

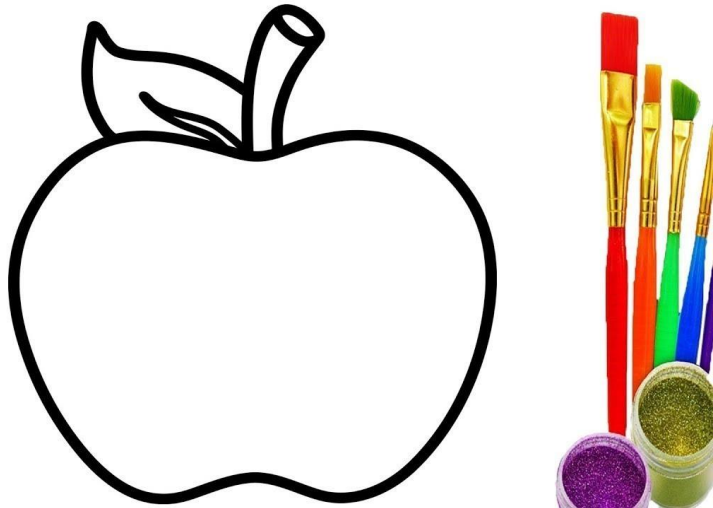
PRINCIPLES OF MULTIMEDIA LEARNING

By Dr. Walid Aboraya

AOU-Oman

2020

Relationship between learning and senses



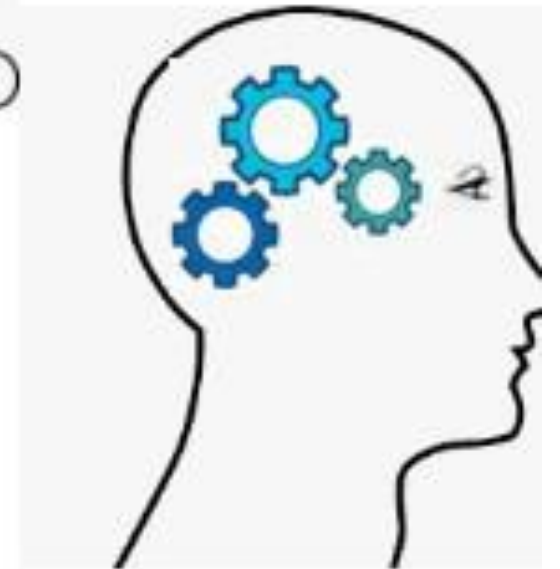


Traditional Learning Vs. Distance Learning

What is Cognitive Learning?

Cognitive learning is a style of learning that encourages students to use their brains more effectively. Students fully engage in the learning process so learning, thinking, and remembering get easier and easier.

Cognitive learning is an immersive and active process that engages your senses in a constructive and long-lasting way. It teaches you to maximize your brain's potential and makes it easier to connect new information with existing ideas, deepening the memory and retention capacity.



What is Multimedia Learning?

Learning that occurs when students build mental representations from words and pictures that are presented to them (e.g., printed text and illustrations or narration and animation). Multimedia messages include words, graphics and animation.



Cognitive Theory of Multimedia Learning



The goal is to instructional media in the light of how human mind works.



This is the basis for Mayer's cognitive theory of multimedia learning.

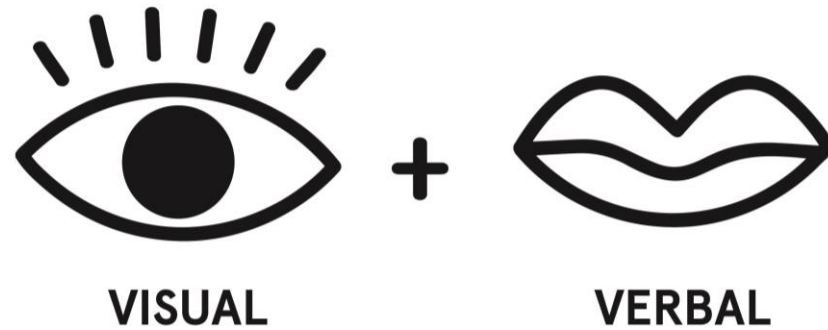


This theory proposes three main assumptions when it comes to learning with multimedia:

First Assumption

There are two ways a person could expand on learned material:

visual imagery and **Verbal associations**



i.e. there are two separate channels (auditory and visual) for processing information (sometimes referred to as Dual-Coding theory)

Second Assumption

Working memory is limited with respect to the amount of information it can hold, and the number of operations it can perform on that information.

i.e each channel has a limited (finite) capacity (similar to Sweller's notion of Cognitive Load)



Working Memory Limitations: Length of Time & Amount of Information



15-20 seconds



items

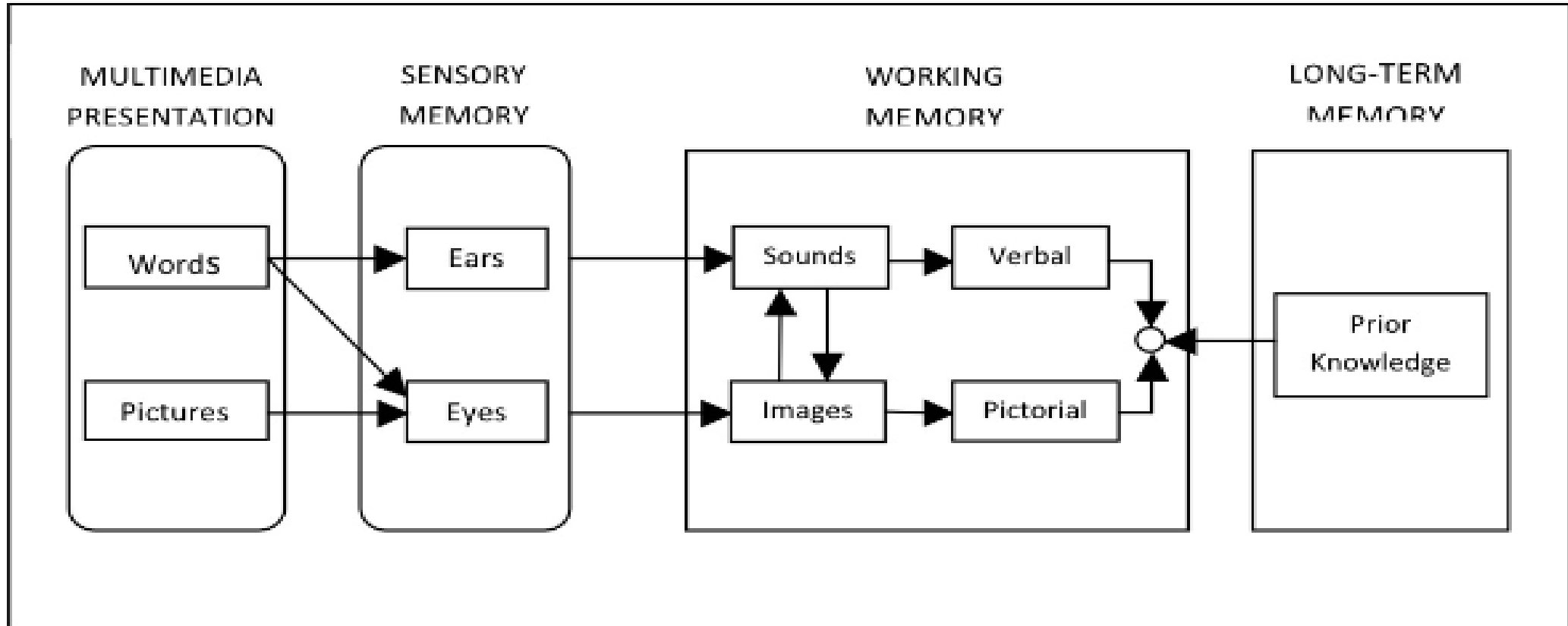
source: Driscoll, Marcy (2005), *Psychology of Learning for Instruction*, 86

Third Assumption

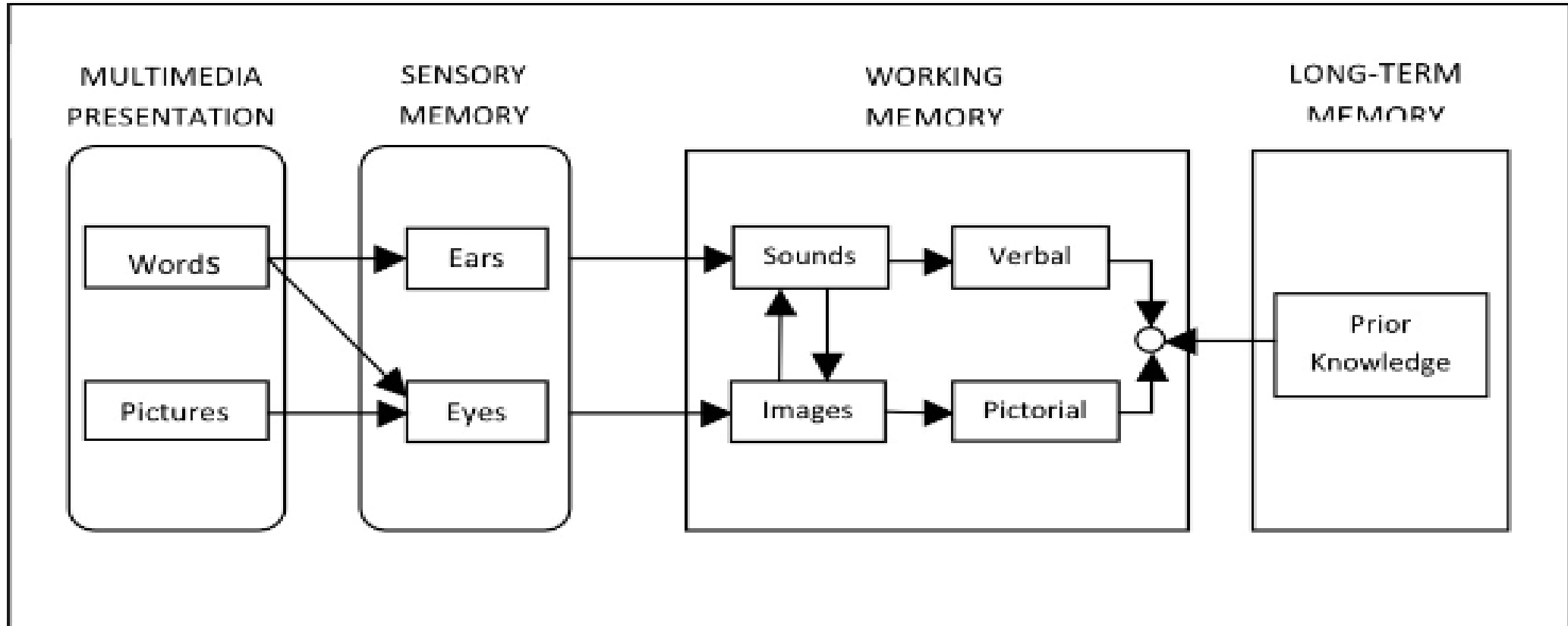
Learning is an active process of filtering, selecting, organizing, and integrating **information based upon prior knowledge.**



