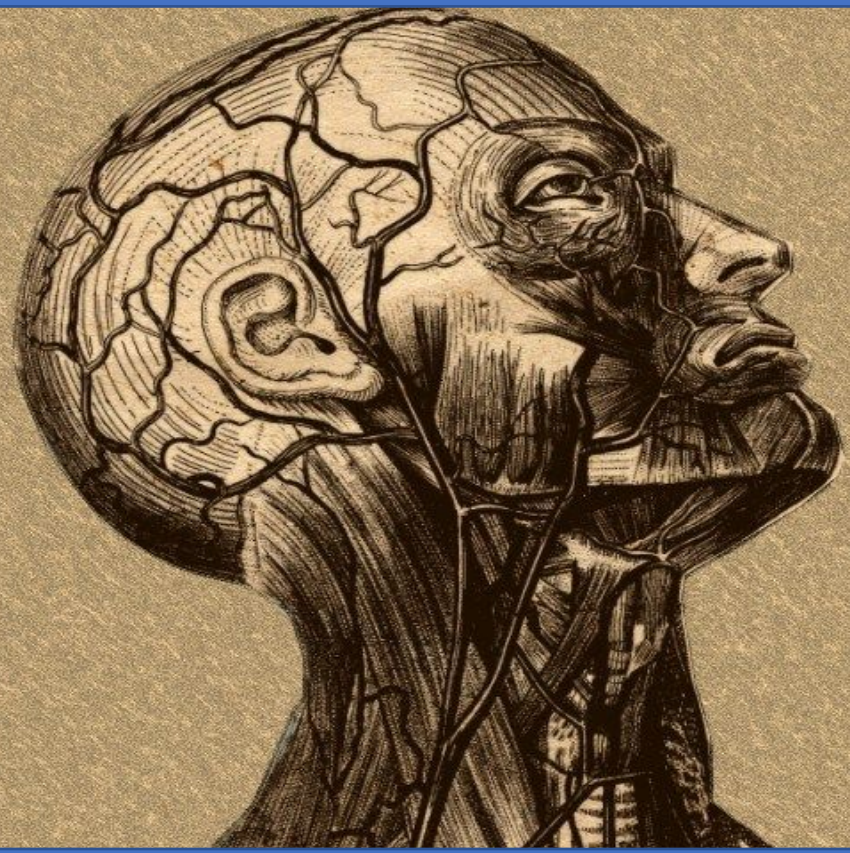
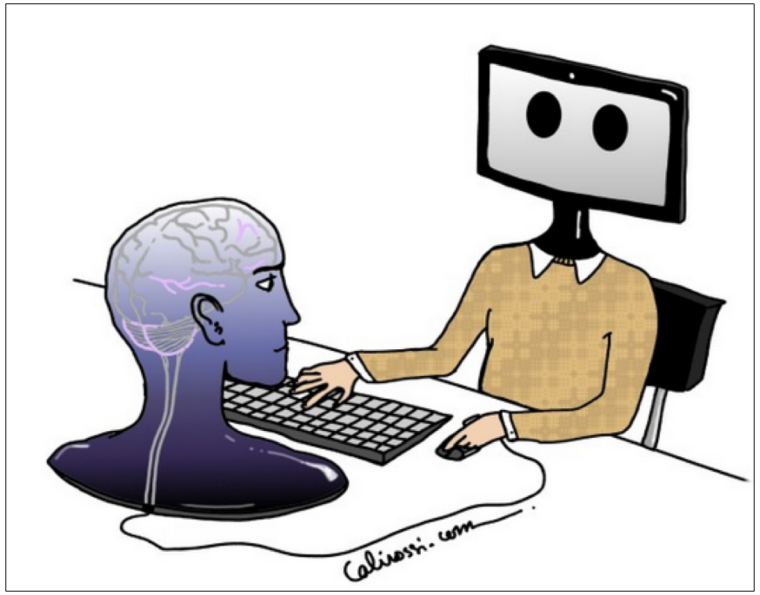
Beyond social semantics



Embodied cognition and language learning



How to interpret SLA research?

COGNITIVISM

- CURRENT PARADIGM

EMBODIED COGNITION

- EMERGING PARADIGM

Presenter: Malcolm Kirkwood

This presentation

1) Cognition is social

2) Language is embodied

3) Language is sensorimotor

4) Meaning is universal

5) Memory is contextual and procedural

THE UNIVERSITY OF QUEENSLAND
AUSTRALIA

ICTE-UQ

Point 1: COGNITION is SOCIAL

Which card/s do I need to turn to check the rule is not being broken?

E	K	4	3

“If a card has a vowel on one side, then it has an odd number on the other.”

Who do I need to check from among these 4 patrons to make sure that no one is doing anything wrong?

