MEMORY - TEST ON WORKING MEMORY

Dr. Suresh Kumar Murugesan PhD
Faculty , Department of Psychology,
The American College, Madurai

Outline

- About The Test
- About the Author
- Purpose or aim of the Test
- Description
- Directions or Instructions
- Individual Data Table
- Group Data Table
- Discussion
- Suggestions
- Reference

Dr.M.Suresh Kumar PhD
sureshkumar800@yahoo.com

About The Test

- **Working memory**
  - the part of **short-term memory** which is concerned with immediate conscious perceptual and linguistic processing.
  - Working memory is a cognitive system with a limited capacity that is responsible for temporarily holding information available for processing.
  - Working memory is important for reasoning and the guidance of decision-making and behaviour.
  - Working memory is often used synonymously with short-term memory, but some theorists consider the two forms of memory distinct, assuming that working memory allows for the manipulation of stored information, whereas short-term memory only refers to the short-term storage of information.
  - Working memory is a theoretical concept central to cognitive psychology, neuropsychology, and neuroscience.

Dr.M.Suresh Kumar PhD
sureshkumar800@yahoo.com

History of Working memory

- The term "working memory" was coined by **Miller, Galanter, and Pribram**, and was used in the 1960s in the context of theories that likened the mind to a computer.
- In 1968, **Atkinson and Shiffrin** used the term to describe their "short-term store". What we now call working memory was formerly referred to variously as a "short-term store" or short-term memory, primary memory, immediate memory, operant memory, and provisional memory.
- Short-term memory is the ability to remember information over a brief period (in the order of seconds).

Dr.M.Suresh Kumar PhD
sureshkumar800@yahoo.com

History of Working memory

- Most theorists today use the concept of working memory to replace or include the older concept of short-term memory, marking a stronger emphasis on the notion of manipulating information rather than mere maintenance.
- The earliest mention of experiments on the neural basis of working memory can be traced back to more than 100 years ago, when Hitzig and Ferrier described ablation experiments of the prefrontal cortex (PFC); they concluded that the frontal cortex was important for cognitive rather than sensory processes. In 1935 and 1936, Carlyle Jacobsen and colleagues were the first to show the deleterious effect of prefrontal ablation on delayed response.

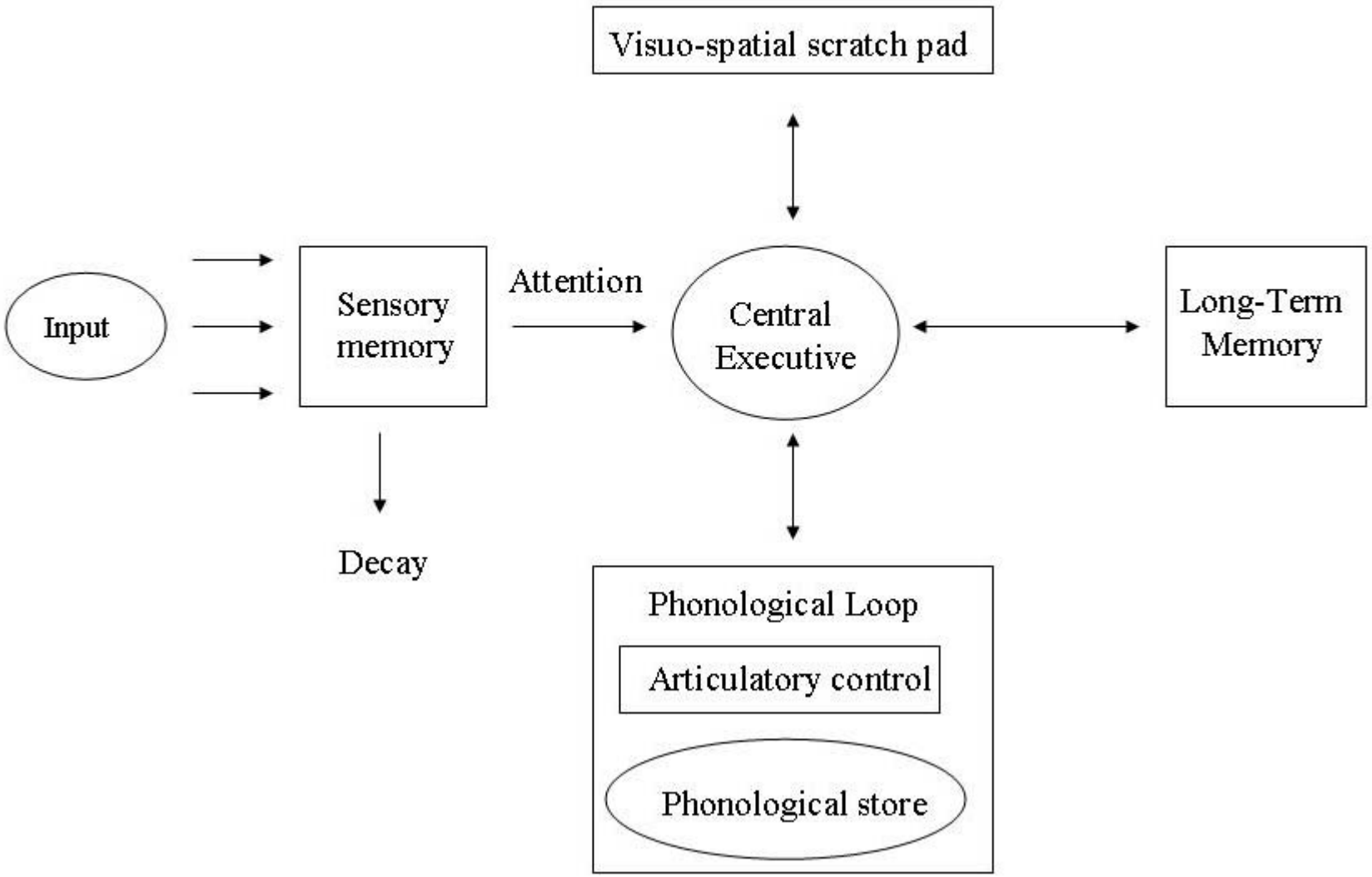
Dr.M.Suresh Kumar PhD
sureshkumar800@yahoo.com