Cognitive Theory of Multimedia Learning



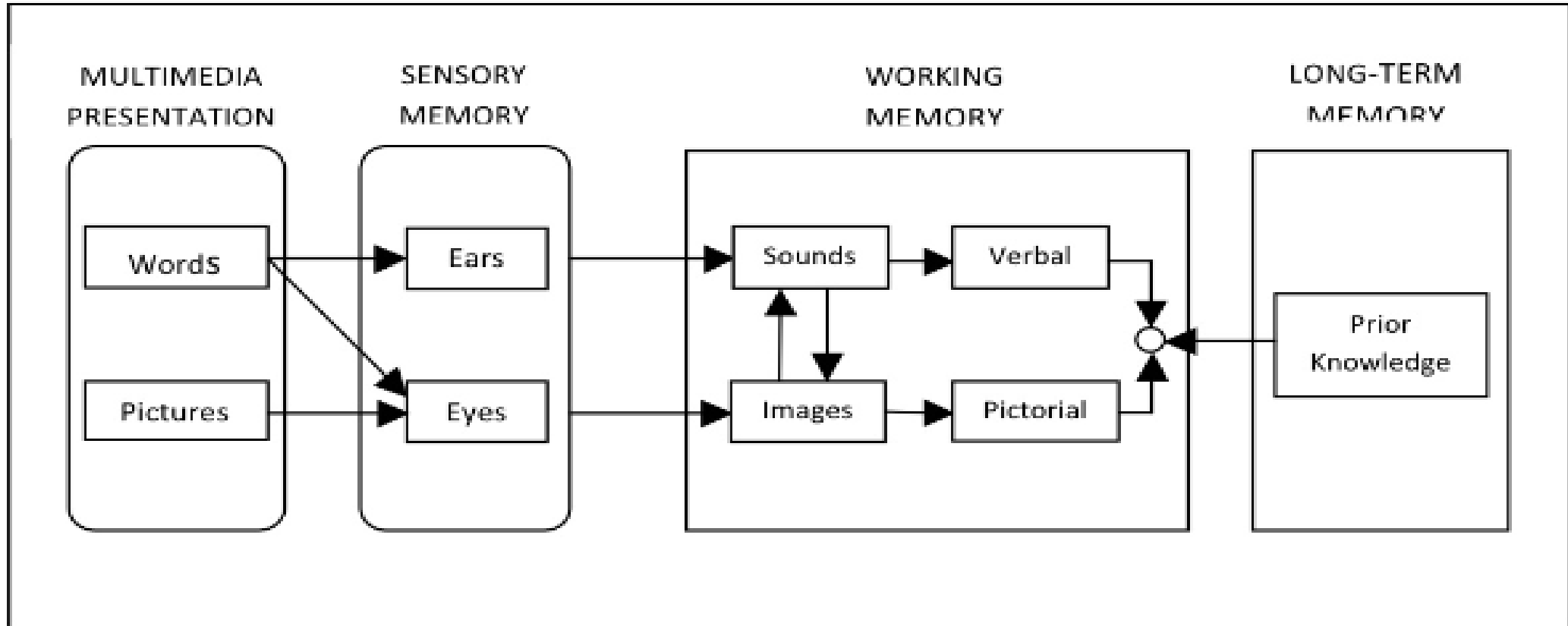
Cognitive Theory of Multimedia Learning



Sensory Memory

Which receives stimuli and stores it for a very short time

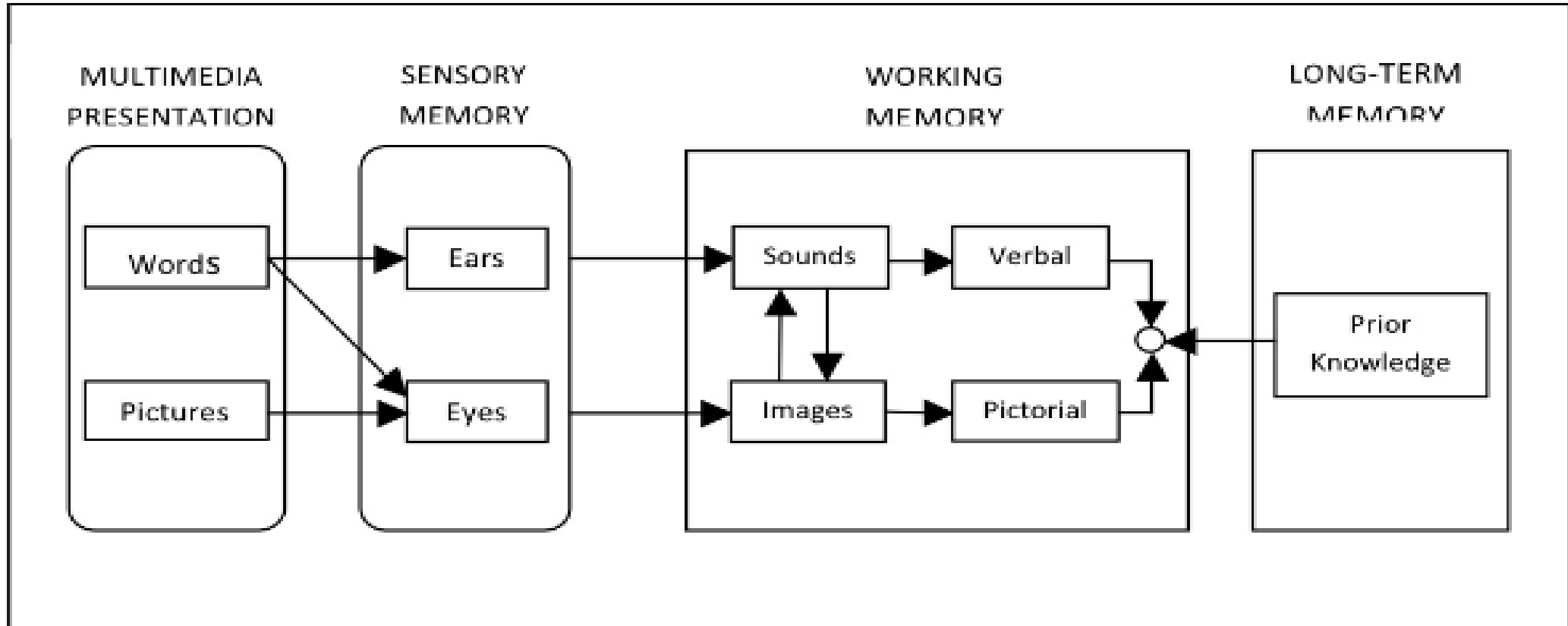
Cognitive Theory of Multimedia Learning



Working Memory

Where we actively process information to create mental constructs or "schema"

Cognitive Theory of Multimedia Learning



Long-term Memory

The repository of all things learned

MULTIMEDIA LEARNING PRINCIPLES



By Richard E. Mayer



Richard E. Mayer has developed a set of instructional design principles that are based on experimental research studies and grounded in a theory of how people learn from words and pictures. Learn more about Mayer's cognitive theory of multimedia learning from his book [Multimedia Learning](#).

PEOPLE LEARN MORE DEEPLY...

COHERENCE

...when extraneous material is excluded

Simply said, cut out the extras. **Use only the information that the learner needs.** And most often, that means simple text and simple visuals that relate directly to the learning topic. Remove all the fluff.

COHERENCE PRINCIPLE



This



Not This

Cut out the extras. Remove all the fluff. Use only the information that the learner needs. That means simple text and simple visuals that relate directly to the learning topic.