Drinking beer	Drinking coke	16 years of age	22 years of age

You have a simple rule to follow:

“If a person is drinking alcohol, than they must be at least 18 years of age.”

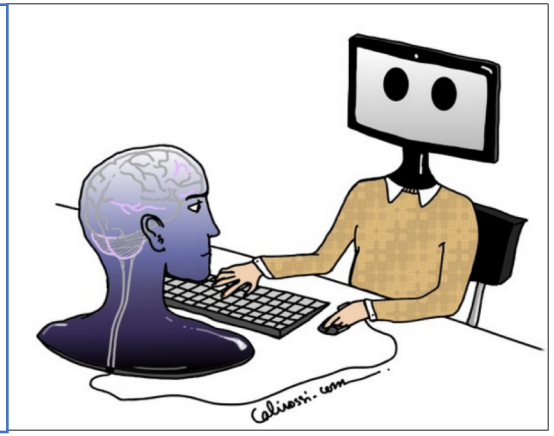
The science

Drinking beer	Drinking coke	16 years of age	22 years of age

Wason and Johnson-Laird (1970) administered both variants of this logical reasoning test. With the administration of the social version of the same task they obtain the following. They record a typical response for the 1st (abstract) test:

Percentage of choices in the concrete 'social' Wason selection				
Cards chosen	BEER and 16	BEER AND 22	BEER	BEER, 22 and 16
Expressed logically	P and not Q (correct)	P and Q	P only	P, Q and not-q
Percentage of respondents choosing this response	77%	0%	20%	3%

COGNITIVISM



interpretations

EMBODIED COGNITION

- EPISTEMIC COGNITION
- DEONTIC COGNITION
- STIMULI PROCESSED EQUALLY
- SOCIOEMOTIONAL STIMULI PROCESSED PREFERENTIALLY

Cognition is social!

TAKEAWAY #1:

Language learners should learn in contexts defined by social interactions. ☑

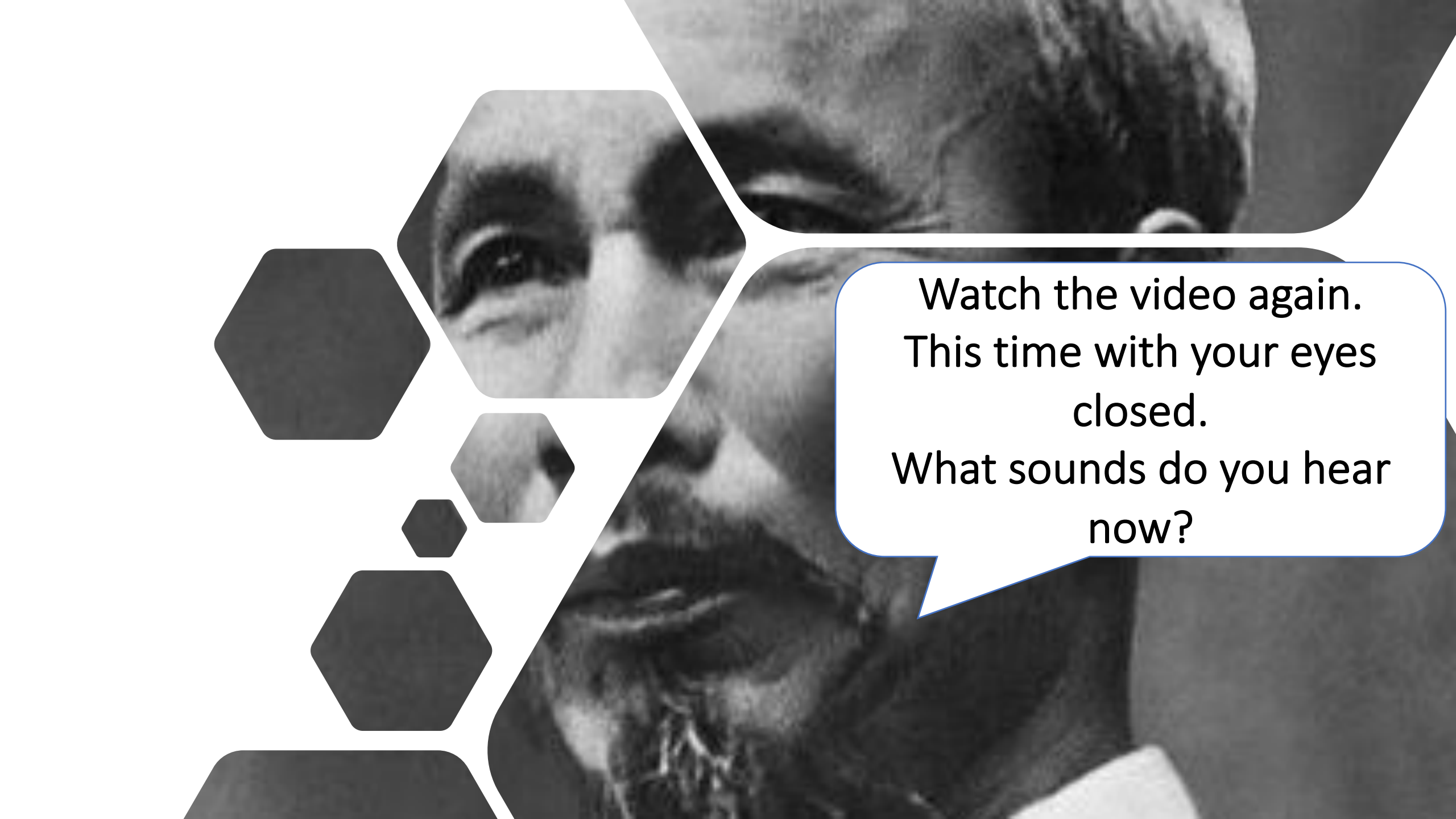
Language should be modelled to reflect typical interpersonal or transactional interactions. ☑

