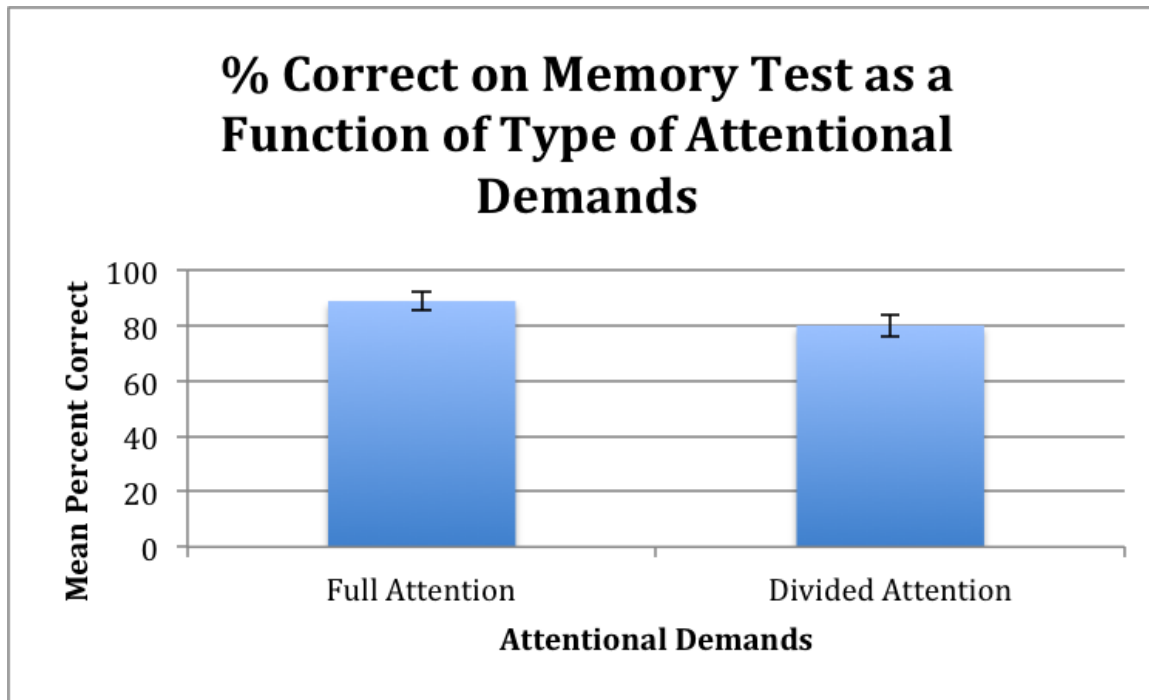
When the experiment was over, the participant was debriefed.

# Results:



Results showed that when people typed under the divided attention condition they took significantly longer to finish typing the passage ( $M = 398.76$  seconds) than when they were under the full attention condition ( $M = 261.76$  seconds),  $t(24) = -8.059$ ,  $p < .001$ .

# Results:



Results showed there was a marginally significant trend for people to answer fewer questions correct when under the divided attention condition ( $M = 80\%$ ) than when under full attention ( $M = 88.8\%$ ),  $t(24) = 1.844$ ,  $p = .078$ .

# Results: Inattentional Blindness

	Frequency	Percent
Yes saw bear	2	8%
No did not see bear	23	92%
Total	25	100%

Previous studies show that only 1/3 – 1/4 of people will not notice the dancing bear. However, our results were higher than expected. 92% of participants in this study did not see the dancing bear.

# Results: Self-Report Questionnaire

Question 6: How often do you text on cell phone or IM on Facebook while studying or reading?

	Frequency	Percent
Never	4	16%
Rarely	0	0%
Sometimes	9	36%
Often	9	36%
Very Often	3	12%
Total	25	100%

# Results: Self-Report Questionnaire

Question 7: I perform just as well while studying or reading when I text or IM as when I do not text or IM

	Frequency	Percent
Never	4	16%
Rarely	9	36%
Sometimes	8	32%
Often	3	12%
Very Often	1	4%
Total	25	100%

# Results: Self-Report Questionnaire

Question 12: When I am in class or at work, I tend to daydream and let my mind wander when I am bored

	Frequency	Percent
Never	0	0%
Rarely	6	24%
Sometimes	6	24%
Often	10	40%
Very Often	3	12%
Total	25	100%

# Results: Self-Report Questionnaire

Question 14: I am very good at noticing and remembering details

	Frequency	Percent
Never	0	0%
Rarely	4	16%
Sometimes	10	40%
Often	8	32%
Very Often	3	12%
Total	25	100%



# Discussion

There were several findings in our study:

The age group of the participants that were tested in this study tend to text or instant message while studying.

They also tend to listen to music while reading.

If participant reported being good at noticing and remembering details, they were quicker at recognizing the change in the change blindness task.

# Discussion: Continued

People who reported being good at multitasking were just as distracted during the divided attention task as participants who didn't claim to be good at multitasking

# Tips for saving energy

Prioritize prioritizing, as it's an energy-intensive activity

Schedule the most attention-rich tasks when you have a fresh and alert mind

Plan and go through with goals that you can manage for the day



# Tips for understanding complex info.

Simplify information by approximating and focusing on an idea's most important elements

Group information into chunks whenever there is too much to take in

Practice getting the most energy-consuming and difficult tasks done before the easier ones



# Tips for Multitasking

Catch yourself doing two things at once and slow down instead

Repeat tasks whenever you can

Get tasks into a neat and functional order



# Tips for avoiding distractions

When you need to focus, remove all external distractions completely.

Reduce the likelihood of internal distractions by clearing your mind before embarking on difficult tasks.

Get rid of distractions before your attention is completely taken by them.



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