This figure represents a person with blue t-shirt, blue short, and weight 90 KG



Figure Before

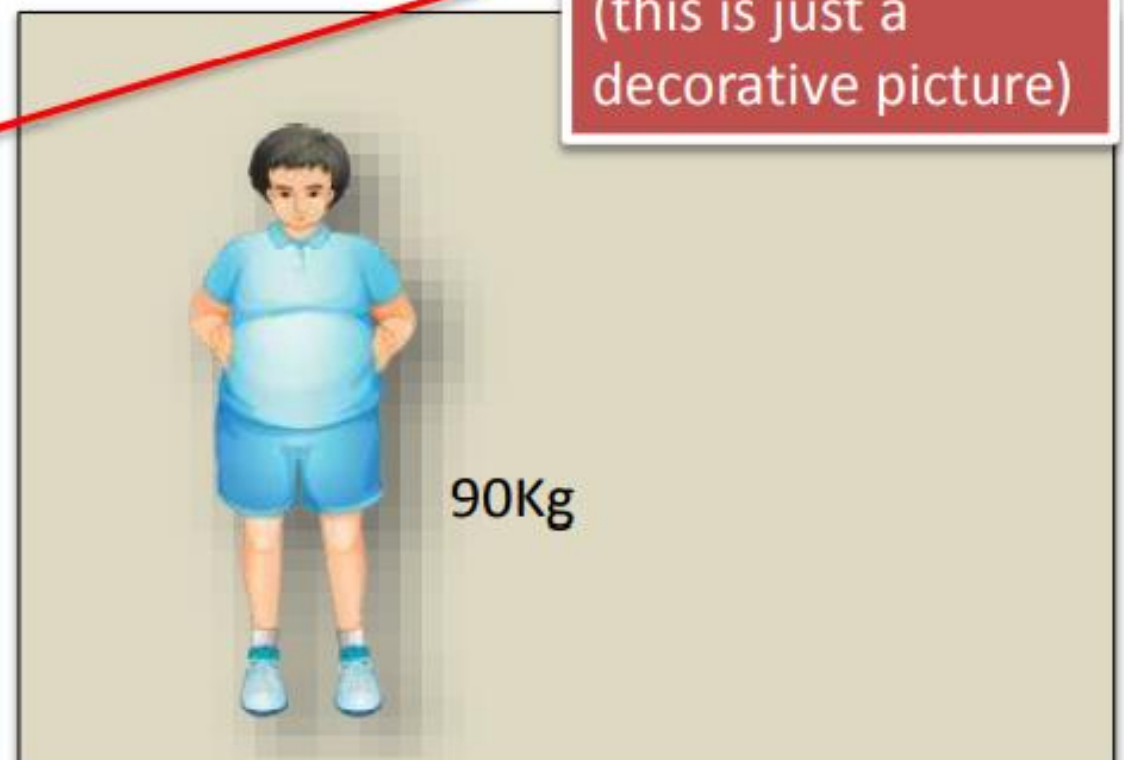


Figure After

Remove the distracting factor (this is just a decorative picture)

Coherence Principle

The Coherence Principle means to avoid unnecessary graphics, words, and sounds from the lesson. Less is more.

Learning Objectives

- You will be able to connect and log in to Blackboard Academic Suite
- You will be able to enter your courses in Blackboard Academic Suite

Unnecessary Graphic



- You can use the Coherence Principle as you're planning your visual elements. **Ask yourself**, "Is this image 100% necessary to help with comprehension? Or could you find a better one? Does this message use simple enough language so the audience will understand? Maybe I could trim down a few words."
- As you re-watch the experience, make sure to **watch with a critical "Coherence Principle" eye**. Determine how you can reduce, simplify, and clarify.

PEOPLE LEARN MORE DEEPLY...

SIGNALING

...when cues are added that highlight the main ideas and organization of the material

if there is a ton of information on the screen, how is the learner supposed to know **what is the most important part?**

SIGNALING PRINCIPLE

The **methodical and deliberate activity** of creating and continuously improving maintenance systems.



This

The methodical and deliberate activity of creating and continuously improving maintenance systems.



Not This

Show the learner exactly what to pay attention to on the screen.
Highlight important words and use arrows to point out significant information.



WWW.YOURWEBSITE.COM



signal with arrows

or circles



SIGN UP NOW!



Another way you can use the signaling principle is by **having slides or scenes that separate learning sections**. This is a quick and easy way to signal to the learner that we're moving on to the next topic.

PEOPLE LEARN MORE DEEPLY...

REDUNDANCY

...from animation and narration than from animation, narration, and on-screen text

The theory here is that if you already have narration and graphics, then the text on top is just redundant information. **And this can be overwhelming for a learner.**

REDUNDANCY PRINCIPLE



This



Not This

**With an audio narration voiceover, use only graphics on screen. Don't use graphics and text.
Add optional closed captioning for learners that prefer to read subtitles.**

Redundancy

My important
key message...



My important
key message...



**A good rule of thumb is:
"If you show it, don't say it, and
if you say it, don't show it"**

Dr. Walid Aboraya AOU OMAN

PEOPLE LEARN MORE DEEPLY...

SPATIAL CONTIGUITY

...when corresponding printed words and graphics are placed near rather than far from each other

It is about the actual space in between your text and visuals on the screen, **humans learn best when relevant text and visuals are physically close together.**

SPATIAL CONTIGUITY PRINCIPLE

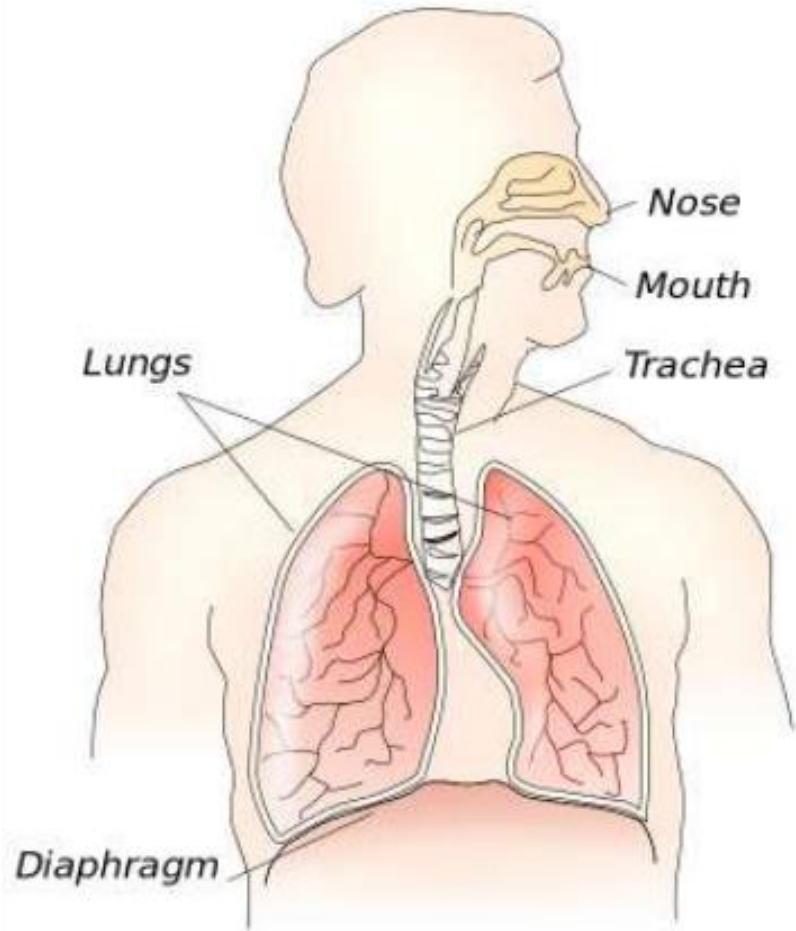


This

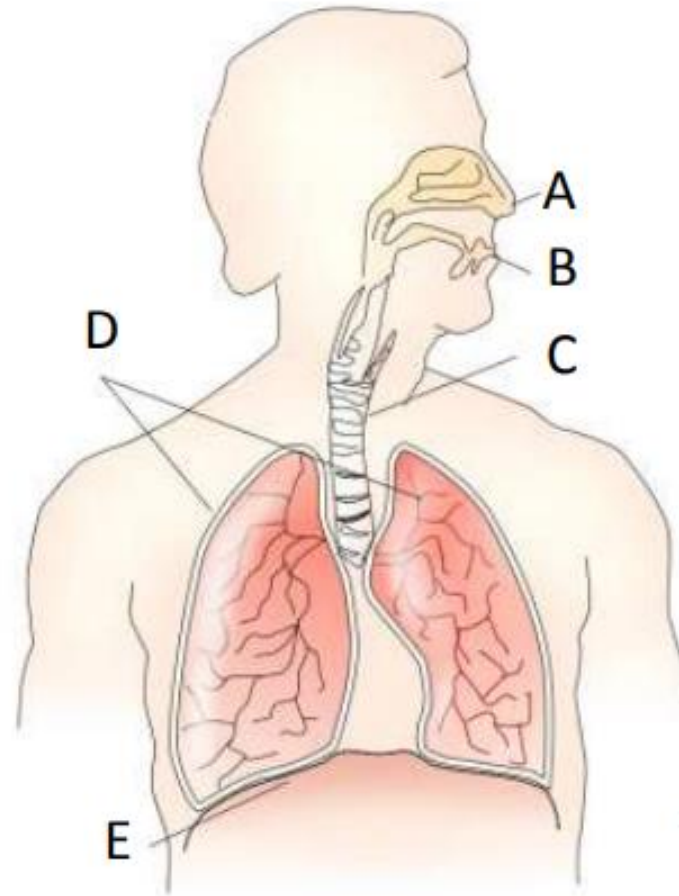


Not This

Keep all related text and graphics physically close together in your frame. Make it easy for learners to understand how text and graphics are related.