Use rules to reinforce, though not introduce, syntax and grammar. ☑

Point 2: LANGUAGE is EMBODIED

Watch the following video carefully.

What sounds do you hear?


Watch the video again.
This time with your eyes closed.
What sounds do you hear now?

In each segment, I said “Ba Ba Ba Ba Ba Ba ….”

However, the 3rd – 6th presentations were incongruent…

Leading to the illusion of the McGurk effect!!

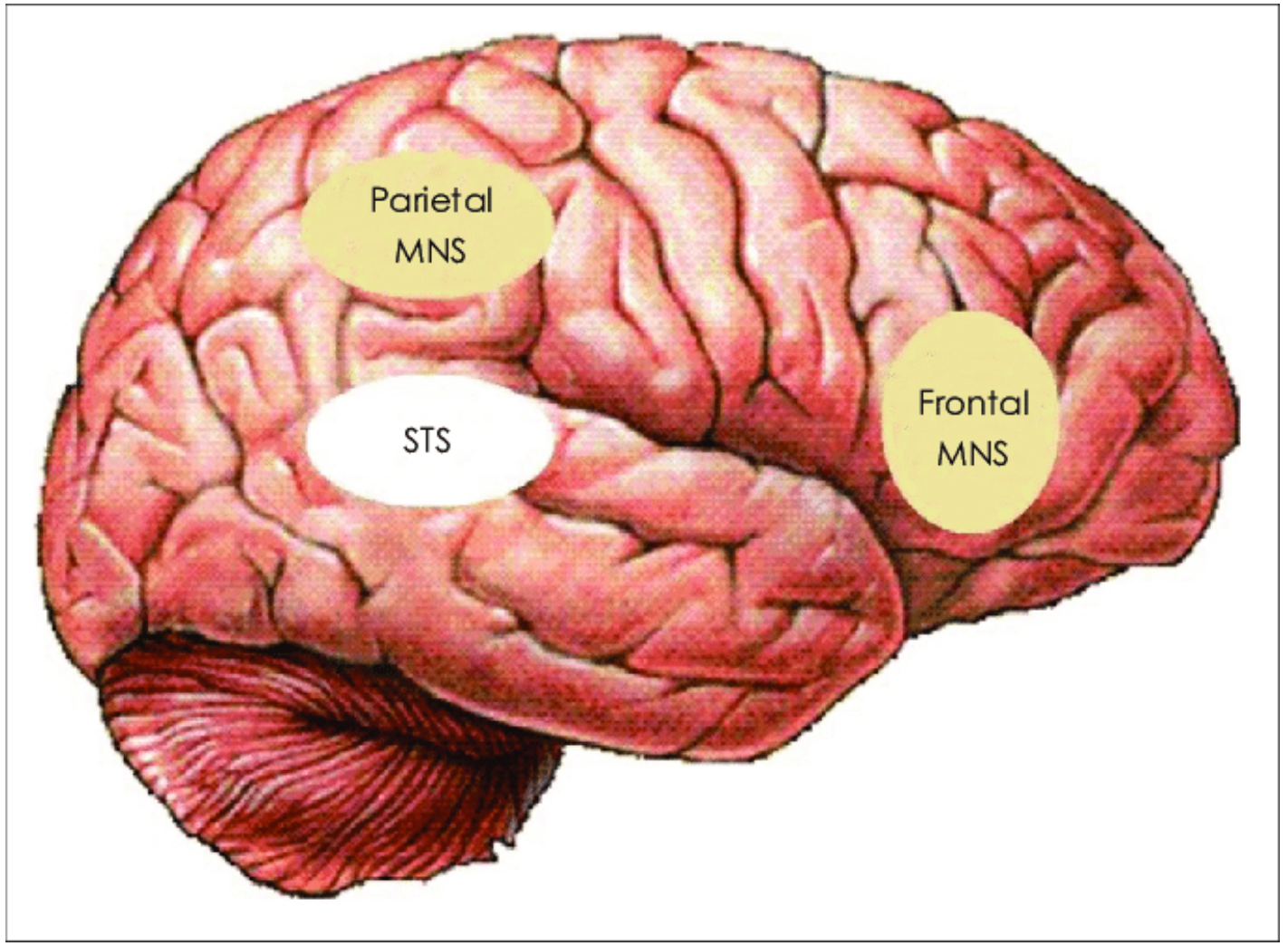
How would you explain the McGurk effect?