Working Memory

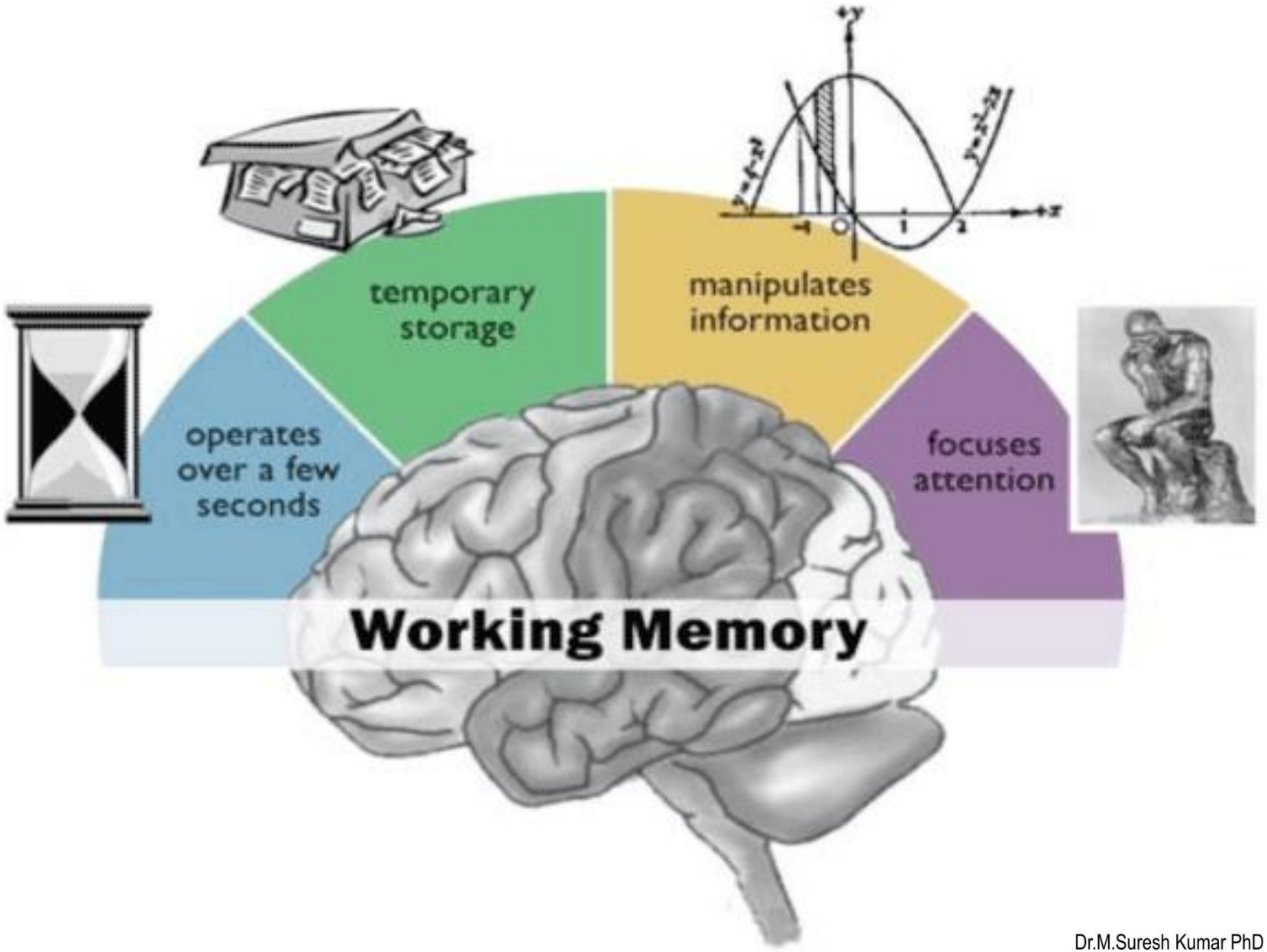
- The ability to temporarily hold and manipulate information for cognitive tasks performed in daily life.
- Working Memory holds information for a few seconds. It is temporary
- Working Memory can hold only five to seven items at a time. It has small capacity.
- Working Memory holds and manipulates information
- Working Memory depends on control of attention and mental effort.

Dr.M.Suresh Kumar PhD
sureshkumar800@yahoo.com

Working Memory Model (Baddeley and Hitch, 1974)

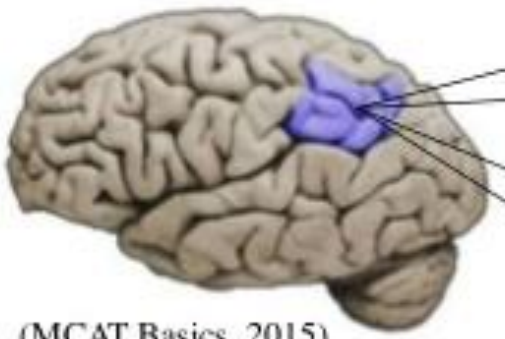


Dr.M.Suresh Kumar PhD
sureshkumar800@yahoo.com



Dr.M.Suresh Kumar PhD
sureshkumar800@yahoo.com

Working Memory Tasks
Activate the Supramarginal Gyrus (SMG) Bilaterally



(MCAT Basics, 2015)

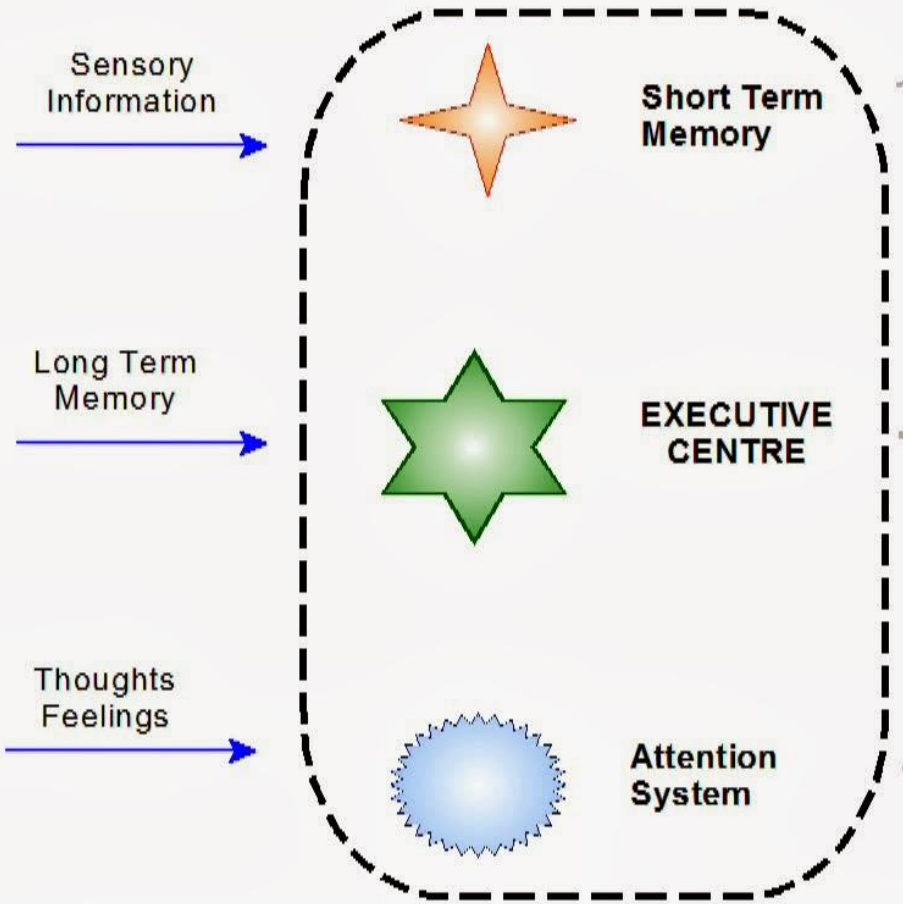
SMG Activated during

- **Short-Term Memory**
- **Verbal Working Memory**
  - *activates* → **Phonemic Representations**
  - *stores* → **Sentences**
- **Visual Working Memory**
- **Spatial Working Memory**