Corresponding word
and pictures NEAR



Corresponding word
and pictures FAR

- A. Nose
- B. Mouth
- C. Trachea
- D. Lungs
- E. Diaphragm

Spatial Contiguity

	£24,300			
	£856		£1,000	

March

May

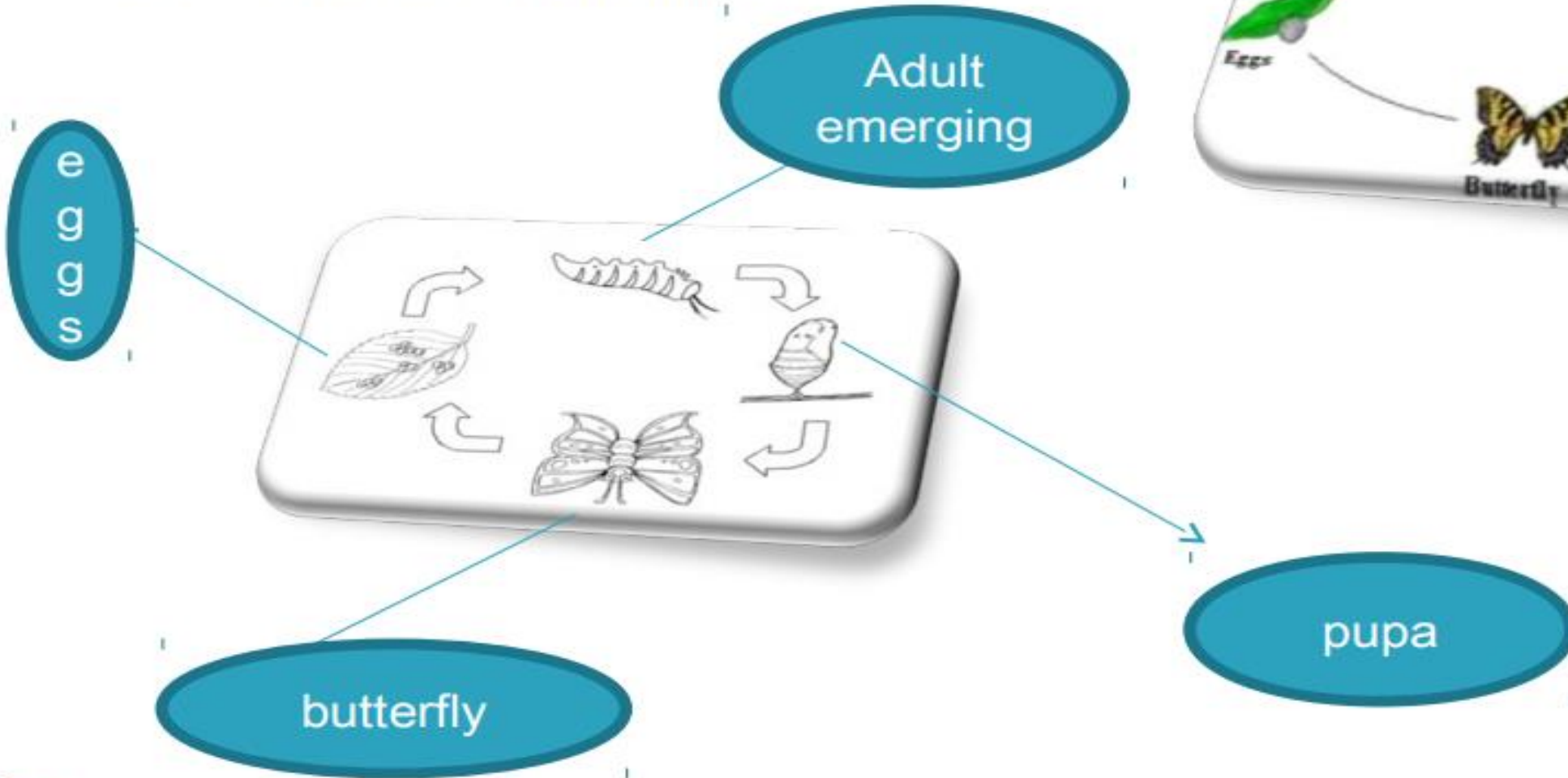
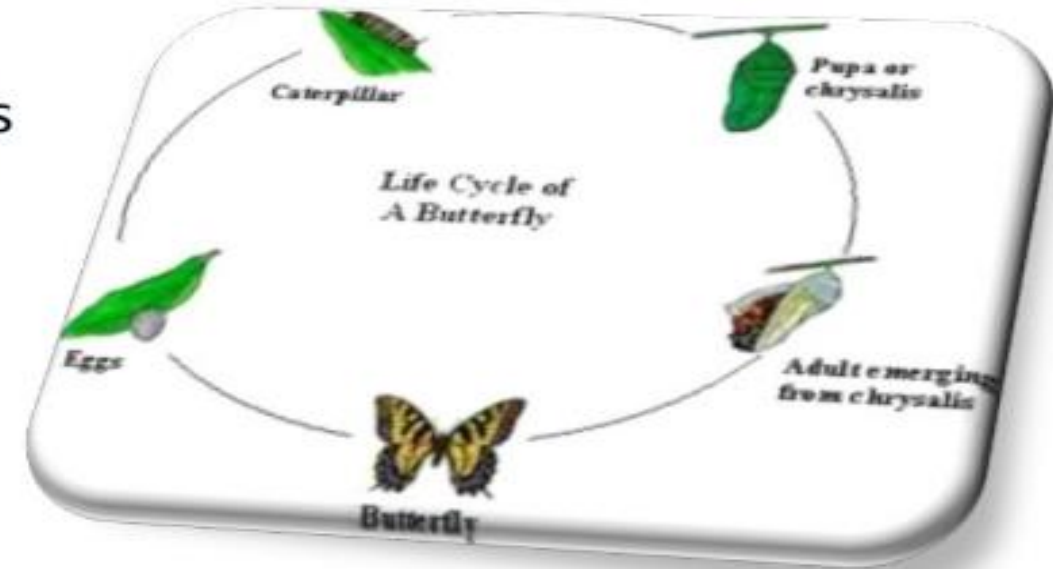
	£24,300			
	£856		£1,000	

B2 = March
D8 = May

Corresponding words and pictures are better understood if positioned close together

▪ The Spatial Contiguity Principle:

Students learn better when corresponding words and pictures are presented near rather than far from each other on the page or screen.



Which example is capable of conveying a better mental image?

PEOPLE LEARN MORE DEEPLY...

TEMPORAL CONTIGUITY

...when corresponding graphics and narration are presented simultaneously rather than successively

If you're introducing a new process for example, the animation (or visual) should be occurring at the same time as the voiceover audio. This is preferred to having the voiceover audio play first, and then watching a visual after. You can use this by **making sure your voiceover audio is always timed well with your visuals** or animations.

TEMPORAL CONTIGUITY PRINCIPLE



This



Not This

Make sure the visuals and audio *occur at the same time* as opposed to having the voiceover audio play before the visual is shown.

PEOPLE LEARN MORE DEEPLY...

SEGMENTING

...when a narrated animation is presented in learner-paced segments than as a continuous unit

It suggests that **learning is broken up into smaller, bite-sized chunks**. Make sure that no one lesson, slide, or video has too much information packed in it.

Mayer found that when **learners can control the pace** of their learning, they performed better on recall tests.

You can use this principle by providing learners with more control over their learning. This is done by **adding next buttons or allowing the speed which a video plays**.

SEGMENTING PRINCIPLE

Let's learn the details of the three
Breakdown Removal Phases



This

Let's learn the details of the three
Breakdown Removal Phases



Not This

Provide learners with control over their learning by including 'next' buttons and customizable video settings. Also, make sure learning is segmented into small chunks.

PEOPLE LEARN MORE DEEPLY...

PRE-TRAINING

...from a narrated animation when they have had training in the names and characteristics of the main concepts

humans learn more efficiently if they already know some of the basics. This often means understanding basic definitions, terms, or concepts before beginning the learning experience.

If a learner starts an eLearning course knowing about the topic, they can easily become overwhelmed once complex visuals and definitions start being thrown their way. A bit of pre-training before starting the course really would have helped.

PEOPLE LEARN MORE DEEPLY...

MODALITY

...from graphics and narration than from graphics and on-screen text

This doesn't mean that you should never use text on screen, it simply means that if there are visuals and too much text, learners will be overwhelmed.

Try to limit the amount of text you use on screen overall. Rely more on visuals, unless you need to define key terms, list steps, or provide directions.