Anyone sleepy?

There is a neurological connection between observed and imagined actions!

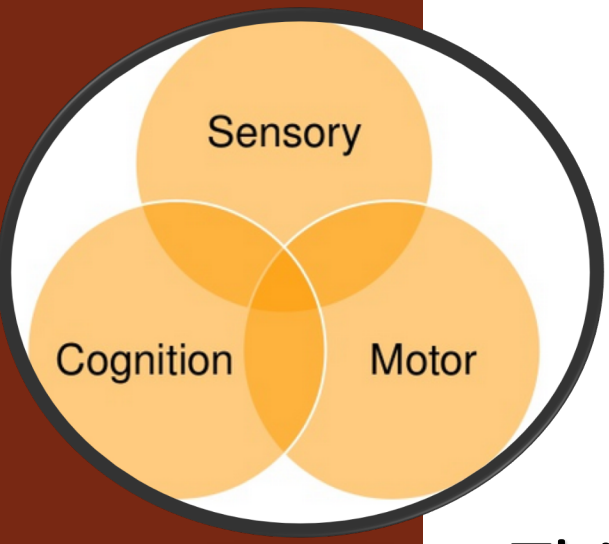
THE MIRROR NEURON SYSTEM (MNS)

The mirror neuron system



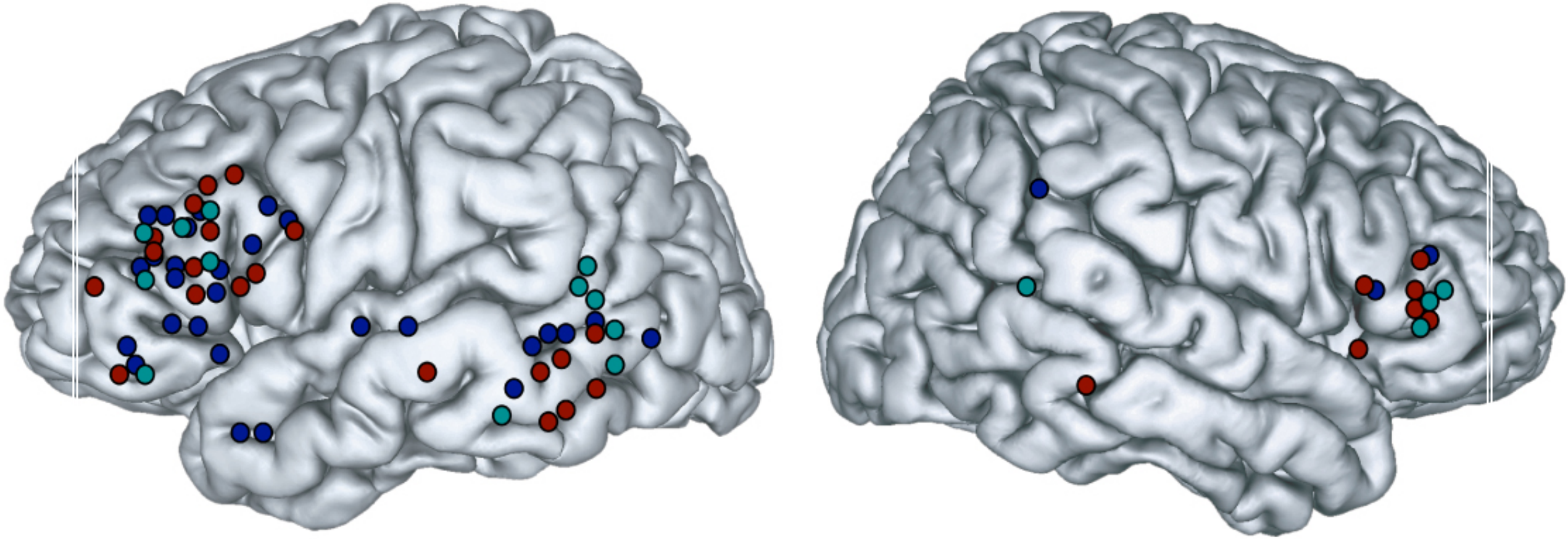
Mirror neurons

The mirror neuron system is responsible for social learning including language.