(Deschamps, Baum, & Gracco, 2013; Meyer, Obleser, Anwander, & Friederici, 2012; Paulesu, Frith, & Frackowiak, 1993 in Weems & Reggia, 2006; Stoeckel, Gough, Watkins, & Devlin, 2009)

Dr.M.Suresh Kumar PhD
sureshkumar800@yahoo.com

Working Memory



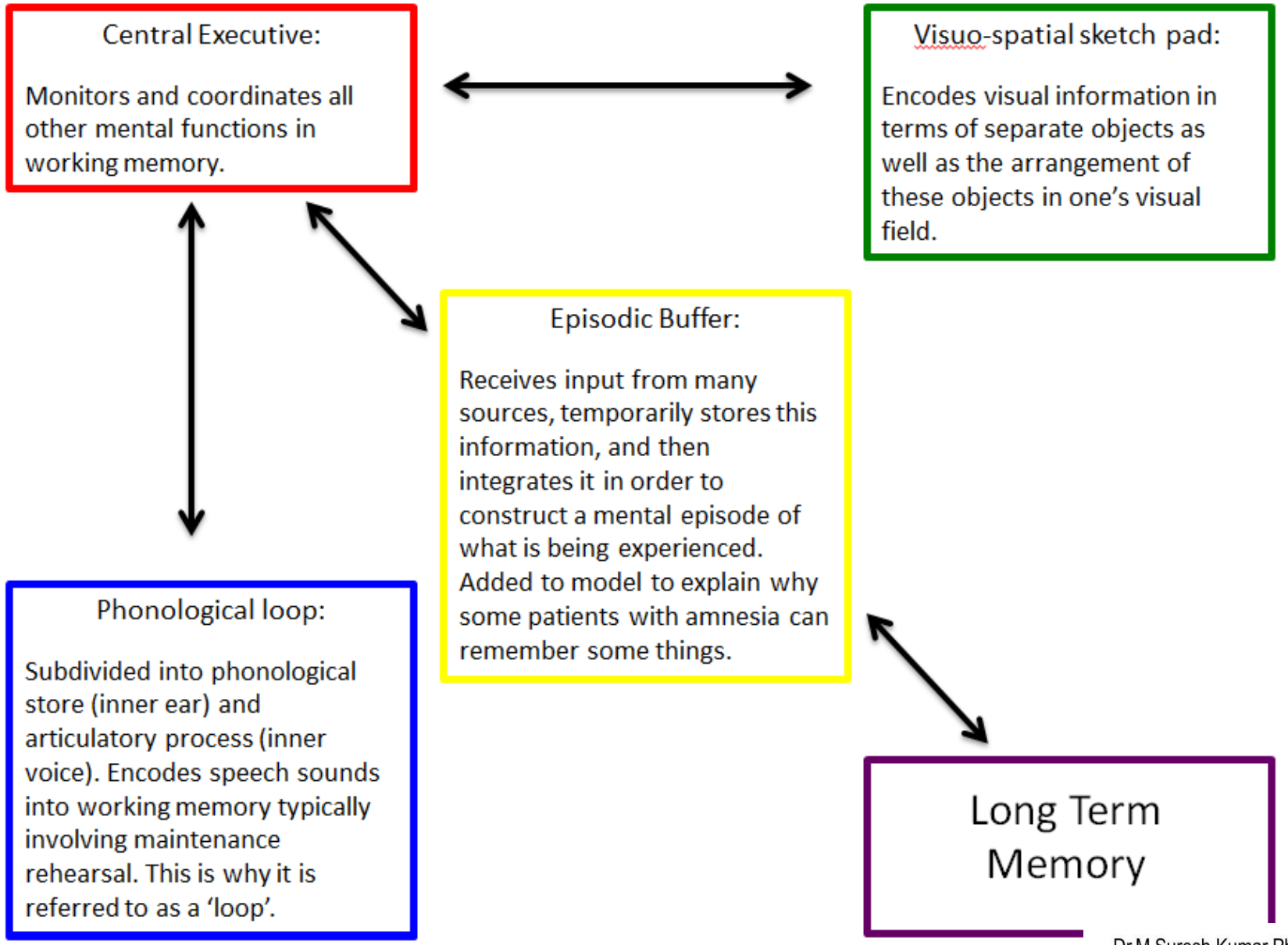
- Pictures
- Words
- Sounds
- Thoughts
- Ideas
- Plans
- Solutions

- Consciously selects focus
- Allocates mental resources
- suppresses task-irrelevant
- sets priorities, expectations
- sets and maintains goals
- planning, reasoning
- problem solving
- decision making

- maintain focus
- "Radar" monitoring
- "Bottom-Up " function

Complex assemblies of brain circuits which focus on, hold, and process relavant information

Dr.M.Suresh Kumar PhD
sureshkumar800@yahoo.com



Dr.M.Suresh Kumar PhD
sureshkumar800@yahoo.com

WORKING MEMORY

Paired-associates is a task for studying memory. Word associations are connections between any pair of numbers, words, or symbols. Pairs are stored in memory as single entities.

Executive Process

Decides what is important, directs attention to a task
Decides which subsystem will to the work

Phonological Loop

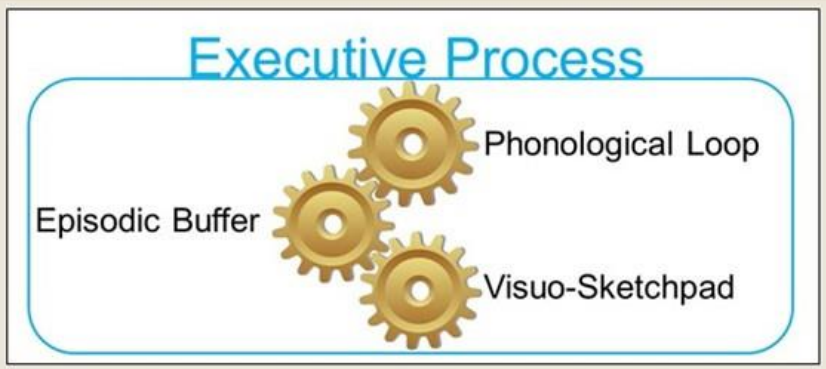
Processes sounds, music & written and spoken words
Temporary store (~4 sec.) is looped

