



# **Working Memory Skill: Language and Reading**

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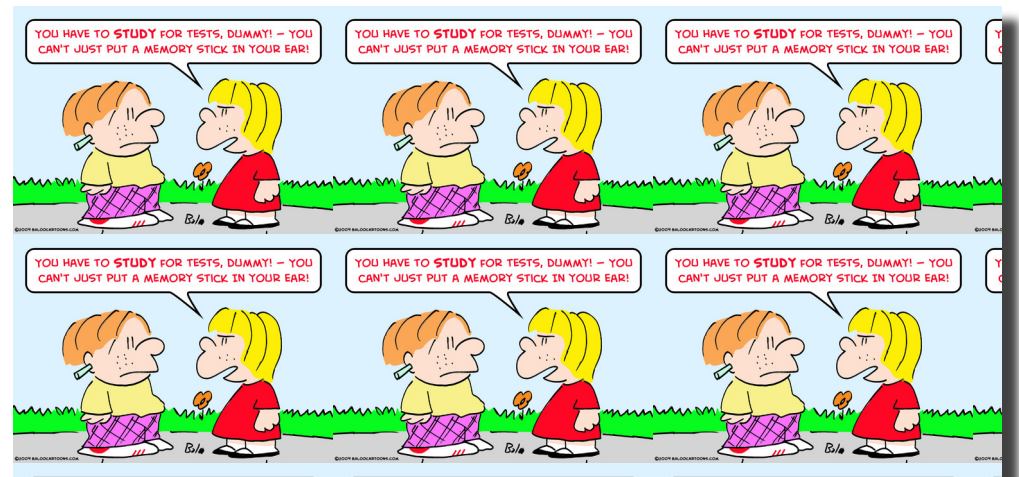
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## Goals of this talk:

- 1- Understand the basic theoretical framework of working memory
- 2- Understand how measuring working memory and short-term memory differs.
- 3- Understand how working memory influences language skill.
- 4- Understand how working memory is related to reading comprehension skill.



- **Working Memory** is the term used to describe the cognitive mechanism that is used for the temporary storage and manipulation of information

## Working Memory

Focuses Attention



Manipu

**Memory** is a cognitive mechanism used in the encoding, storage, and retrieval of information.

- **There are numerous types of memory:**
  - **As an example:**
    - **Semantic memory-** knowledge of words and their meaning
    - **Procedural Memory-** knowledge of how to do things
    - **Declarative memory-** things we know
    - **Episodic memory-** knowledge of events

# Historically

- Multistore model of memory ( Craik and Lockhart, 1972).
- Multistore models of memory proposed that information was transferred from limited capacity storage mechanisms, through transient mechanisms, to large-capacity permanent-storage mechanisms.
- The limited-capacity mechanism, **previously referred to as short-term memory**, was hypothesized only to store information, not to process information.
- The notion of working memory was a departure from that conceptualization

- **Working Memory- key factor** is temporary storage and manipulation of information.

Working Memory has been proposed to influence our functional skill (e.g Daneman, M., and Carpenter, P.A., 1980; Masson and Miller, 1983).

- Used for **holding** information **before responding**
- Used for **remembering the temporal order** of information presented in a sequence
- Used for **self ordering** in order to achieve a goal

# Working memory is believed to have a limited capacity.

- A variety of techniques have been used to assess working memory
- A measure of working memory is proposed to quantify an individual's capacity for information storage and processing



# Examples of tasks

- Digit recall backwards
- Digit letter recall
- Reading span task

Digit recall

1-4-7-9

1-4-7-9

Digit recall backwards

5-8-1-6-7

7-6-1-8-5

Digit letter recall

3-A-9-4-2-C

3-A-9-4-2-C

Digit letter backwards

7-6-C-K-2

2-K-C-6-7

Digit letter recall ordered

8-F-6-2 D-1

1-2-6-8-D-F

# Reading Span Task

Try it!

Research Task:

Instructions

# Practice Item 1

The newspapers were piled high on the porch.

The college graduates were looking for jobs.

Question:

Papers were piled high on the lawn.

True or false?

Recall sentence final words.



# Practice 2

The children were late for the party.

Garbage was all over the street.

Her husband was outside speaking with the police officer.

The children were early for the party  
True or False?

Recall sentence final words.

# Basic Developmental Issues and Working Memory

1- components of working memory are all in place by age 6  
– structure is constant

2-correlation between age and overall performance on measures of working memory (Gathercole, Pickering, Ambridge & Wearing, 2004)

3- skills improve through adolescence

4-relation between working memory skill and reading skill in children with identified reading disabilities (e.g. Gathercole, Alloway, Willis, & Adams, 2005)

5- children with poor phonological memory performed less accurately on sentence recall

Typically :

Oral reading fluency (automatic decoding) is considered an indicator of reading proficiency and correlates with reading comprehension in children.

# My own research

- Investigated the relation between cognitive factors and reading skill in young adults
- Looked at oral reading, silent reading and multiple cognitive measures
- Tasks Included:
  - Oral paragraph reading ( 200 word passage/words per minute)
  - Nelson Denny Test of Reading Comprehension
  - Wechsler Adult Intelligence Test III
  - Reading Span Test

## Participants



41 students

Native English speakers

Aged 16-36 (mean=21.26)

Corrected or normal vision

No history of neurological, hearing, speech, or language disorders.

11 participants reported some previous history of learning differences



- Overall, there was a correlation between :
  - oral reading skill and silent reading comprehension
  - IQ and reading
- There was NO significant correlation between working memory and reading.

- 2 individuals in this sample had a dissociation between reading comprehension and oral reading rate
- They were noted to have large working memory capacity scores (5 and 3.5)

- Their slow oral reading suggests a lack of automaticity.
- Their good performance on the reading comprehension measure suggests that there is a mechanism in place to facilitate understanding.
- Since working memory is proposed to be involved in the manipulation and storage of information, I conclude that for some adults an enhanced memory capacity compensates for a lack of automaticity.

# In summary

- Reading is a language based activity
- Working memory is influential in the development of reading and language skill