This is because mirror neurons coordinate sensory, motor and language processes.

Some Brain Areas Active During Gesture, Speech or Both



LEFT HEMISPHERE

RIGHT HEMISPHERE

In studies of gesture-speech integration

Speech at the word level

Speech at the sentence level

Correspondingly, **LANGUAGE** has a semantic basis in **BODY ORIENTATION**

Lakoff and Johnson (1999) have researched CONCEPTUAL METAPHORS

Can you grasp the idea? If so, things are looking up!

Conceptual metaphors: embodied basis

1. Multiple experiences share the same bodily pattern

2. A simple mental representation conveys these elements

3. Unconscious application of schema in abstract domains

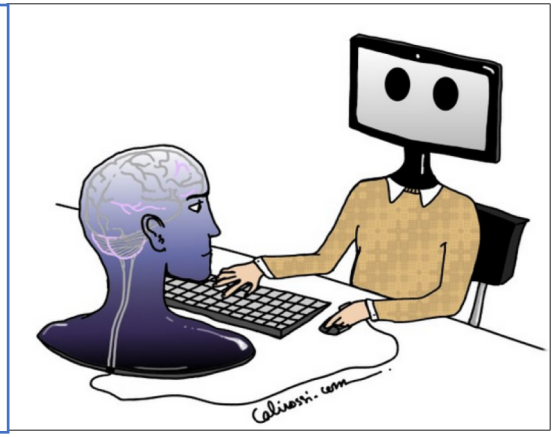
Bodily experience