Visuo-Spatial Sketchpad

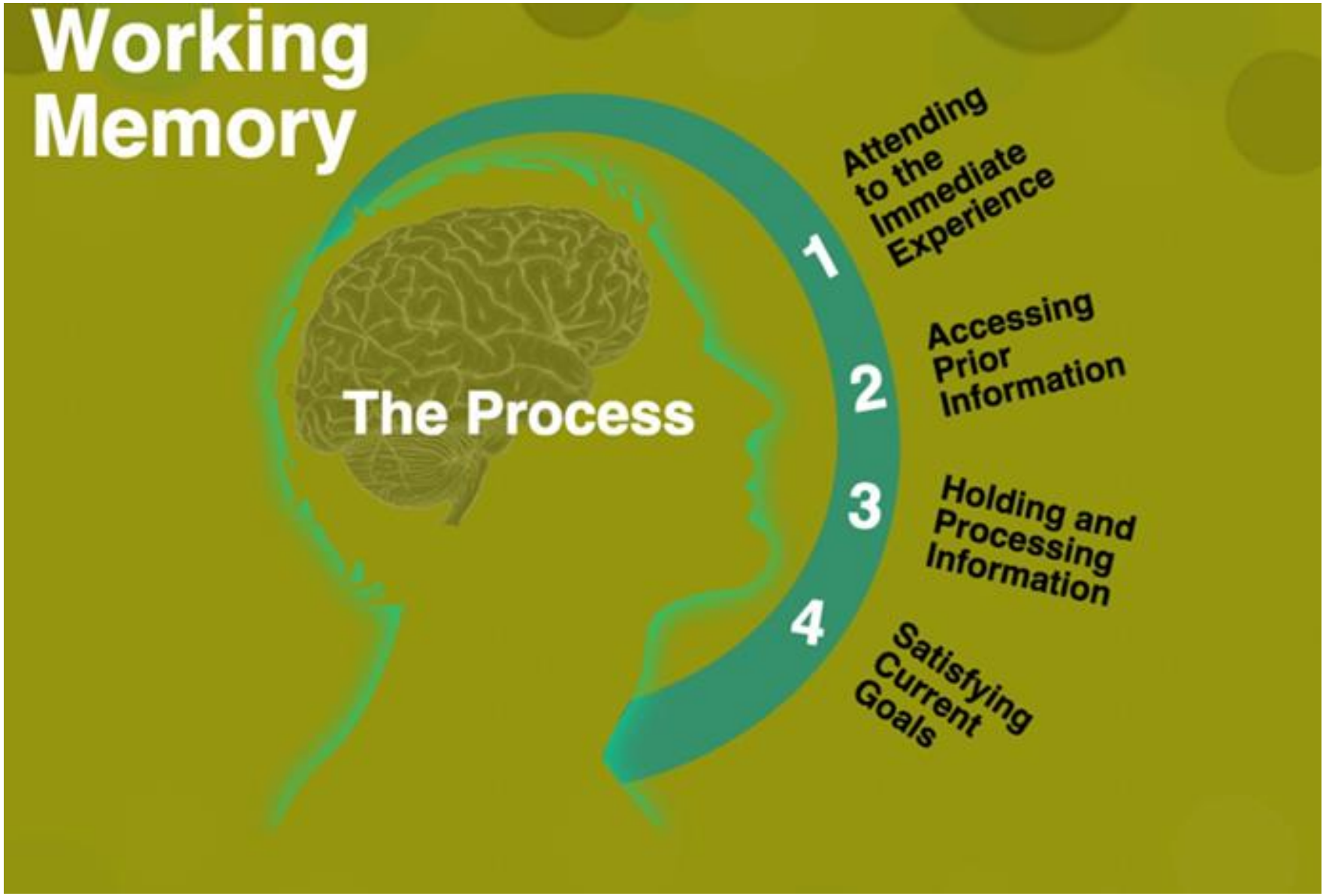
Processes images and spatial relationships
Temporary store (~half second)

Episodic Buffer

Provides timing and backup processing



Dr.M.Suresh Kumar PhD
sureshkumar800@yahoo.com



Dr.M.Suresh Kumar PhD
sureshkumar800@yahoo.com

Fun Facts

WORKING MEMORY FOCUSES ATTENTION ON EXPERIENCES IN THE MOMENT.

WORKING MEMORY ONLY LASTS A FEW SECONDS.

WORKING MEMORY CAN HOLD ABOUT 4 ITEMS.

WORKING MEMORY IS A BETTER INDICATOR OF SUCCESS THAN IQ.

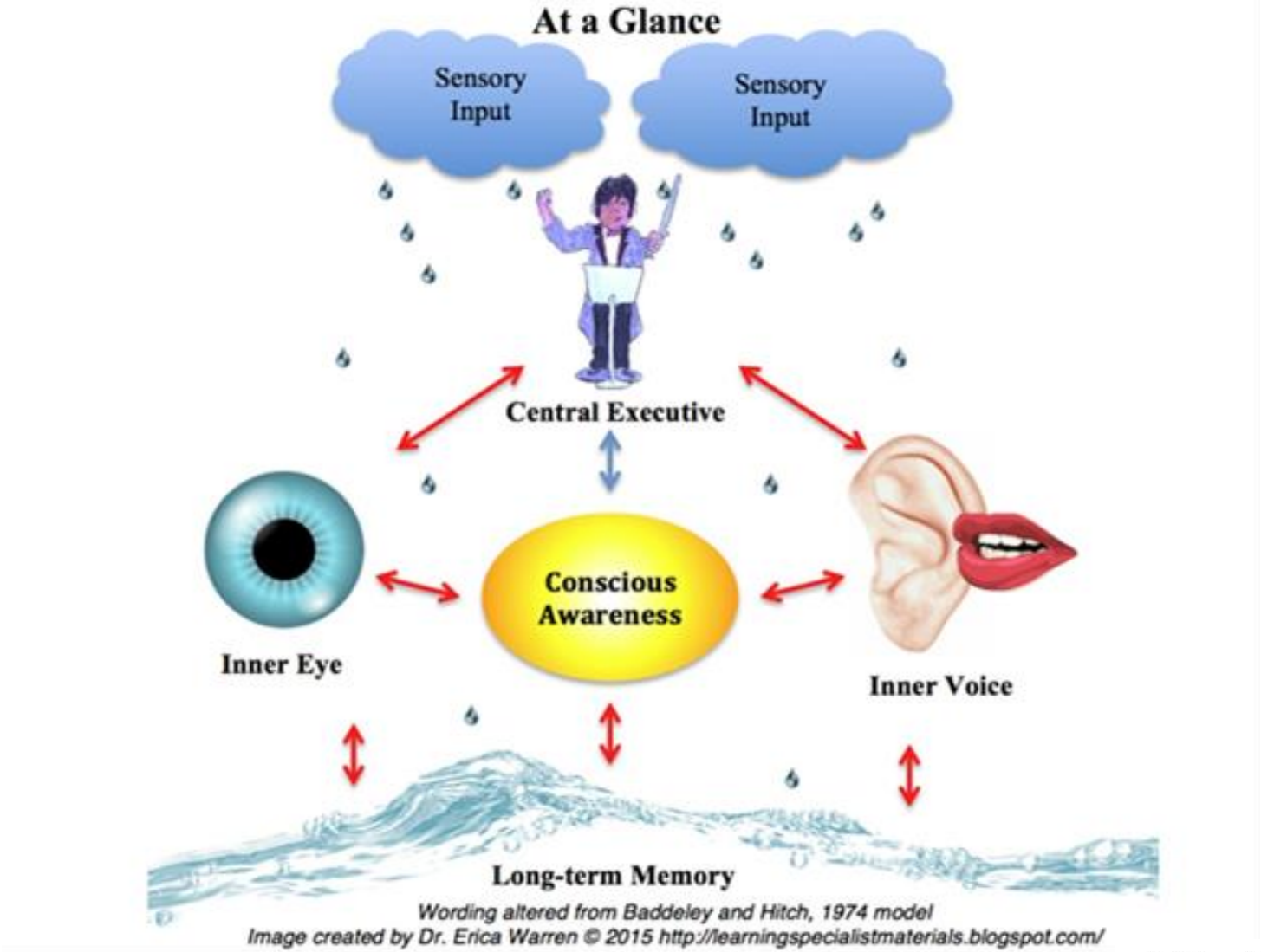
Dr.M.Suresh Kumar PhD
sureshkumar800@yahoo.com