MODALITY PRINCIPLE

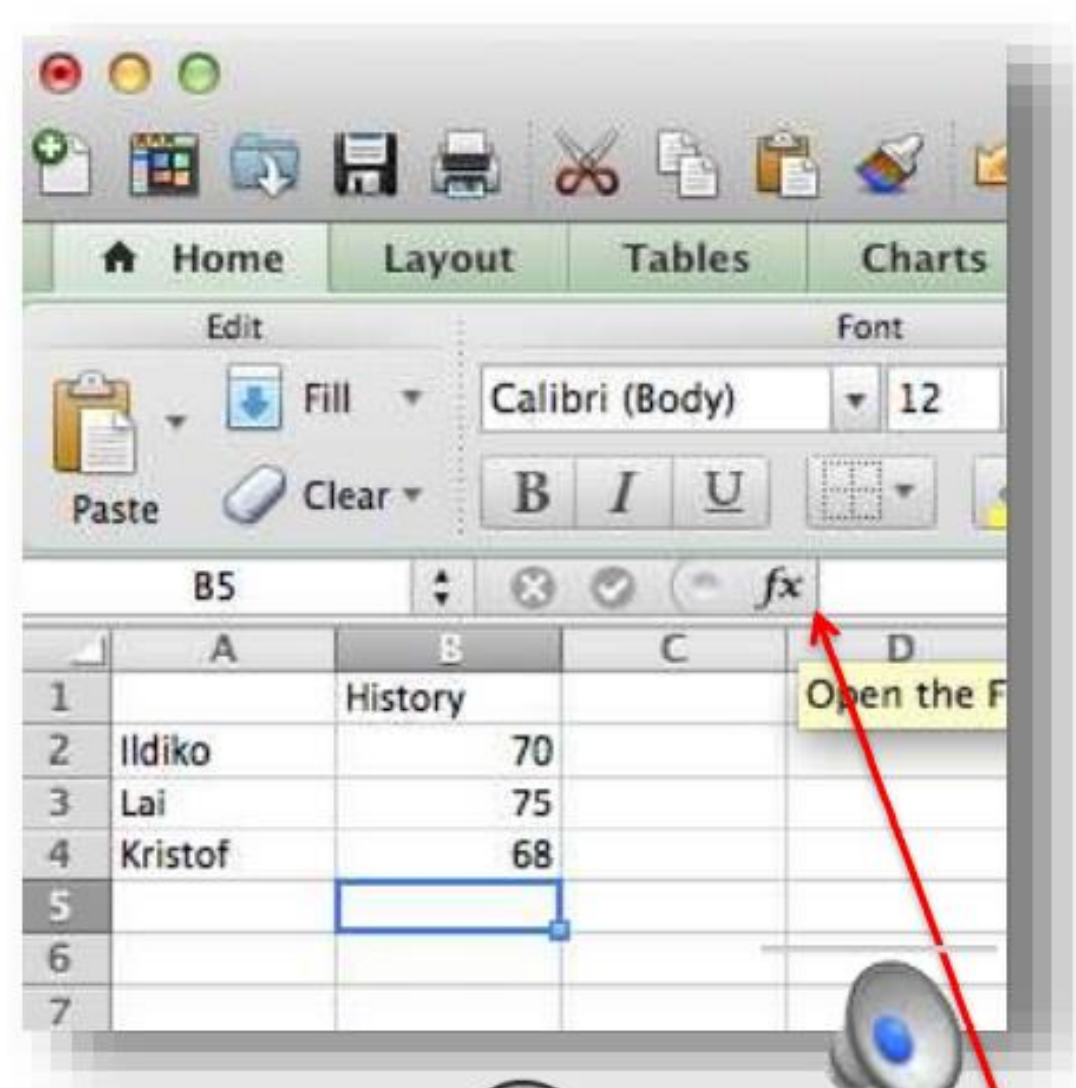
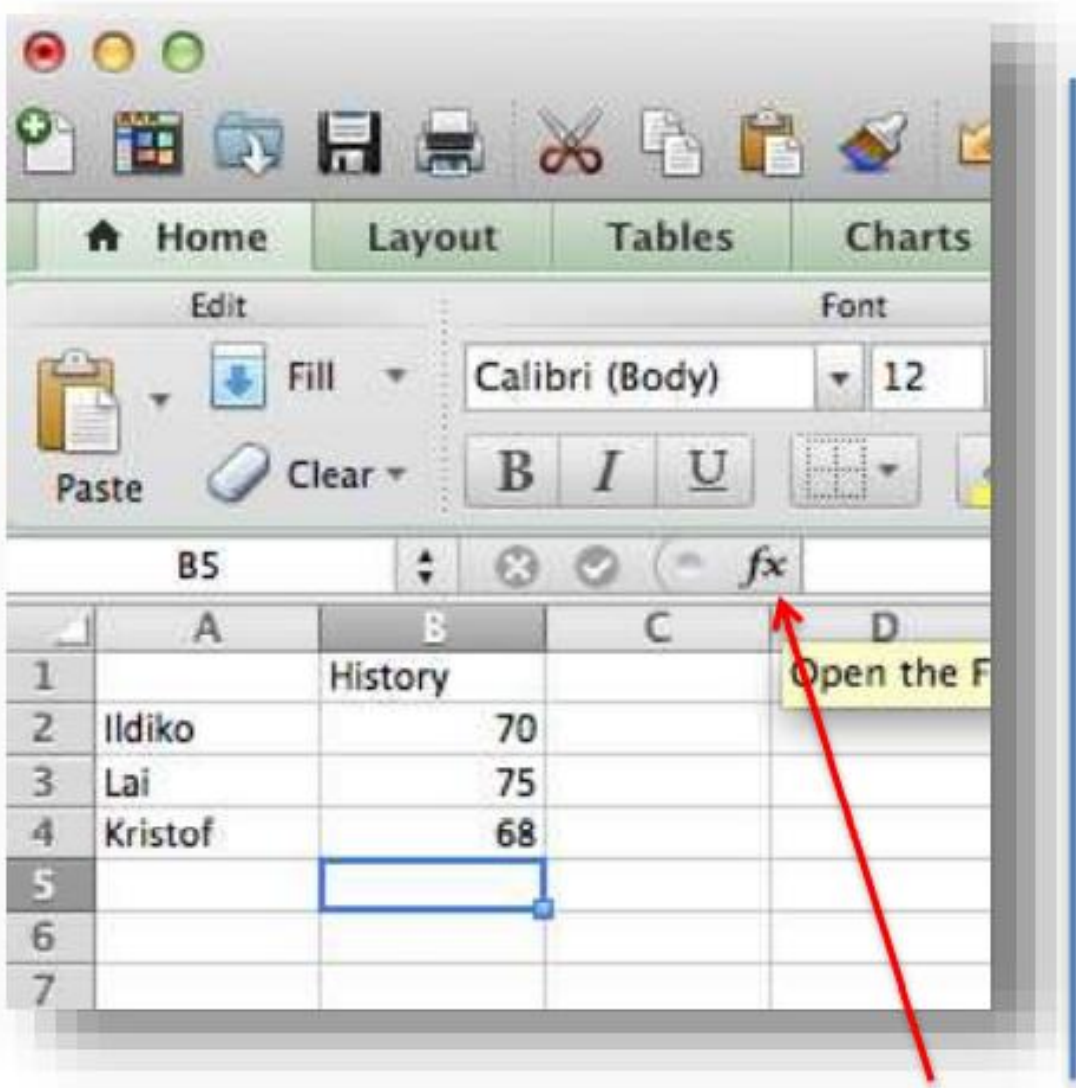