Embodied schema

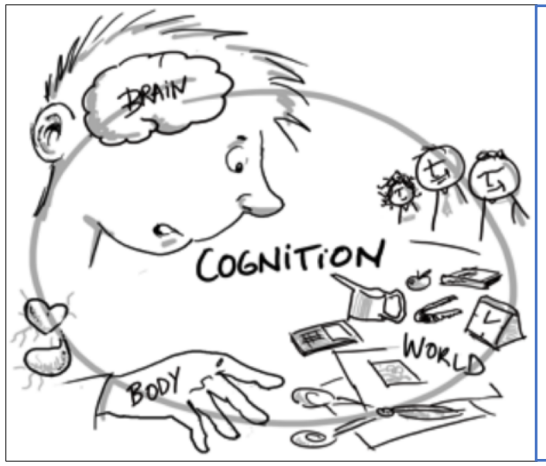
Embodied metaphor

I can balance the equation by adding an x

COGNITIVISM

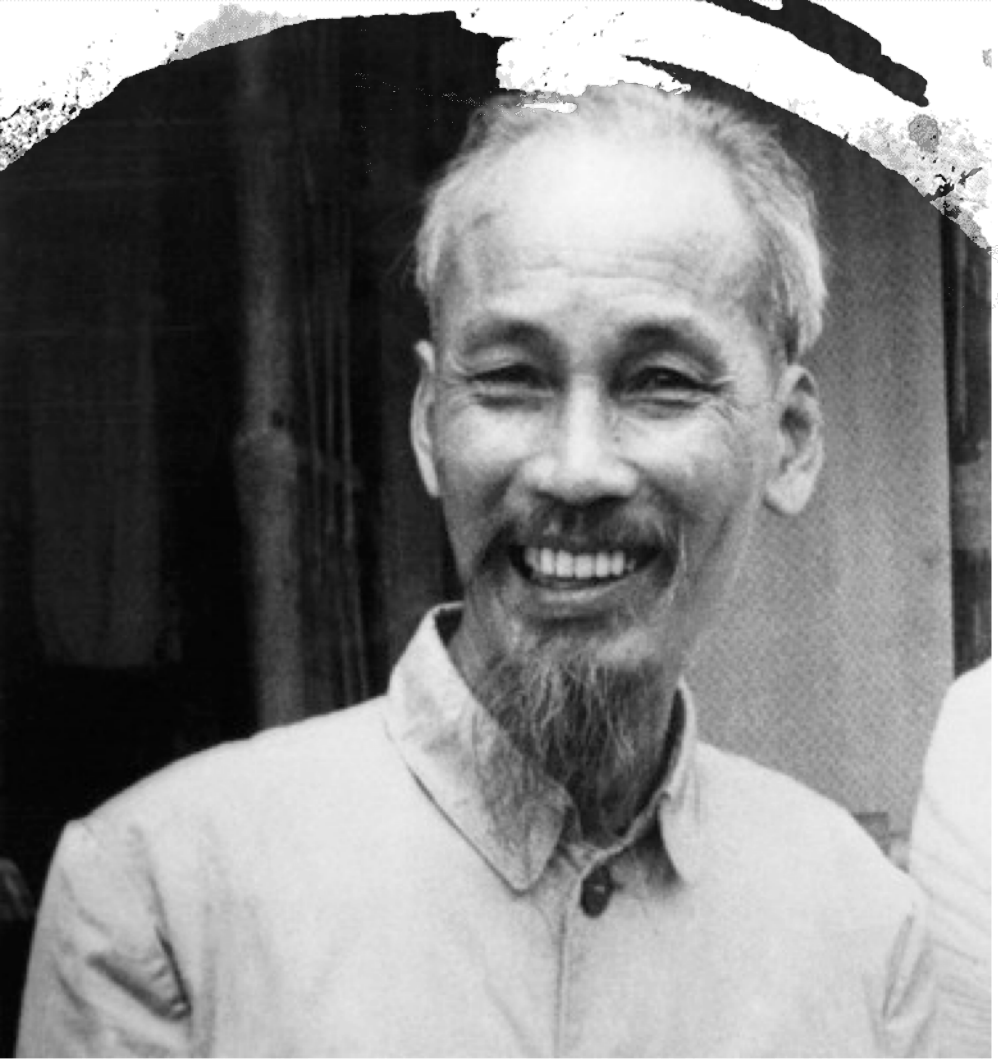


interpretations



EMBODIED COGNITION

- The McGurk effect is due to the physics of the auditory system.
- The McGurk effect is due to imitative neural activity (i.e. sensorimotor mirror neuron activity)
- The McGurk effect demonstrates the dominance of visual to auditory speech stimuli
- The McGurk effect demonstrates that language is primarily visual. This is because verbal language is an extension of gestural language.



Language is embodied!

TAKEAWAY #2:

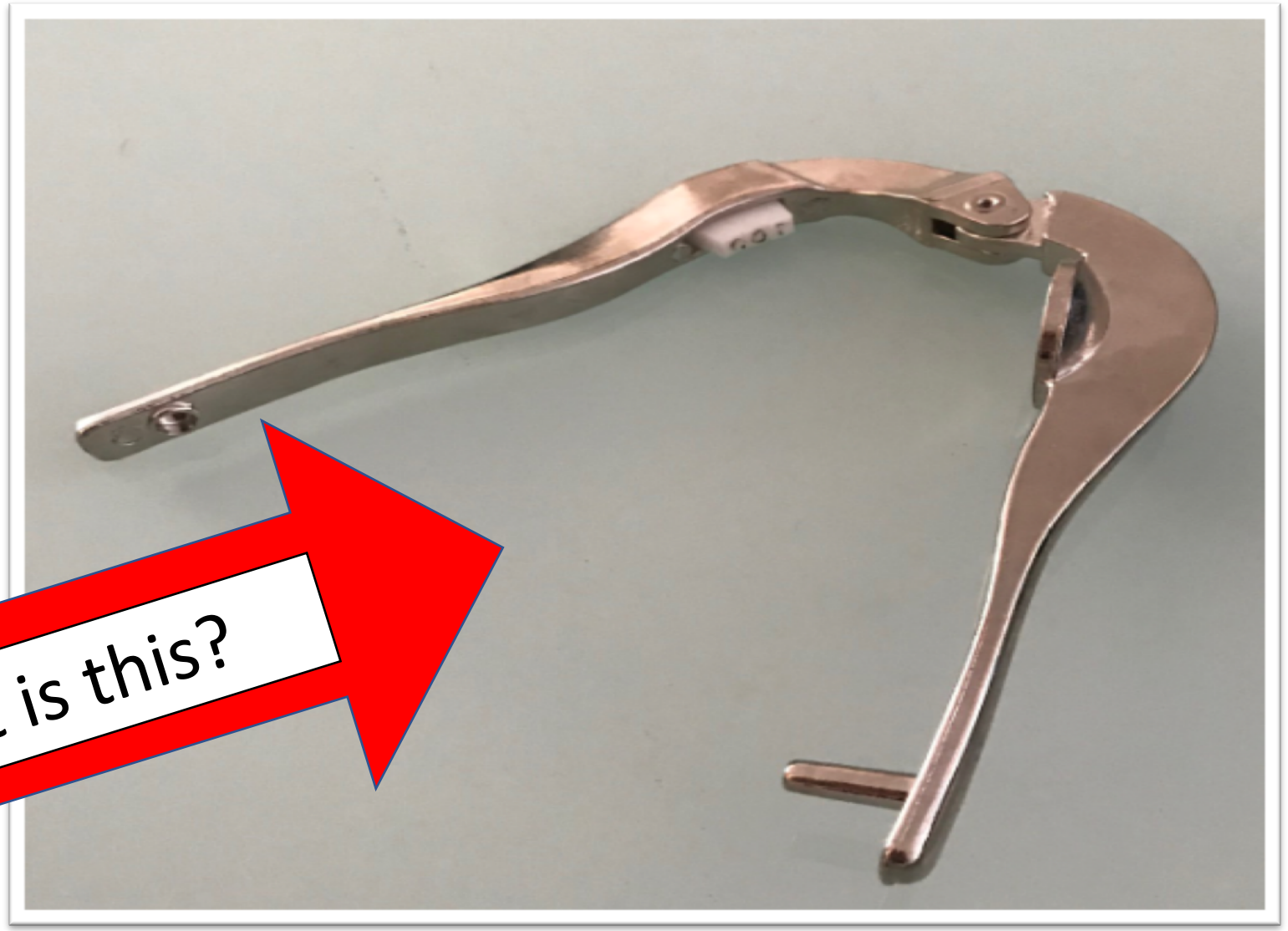
Prioritise physical enactment when teaching language.