Symptoms of a Weak Working Memory

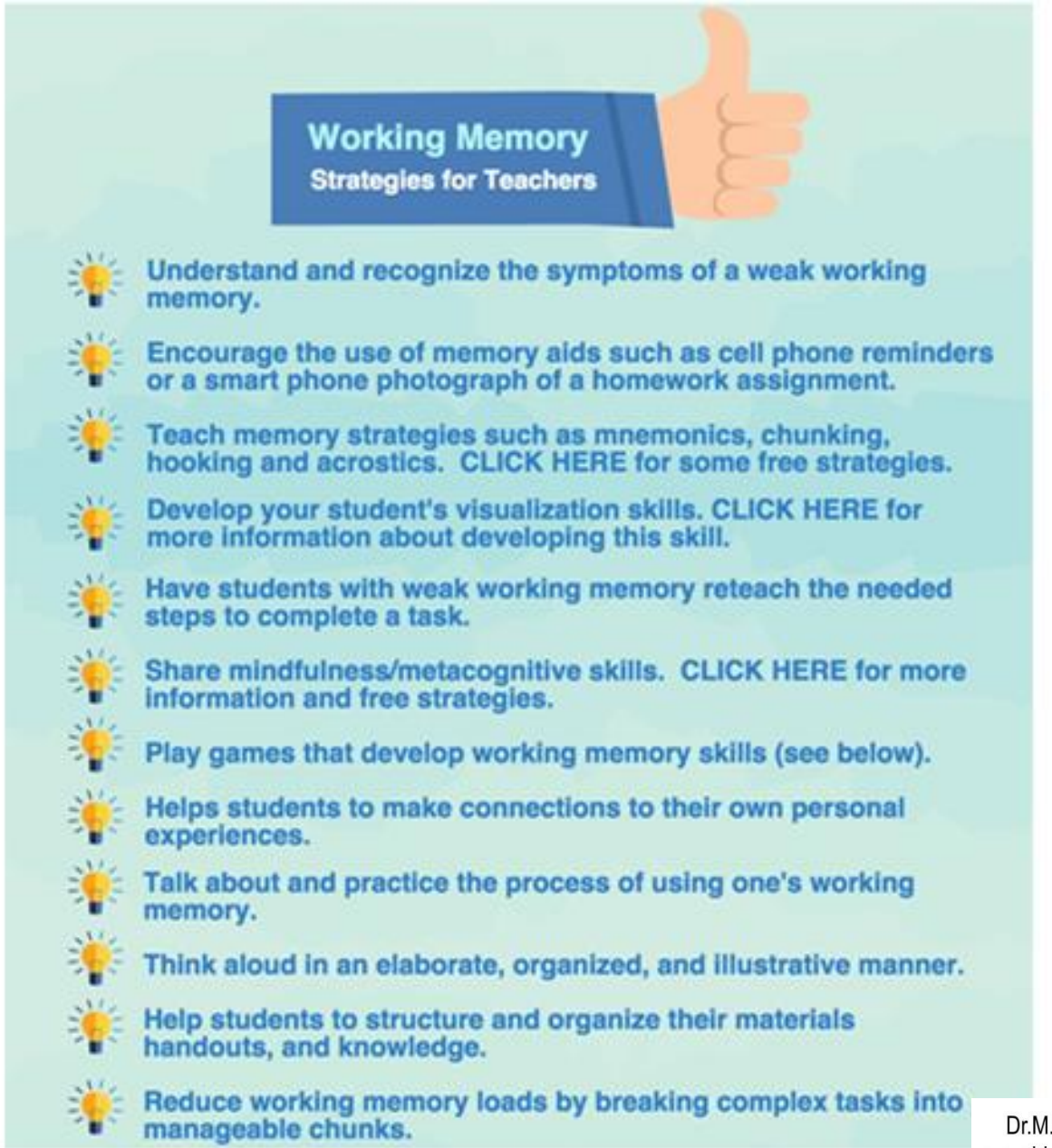
1. Seldom volunteers and difficulty answering direct questions
2. Difficulties following a sequence of directives
3. Challenges when learning new concepts and vocabulary
4. Trouble finishing tasks to completion
5. Appears unmotivated, inattentive and is easily distracted
6. Difficulty remembering passwords, phone numbers, and other rote memory activities
7. Trouble organizing sounds, sentences and stories
8. Problems conducting mental math and problem solving
9. Challenges with note-taking or copying from the board
10. Difficulties maintaining stamina during complex tasks

Dr.M.Suresh Kumar PhD
sureshkumar800@yahoo.com

Working Memory



Dr.M.Suresh Kumar PhD
sureshkumar800@yahoo.com



Dr.M.Suresh Kumar PhD
sureshkumar800@yahoo.com

Working Memory Strategies:

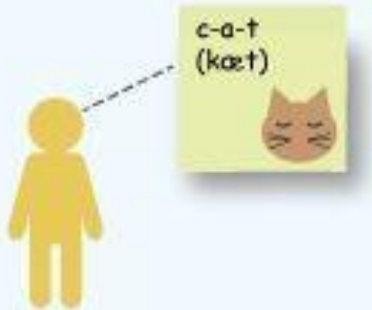
- Start with an overview of the material
- Present the content in order of complexity
- Chunk information
- Revisit critical information
- Encourage reflection

Dr.M.Suresh Kumar PhD
sureshkumar800@yahoo.com

Working Memory

What is working memory?

Working memory is the ability to hold and process information in our minds for a brief period of time. Kids use their working memory when they're learning math or how to spell a word for the first time. Adults use working memory when learning a new phone number or how to drive. Think of working memory as the **brain's post-it note** on which we place information we need to hold onto and put into action.[1]



Working memory and school success

Research shows a correlation between high working memory and success in school for a child.

Working memory is **3X** more accurate in predicting literacy skills than IQ. Working memory is **4X** more accurate in predicting math skills than IQ.[2]

100% of students whose working memory scores were in the top **5%** for their age scored above average in language tests.[3]

10% of kids have problems with their working memory. **75%** of kids ages 5-12 with poor working memory will struggle in math and language.[4]

Dr.M.Suresh Kumar PhD
sureshkumar800@yahoo.com

Signs your child may have low working memory

- The child has a hard time following instructions.
- The child seems like he's daydreaming and not paying attention.
- Both can be the result of a child's working memory literally running out of space – the post-it note is full.

What can parents do?

The good news is you can improve your child's working memory.