This



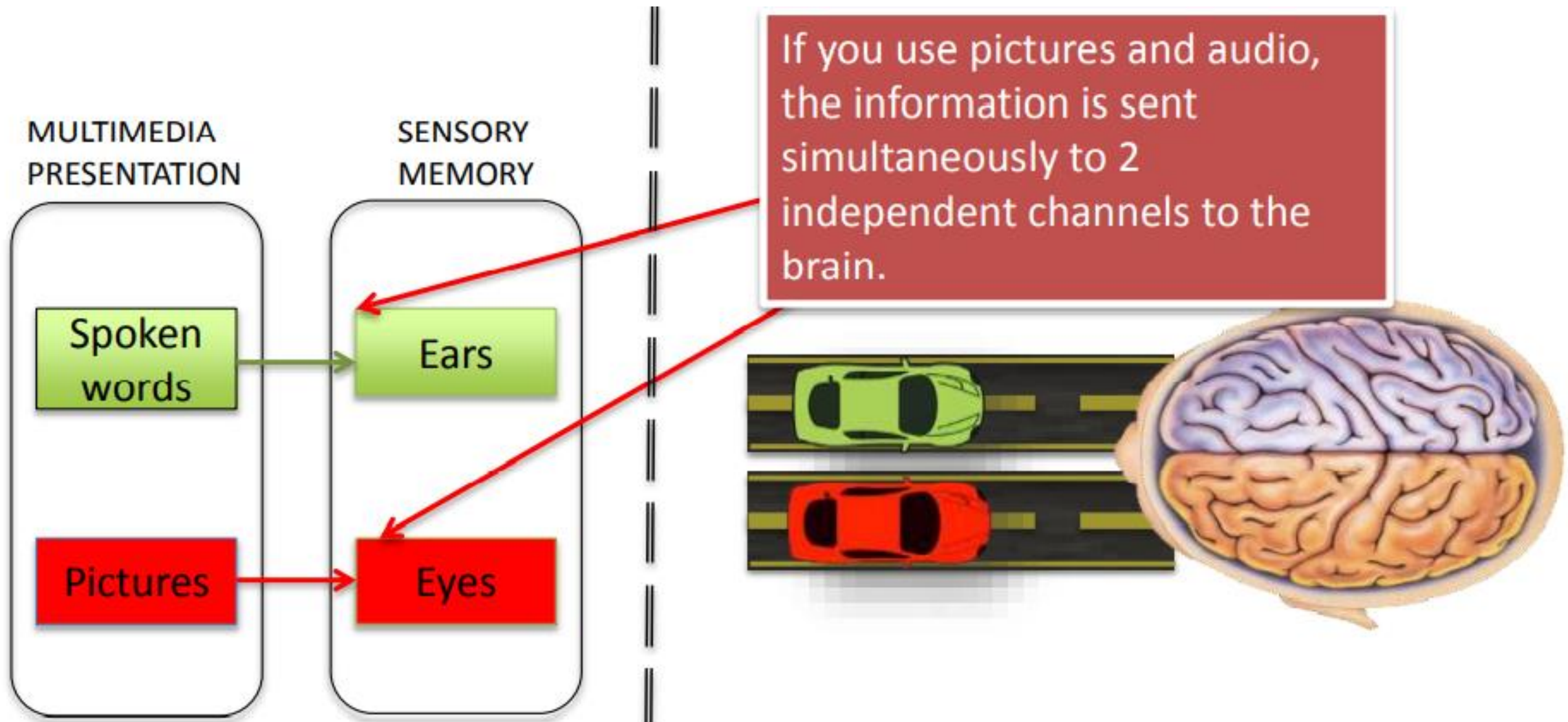
Not This

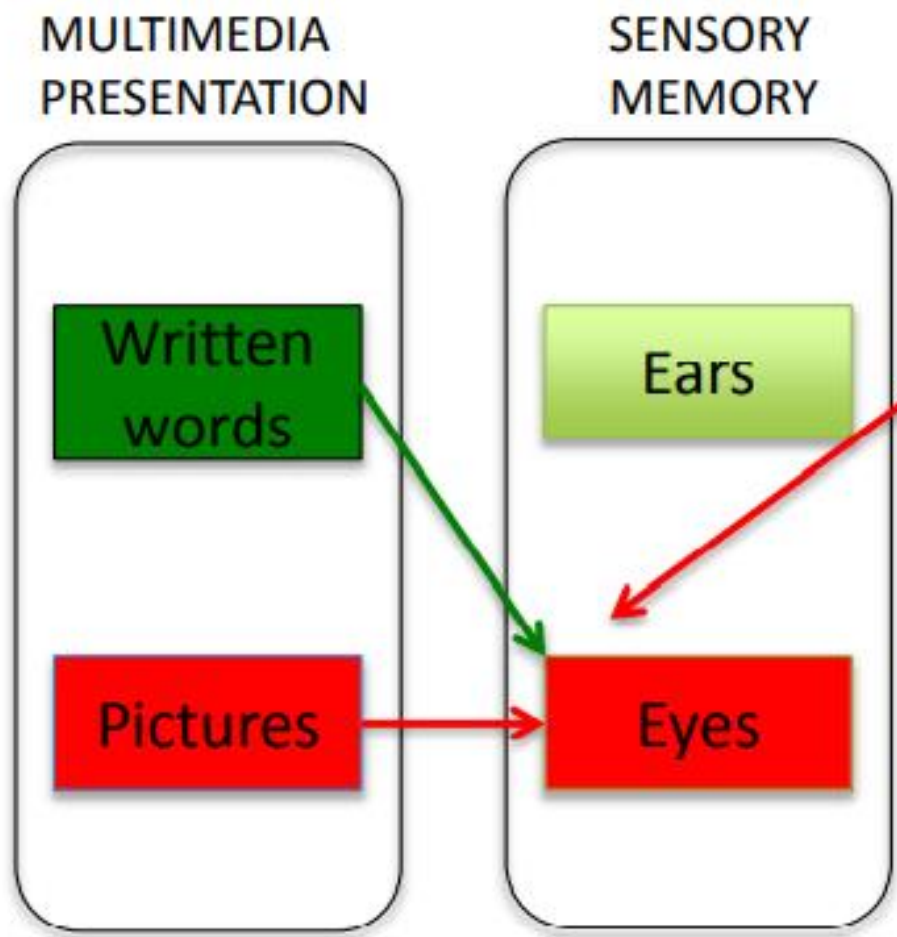
In voiceover supported learning, try to limit the amount of text used. Rely on visuals instead. Text should be used only for key definitions, lists, and directions.



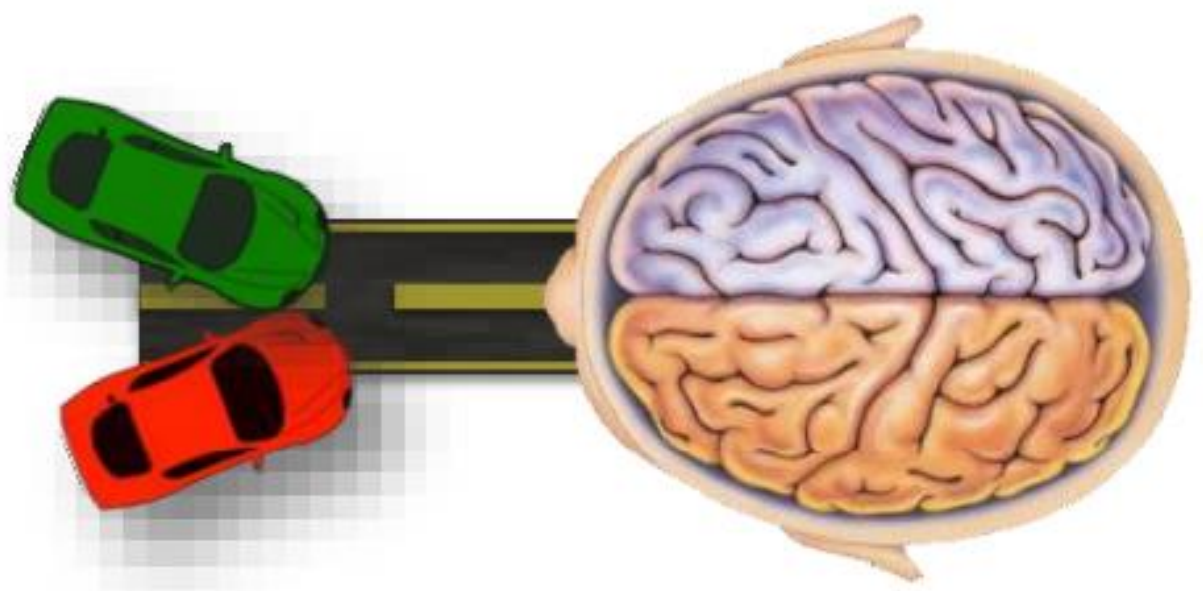
1. Let's calculate the average at the cell B5. First let's click the option function that is represented with the letters fx







If you use pictures and words we are saturating the same channel, they are competing for the same channel to the brain.



PEOPLE LEARN MORE DEEPLY...

MULTIMEDIA

... from words and pictures than just words alone. This principle is sort of the foundation of all Mayer's principles, that images and words are more effective than words alone

You can use this principle by being very thoughtful about the images you select.

Remember that these images need to enhance or clarify the information.

MULTIMEDIA PRINCIPLE

Phase 1

Develop optimal equipment conditions



This

Phase 1 is achieved through proper implementation of our tools and systems using the Breakdown Removal Phases and the five Program Activation Steps that we will discuss further in this course.

The rigorous, step-by-step development of total capability in Dynamic Maintenance is the key difference compared to other supply chain methodologies.

Foundational elements must be well established before developing higher-level tools and systems.

Not This

Avoid using text on screen alone. Use relevant visuals instead. Be thoughtful about the visuals you select, making sure they enhance or clarify the information.



Words and pictures

- A boy with a blue t-shirt, blue short and blue tennis.
- He has lost weight from July to September
- He was having 90Kg, after 3 months he has 60 Kg.

Words alone

PEOPLE LEARN MORE DEEPLY...

PERSONALIZATION

... from a more informal, conversational voice than an overly formal voice. This improves the learning experience.

You can use this by **keeping your language simple and casual**. Try to avoid overly professional sounding text, or long, complex words.

It also helps to **use the first person** (you, I, we, our). This is where it helps to consider your audience demographics and try to match the tone of your voiceover to enhance personalization.

PERSONALIZATION PRINCIPLE

How is Phase 1 achieved?

Phase 1 is achieved by establishing a 30% decrease in breakdowns.



This

How is Phase 1 achieved?

Phase 1 is achieved by implementing the appropriate maintenance tools and structural conformities which meet our organizations core competencies of establishing a 30% decrease in breakdowns.



Not This

Keep your message simple and casual. It allows learners feel more comfortable.
Avoid using overly professional sounding text, or long, complex words.



ADD-ONS

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PEOPLE LEARN MORE DEEPLY...

VOICE

... from a human voice
than a computer voice.

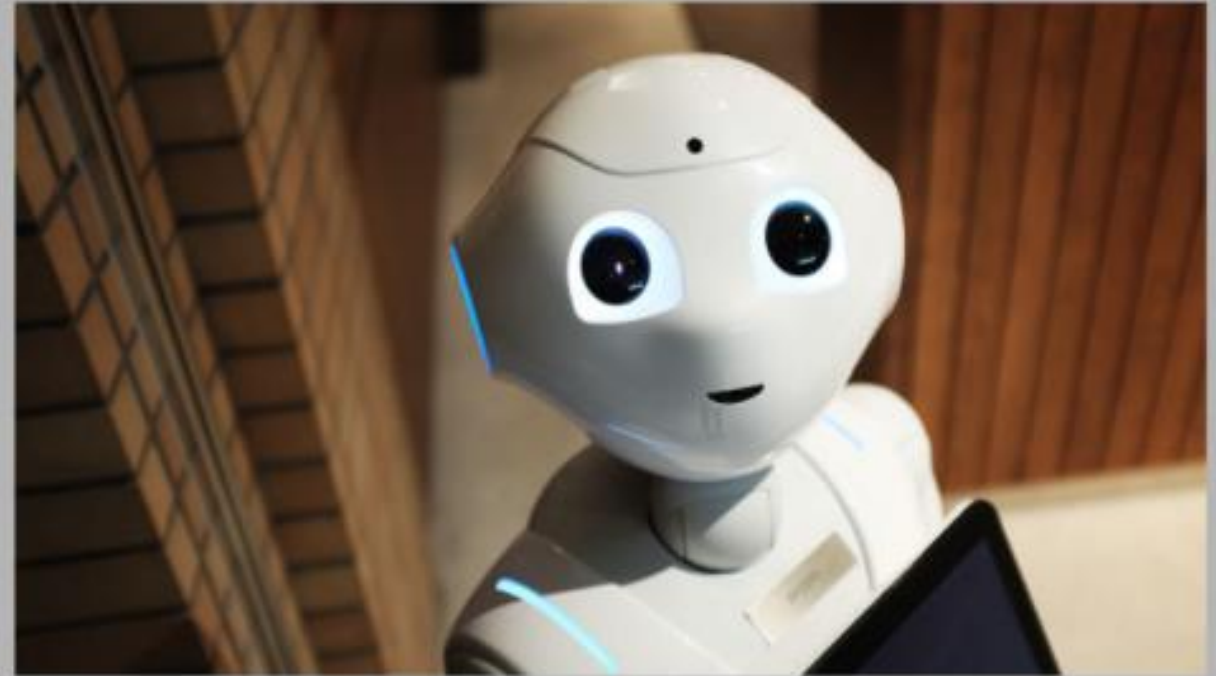
While Siri and Alexa are getting pretty close, there is **no substitution for a human voice.**

It's important to note that the studies are still rather preliminary for the Voice Principle. But even so, it makes sense to use a human for your voiceover.

VOICE PRINCIPLE



This



Not This

**Use audio that was recorded professionally by a human.
Don't use an automated, robotic, computer voice.**

PEOPLE LEARN MORE DEEPLY...

IMAGE

... from relevant visuals on the screen rather than using a talking head video.

Talking head videos are incredibly common in eLearning courses and MOOCs.

The research on this one is also still in its early phases, so take this principle with a grain of salt.

The thinking here is that if there is important information to be learned, relevant visuals on the screen will be more effective than showing a talking head of an instructor.

IMAGE PRINCIPLE



This



Not This

Use relevant animations and visuals that help reinforce the audio voiceover.
Try to limit the amount of talking head screen time by the instructor.