☑

POINT 3:

Language is

sensorimotor



Try to match these objects with their correct names

A

B

C

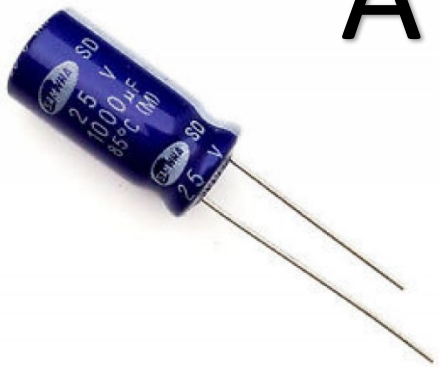
Trucker’s friend

Timber scribe

Kitchen mate

Now, try to match these objects with their correct names

A



B

C

Capacitator

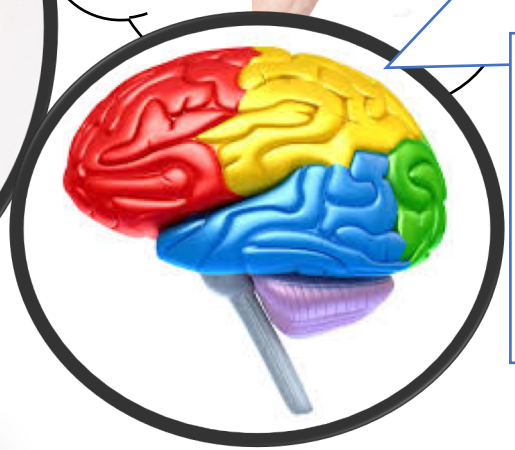
Distributor

Alternator

Why was it easier to identify the LIKELY names for the first three items?

The short answer is that we have either used, or have seen other people use, similar objects.

- ❑ Auditory
- ❑ Visual
- ❑ Motor
- ❑ Gustatory
- ❑ Olfactory
- ❑ Proprioceptive
- ❑ Nociceptive
- ❑ Emotional

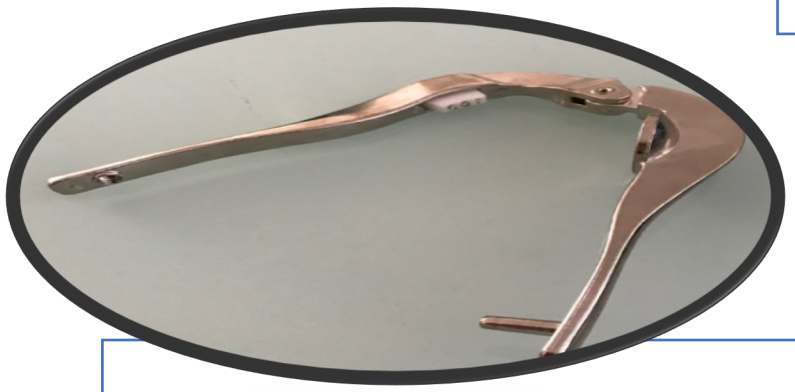


familiar things

On the other hand, most of us don't have sensorimotor representations of things like distributors

RETURNING TO OUR *MYSTERY OBJECT*...

Have a go at using it...



How would you define it?
What would be a suitable name for it?