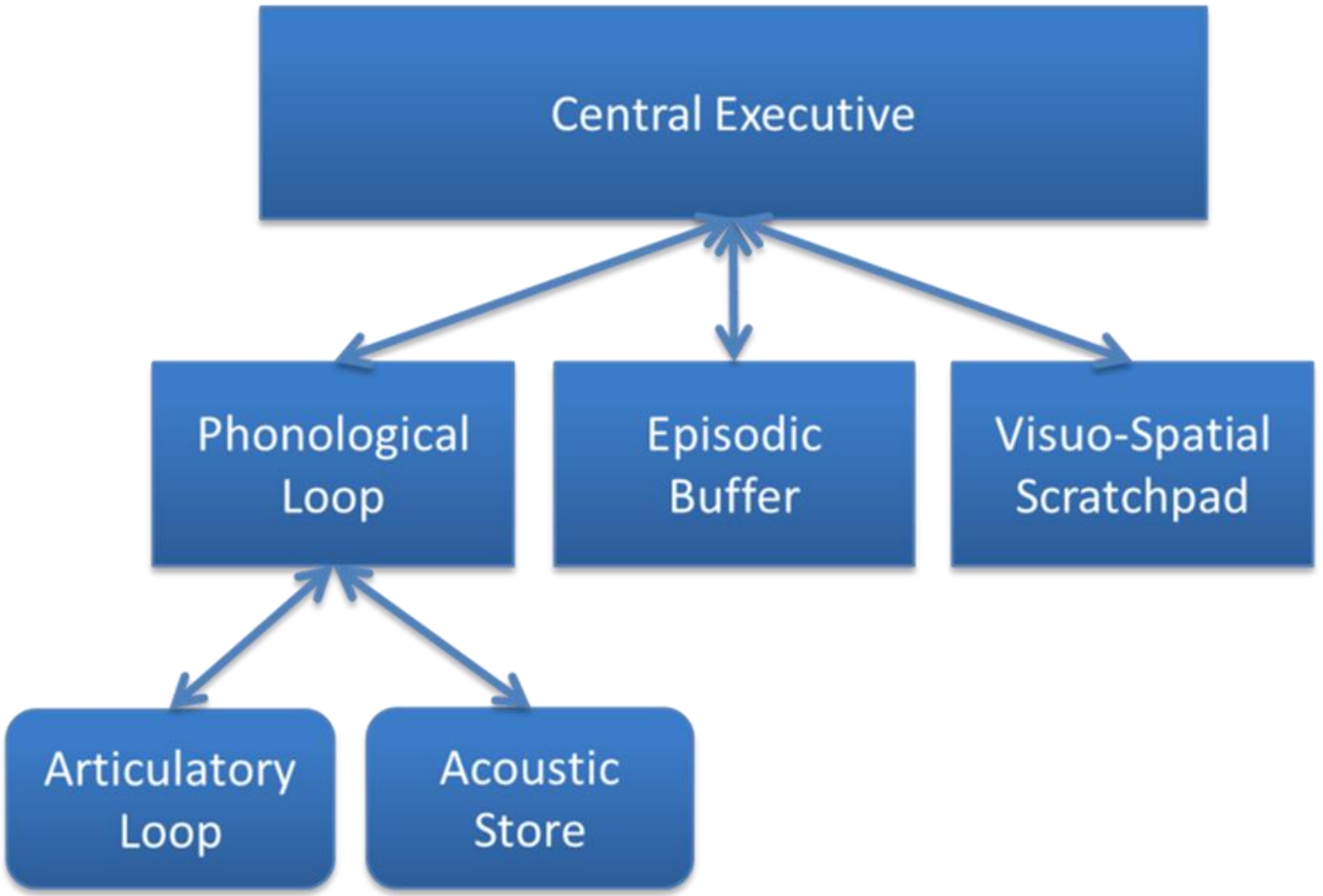
Computerized games: The working memory games created by TVOKids.com and the more intensive Jungle Memory program showed improvements in the working memories of children using those resources.[5]

Pencil and paper games: Crossword puzzles, word scrambles, word search puzzles and Sudoku puzzles help train the brain to use working memory more efficiently.[6]

Verbal word games: Verbal word games, riddles and brain teasers also train the brain. For example: Q: "What gets larger as it eats, but smaller as it drinks?" A: "A fire".[7]

Dr.M.Suresh Kumar PhD
sureshkumar800@yahoo.com

The Working Memory Model

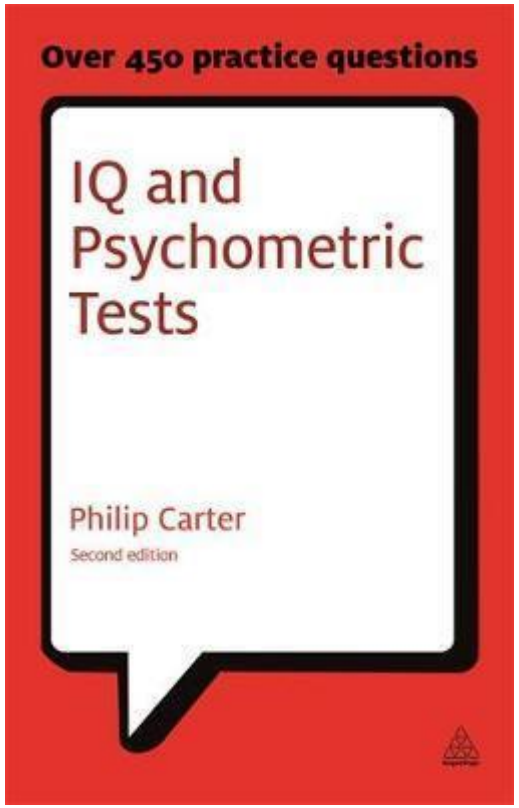


About The Test

- The working Memory Test was developed by Philip Carter (2005)
- It included 5 sub Dimensions. They are
  1. Pattern Recognition
  2. Word Association
  3. Verbal dexterity and memory test – anagrams
  4. Number & shape recognition
  5. Pattern recognition - Attention

Dr.M.Suresh Kumar PhD
sureshkumar800@yahoo.com

About the Author



- **Philip Carter** is a UK IQ test expert who is continually devising new IQ tests and puzzles.
- He has produced many books covering all aspects of testing, puzzles and reasoning. These include *Advanced IQ Tests*, *IQ and Personality Tests*, *IQ and Psychometric Test Workbook*, *IQ and Psychometric Tests*, *Test and Assess your Brain Quotient* and *The Brain Fitness Workout*.
- With the late Ken Russell he has written ***Test your IQ***, ***Test and Assess your IQ*** and ***Ultimate IQ***, all published by Kogan Page

- **Philip Carter**

Dr.M.Suresh Kumar PhD
sureshkumar800@yahoo.com

Aim:

- To study the working memory of an individual with an appropriate test.

Dr.M.Suresh Kumar PhD
sureshkumar800@yahoo.com

Description

- The working memory test has 5 sub Dimensions. They are
  1. Pattern Recognition
  2. Word Association
  3. Verbal dexterity and memory test – anagrams
  4. Number & shape recognition
  5. Pattern recognition - Attention

Dr.M.Suresh Kumar PhD
sureshkumar800@yahoo.com

Directions

- The Working memory Test has five dimensions. So, each dimension has unique direction to proceed the test. Therefore, read the directions before proceeding to answer the questions.
- Don’t take much time to read and answer to the questions.
- Please put your answers only in the answer sheet.
- If you have any doubts in the test please ask the experimenter.