ACTIVITY



Dr. Walid Aboraya AOU OMAN

Do you agree
with the
following
images?

How can you
improve
them?



Week 1

Time/Location	Topic	Faculty	Readings/Assignments
Monday, July 27			
8:00 – 8:50 am 120 WH	Course Intro and Clinical Uncertainty	Raslich	Overview PPT PDF Clinical Uncertainty PPT PDF
9:00 – 9:40 am 120 WH	CDM Appreciation	Raslich	CDM Appreciation PDF PPT Prasad V. Article



Uses of algebra

- Most of us use algebra every day - simple problems that we "do in our heads". For instance, say you have \$20 and you go to the store. The store is having a "buy one and get one at half price" sale. How do you figure out what you can buy? There's an equation for that. Or, "how tall is that building?" If you know how far away it is, and the height of any one thing you have at hand, there's an equation for that.

Science

- When doing any form of science, whether just a project or a lifetime career choice, you will have to be able to do and understand how to use and apply algebra.



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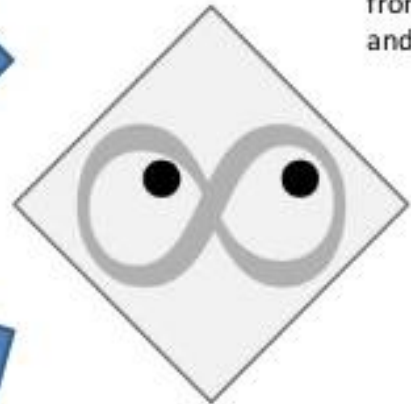
EXAMPLE



Text used to explain graphics or as bullet points in conjunction with graphics

Visual input taken in from combined use of Text and Graphics

Graphics in the form of graphs, pictures or illustrations



Memory



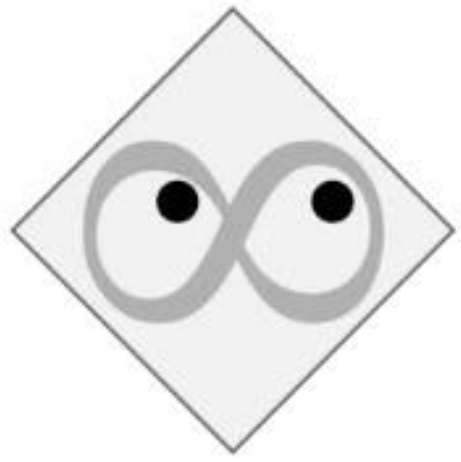
Narration that reads the text to reinforce the graphic

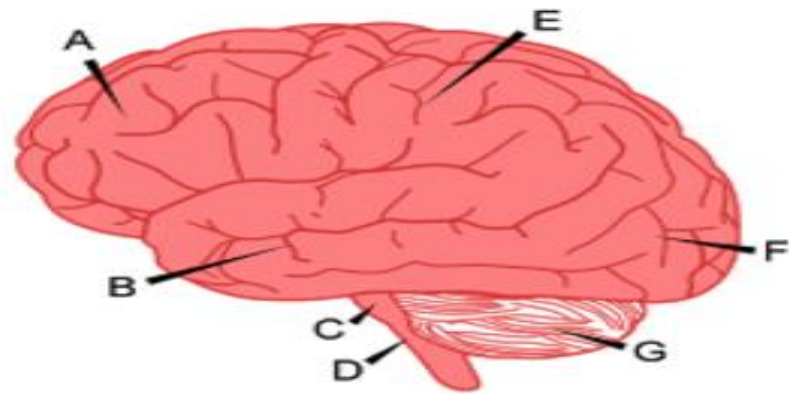


Auditory reinforcement through narration of text



OR





A - Frontal Lobe
B - Temporal Lobe
C - Pons
D - Medulla Oblongata

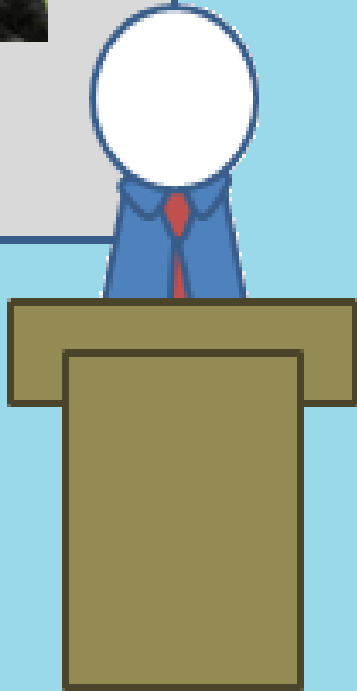
E - Parietal Lobe
F - Occipital Lobe
G - Cerebellum

EXAMPLE



-Bears enjoy eating
Honey

Bears enjoy
eating Honey.



1



2



3

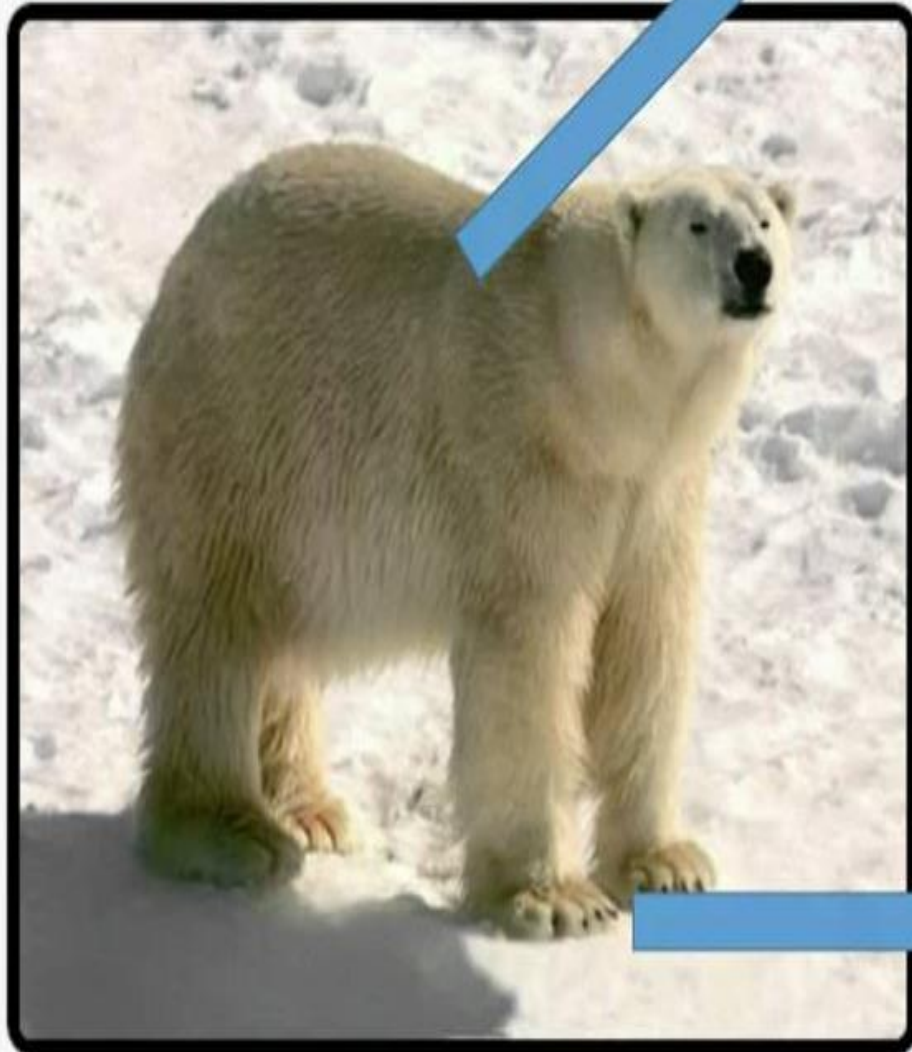


4



EXAMPLE

fur



paws



A: Evaporation

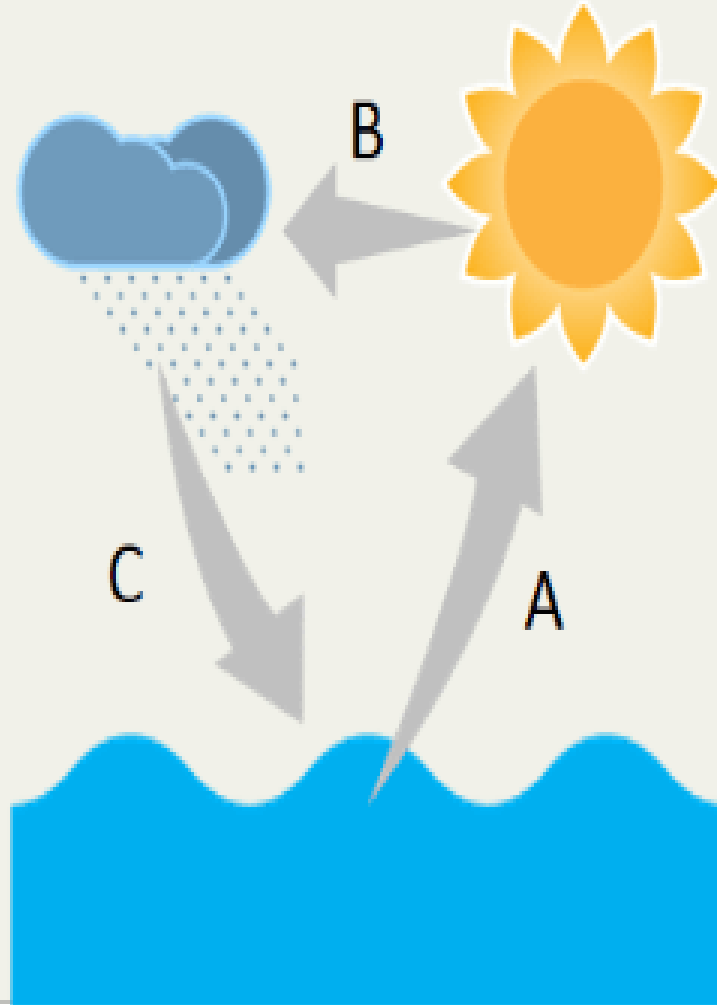
The sun's heat changes water into vapor.

B: Condensation

The vapor changes to droplets. Clouds begin to form.

C: Precipitation

The pull of gravity brings water to the earth



Chapter 6: Modality Principle Psychology

- When learners are given simultaneous graphics and on-screen text, both are initially processed in the visual channel.
- The capacity of this channel is limited, so the graphics and the on-screen text compete for attention. This competition results in an overload and the learning result suffers.
- The visual channel load can be lightened by presenting the verbal explanation as speech or narration.
- The verbal material enters the cognitive system through the ears and is processed in the verbal channel. At the same time the graphics enter the cognitive system through the eyes and are processed in the visual channel. In this way neither channel is overloaded, but both words and pictures are processed.

Liquid oxygen, transported into pressurized cylinders. It saves space and improves the security of transport than gaseous oxygen one



Nested container:



Rice vacuum: in addition to satisfy organoleptic requirements, eliminating the space normally occupied by the air



If it is possible, it is useful to compress the transported materials, for a better exploitation of the available space

Changing shape: the use of rectangular cans allows a better use of the space.

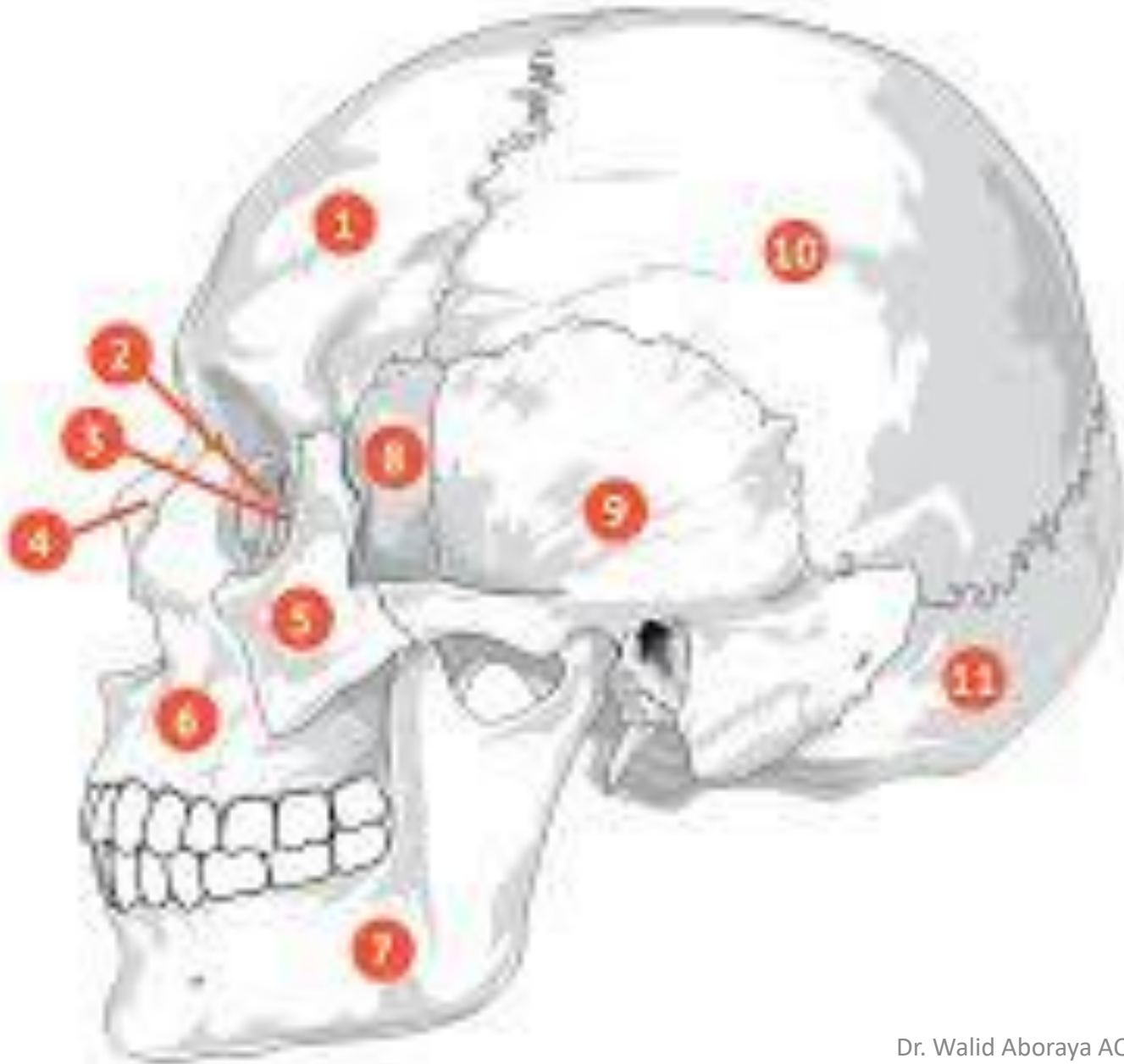
Compressed sponges: the expanded form, necessary for their use, is being acquired through the hydration, that will do the user



Powdered milk: rehydration takes place before the use by adding hot water.

Industrial cellulose: the cellulose fibres, for the transport, are compacted in bobbins, for reduce the volume. Only after the transport, the cellulose will be ground in fibres

BONES OF THE SKULL



1. Frontal
2. Lacrimal
3. Ethmoid
4. Nasal
5. Zygomatic
6. Maxilla
7. Mandible
8. Sphenoid
9. Temporal
10. Parietal
11. Occipital

EXAMPLE

- Refers to simultaneous delivery
- Reduce overload & strain
- Deeper learning from speech
- Can increase production time of resources





Apple



Molecules viewed with a microscope. X



- ⚗ Elements
- ⚗ Atoms, and
- ⚗ Molecules.

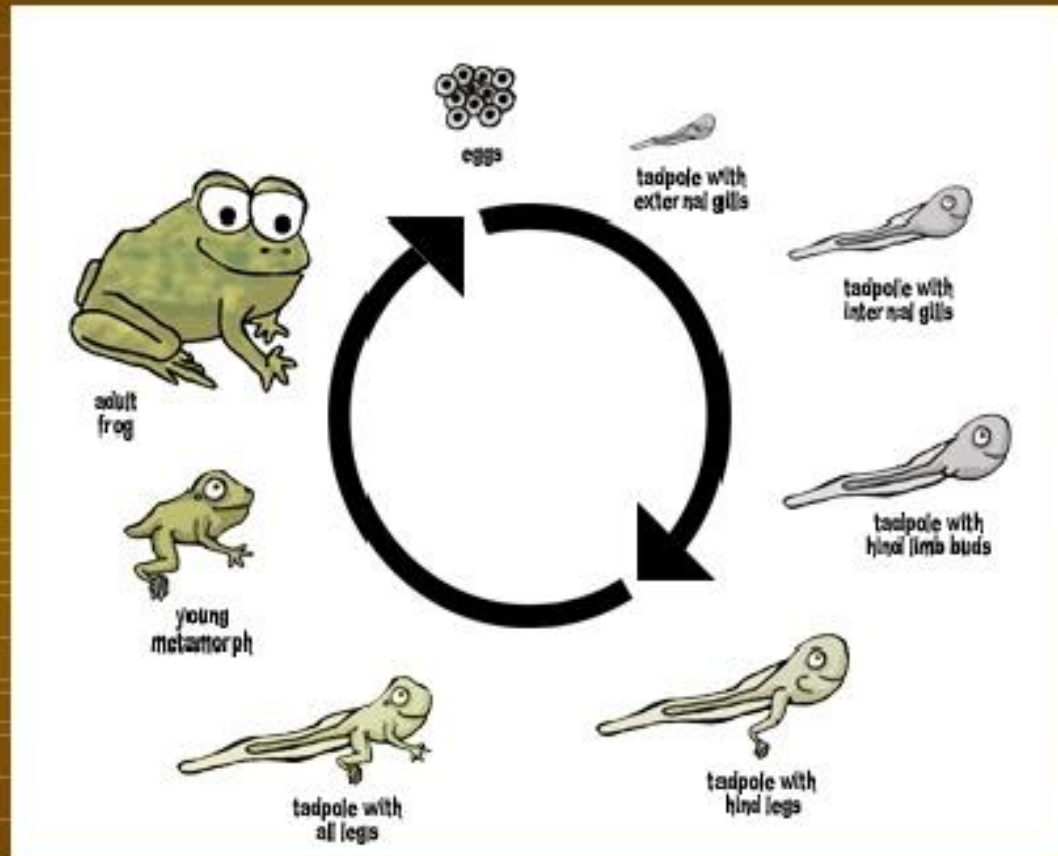
Click the **Next** button to learn more.

Modality Principle



Begin by opening the Google homepage, then select the Google Docs. Next, sign-in using your information. After you have accessed the Google Docs screen, create a new drawing document...

Example 1: Using graphics to teach five different types of content such as facts, concepts, processes, procedures, and principles:



This graphic teaches content related to the life cycle of the frog.



Italicize, bold and underline text



To change the appearance or 'format' of text, you can use the **B**, **I**, or **U** features.

B *I* U

Click the *I* icon to italicize the selected text.



Click the **B** icon to bold the selected text.

Click the U icon to underline the selected text.



What is Multimedia Learning?

Learning that occurs when students build mental representations **from** words and pictures that are presented to them (e.g., **printed** text and illustrations or narration and animation). Multimedia **messages** include words, graphics and animation.

END OF PART II

Thank You