Dr.M.Suresh Kumar PhD
sureshkumar800@yahoo.com

Responses

- The answers were recorded in a sheet by the experimenter

Working Memory Dimension	Maximum Score
Pattern Recognition	01
Word Association	24
Verbal dexterity and memory test – anagrams	20
Number & shape recognition	10
Pattern recognition - Attention	01
Total Score	56

Dr.M.Suresh Kumar PhD
sureshkumar800@yahoo.com

Scoring

Scoring	Score
Each right answer carry	1
Each wrong answer carry	0

Dr.M.Suresh Kumar PhD
sureshkumar800@yahoo.com

Norms

Score Range	Working Memory Level
45 - 56	High level
35 - 44	Above Average
23 - 34	Average
12 - 22	Below Average
0 - 11	Low

Dr.M.Suresh Kumar PhD
sureshkumar800@yahoo.com

Individual Data Table

Working Memory	Score	Remark
Pattern Recognition		
Word Association		
Verbal dexterity and memory test – anagrams		
Number & shape recognition		
Pattern recognition - Attention		

Dr.M.Suresh Kumar PhD
sureshkumar800@yahoo.com

Group Data

S. No.	Initial	Working Memory	
		Score	Level
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
Mean of Male			
Mean of Female			
Mean of Group			

Dr.M.Suresh Kumar PhD
sureshkumar800@yahoo.com

Discussion

- **Paragraph 1**
  - What is working memory?
  - Write the importance of working memory
  - State the subject's score on working memory test
  - Interpret the subject's score
  - **Paragraph 2**
  - State the male, female and group's score and its level in working memory test
  - Interpret the male, female and group's score and find out the least scored person and its level
  - Compare the individual data with male, female and overall group data
  - Compare the male group data with female and overall group data

Dr.M.Suresh Kumar PhD
sureshkumar800@yahoo.com

Suggestions

- To suggest suitable intervention strategies to improve the free recall and cued recall

Dr.M.Suresh Kumar PhD
sureshkumar800@yahoo.com

Conclusion

1. The level of working memory of subject's is found to be ……..
2. The working memory of male group is ……and ……
3. The working memory of female group is ……and …..
4. The working memory of overall group is ……and ….
5. Individuals differ in their working memory scores

Dr.M.Suresh Kumar PhD
sureshkumar800@yahoo.com

Reference

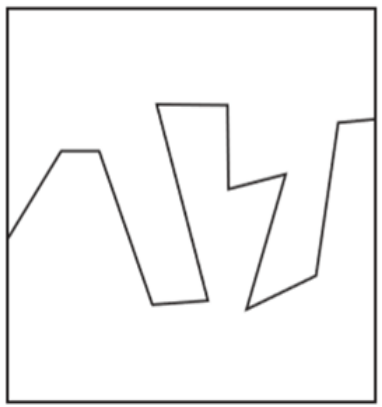
- APA format

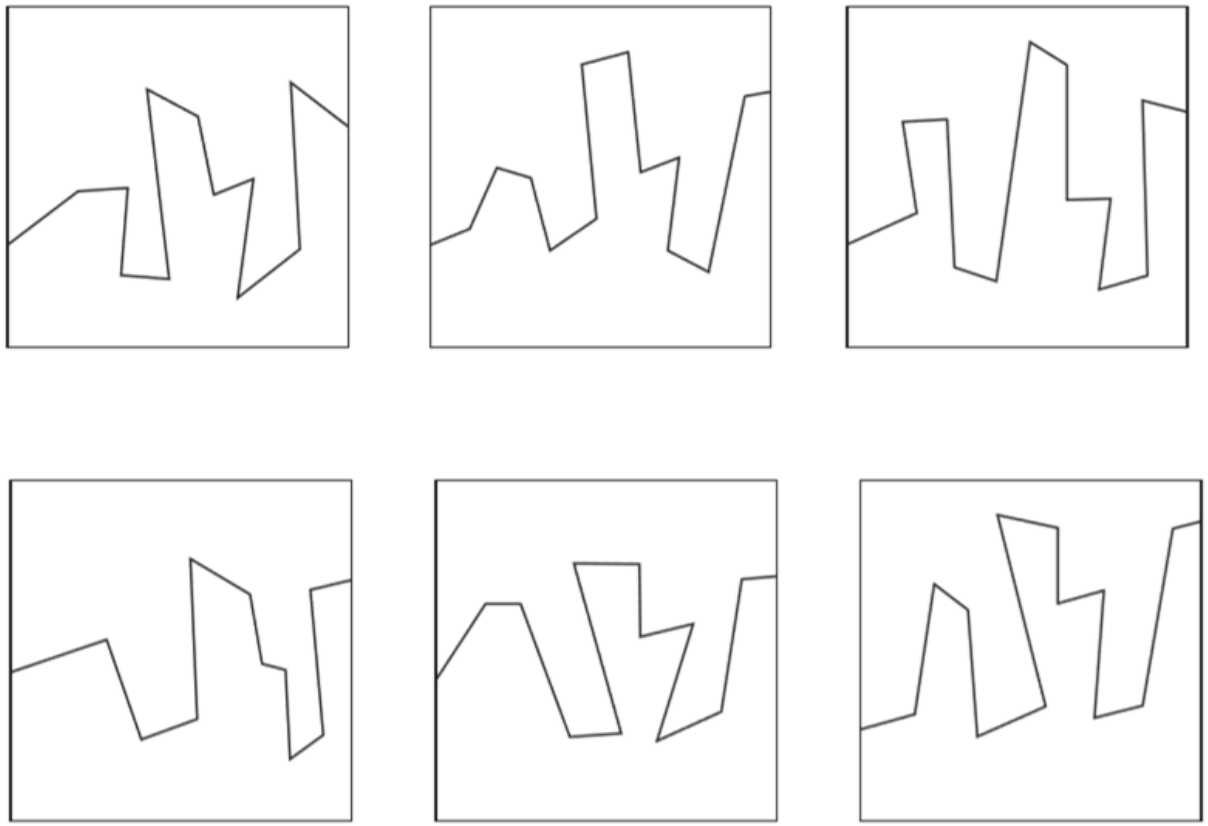
Dr.M.Suresh Kumar PhD
sureshkumar800@yahoo.com

The Working Memory Test

Pattern recognition A

Study the diagram below for 5 seconds, then wait for 5 minutes and





2. Word Association

- This exercise tests your ability to remember pairs of words and form associations. Study the 12 pairs of words below for 10 minutes and use your imagination to link each pair of words, as shown below, in as many ways as

SAUSAGE TRACTOR	BAGPIPES ARROW	SLIPPER PARROT
BLACKBOARD PARASOL	POTATO COMPUTER	TELEVISION CANDLE
ROBOT MANDOLIN	NAIL SNAKE	CHAIR BALLOON
PIPE BRIDGE	PENCIL TREE	DICTIONARY MOUSTACHE

ARROW .....
CHAIR .....
COMPUTER .....
SAUSAGE .....
PENCIL .....
BALLOON .....
ROBOT .....
PARROT .....
BAGPIPES .....
TELEVISION .....
BRIDGE .....
SNAKE .....
DICTIONARY .....
BLACKBOARD .....
POTATO .....

SLIPPER .....
TREE .....
MOUSTACHE .....
PARASOL .....
NAIL .....
CANDLE .....
TRACTOR .....
PIPE .....
MANDOLIN .....

Put a letter A against one pair, the letter B against a second pair, etc., through to the letter L, until you have matched what you think are the original 12 pairs of words.

Verbal dexterity and memory test - anagrams

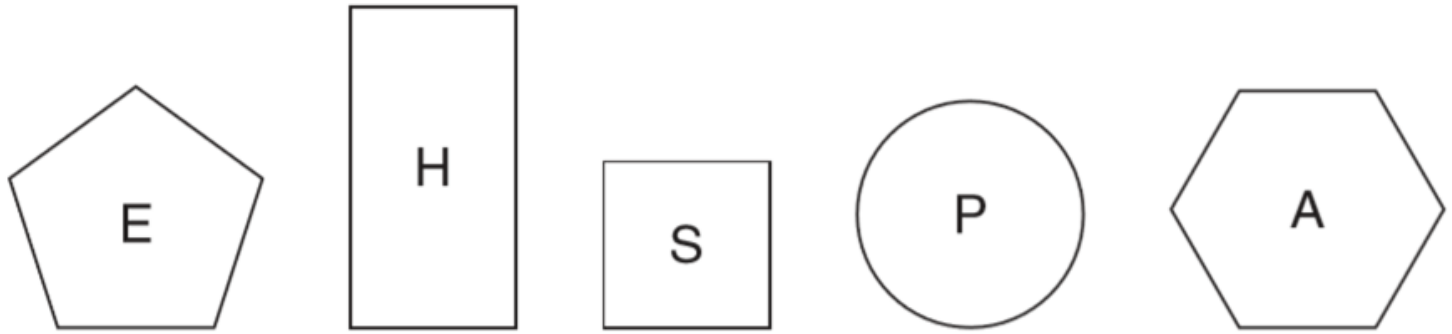
- This test consists of 20 sets of letters. From each set of letters a seven letter word can be produced. The test is designed to test and develop both your powers of memory and your verbal dexterity. To solve each anagram, you must first memorise each set of seven letters and then use these seven letters to produce a seven-letter English word.
- Example: WOKEDRY=KEYWORD
- Look at each set of seven letters in turn for just 5 seconds, then look away and try to solve the anagram within 2 minutes without committing anything to paper.

Anagrams – Memory Test

- 1 IANBATS
- 2 PHILDON
- 3 PAINOUT
- 4 DIMMARE
- 5 TALLFEE
- 6 OURPETS
- 7 NOBREAD
- 8 CENTCOP
- 9 DOEPIES
- 10 TENRAVE
- 11 OARPANG
- 12 SHYAREA
- 13 METHERO
- 14 TAILMOP
- 15 RAGMICE
- 16 TIEZINC
- 17 TAUTODE
- 18 COYOMEN
- 19 ANULTRA
- 20 VIAROTA

4. Number & shape recognition

- Study the figure below for 15 seconds



Number Shape Recognition

1 Which shape is in the middle position?

a) circle b) square c) rectangle

2 The letter ‘P’ appears inside which shape?

a) rectangle b) pentagon c) circle

3 Which shape is immediately to the left of the rectangle?

a) square b) pentagon c) hexagon

4 In which shape does the letter ‘H’ appear?

a) circle b) pentagon c) rectangle

5 Which letter appears inside the hexagon?

a) H b) A c) S

6 Which letter appears inside the square?

a) S b) P c) E

7 Which letter is positioned next to the letter A?

a) S b) P c) H

8 What word is spelled out by the first three letters in reverse?

a) ASP b) SPA c) SHE

9 What word is spelled out by the last three letters?

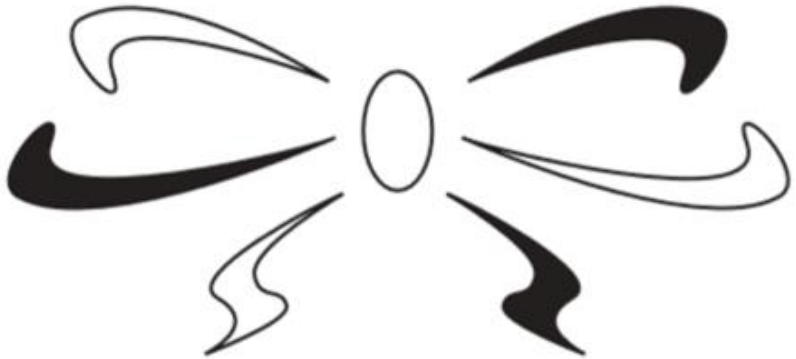
a) ASP b) SPA c) SHE

10 What word is spelled out by taking the third, second, fifth, fourth and first letters, in that order?

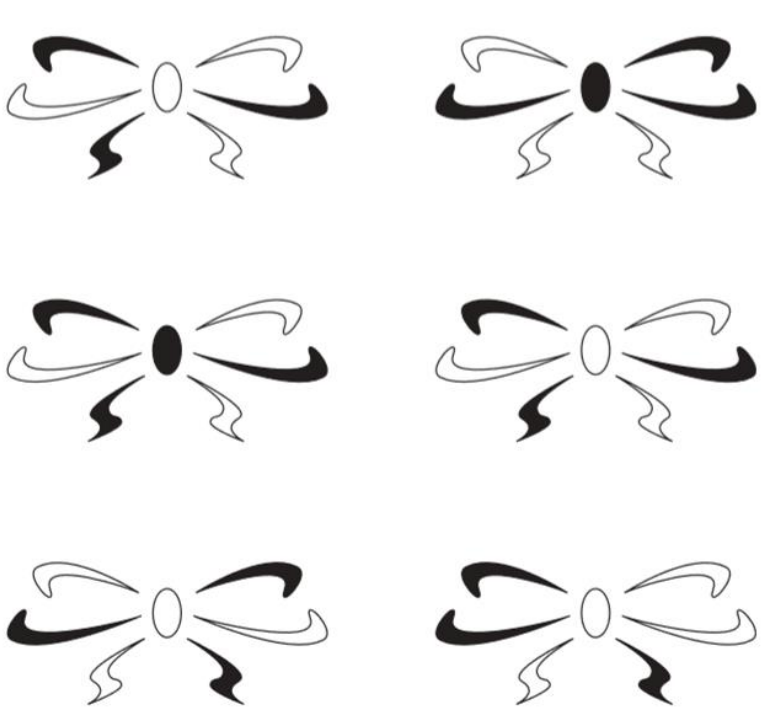
a) PHASE b) SHAPE c) HEAPS

5. Pattern recognition

- Study the figure below for 5 seconds. Now wait for 5 minutes



Which of the following figures did you look at 5 minutes ago ?



Scoring Key

Answer

- 1 ABSTAIN
- 2 DOLPHIN
- 3 UTOPIAN
- 4 MERMAID
- 5 LEAFLET
- 6 POSTURE
- 7 BROADEN
- 8 CONCEPT
- 9 EPISODE
- 10 VETERAN
- 11 PARAGON
- 12 HEARSAY
- 13 THEOREM
- 14 OPTIMAL
- 15 GRIMACE
- 16 CITIZEN
- 17 OUTDATE
- 18 ECONOMY
- 19 NATURAL
- 20 AVIATOR