POSSIBLE DEFINITION:

A type of (lever / tool) that (stamps) letters (onto a golf ball)

POSSIBLE NAME: Golf ball letter stamper

IN CONCLUSION:
WE CAN EASILY PROVIDE A WORKING DEFINITION OF A
GOLF BALL MONOGRAMMER (n.)…

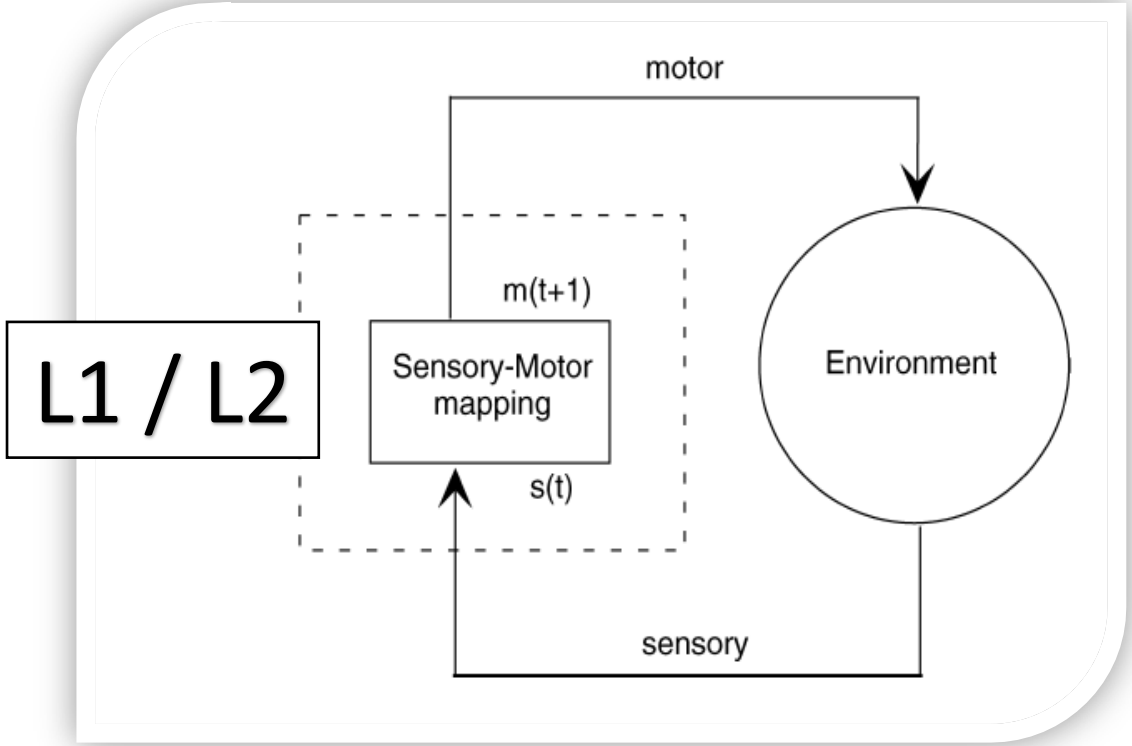
…AS WE HAVE **SENSORIMOTOR REPRESENTATIONS** STORED FROM USING, OR SEEING PEOPLE USE, SIMILAR TOOLS

But how does this relate to language learning?

These **simulations** become more abstract (and off-line). This is called **procedural memory**.

We gain **declarative knowledge** from the brain's storage of sensorimotor experiences early in development.

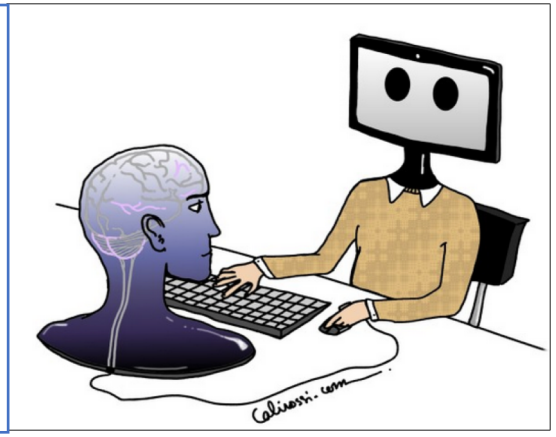
And as such, language is **SENSORIMOTOR!!**



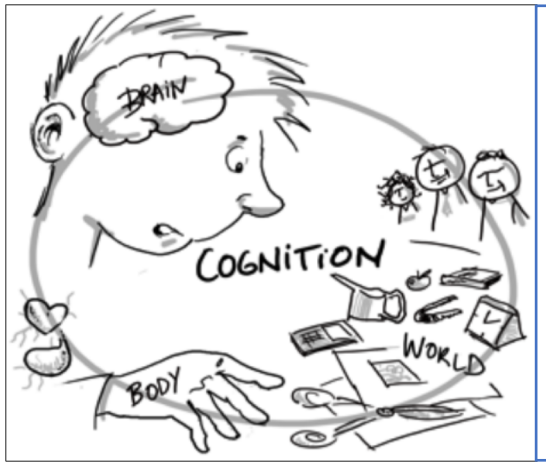
Language, whether L1 or L2, relies on the same **simulatory** mechanisms that underlie **declarative** and **procedural** knowledge.

This is the case even for **ABSTRACT CONCEPTS** as all concepts have a sensorimotor basis!!

COGNITIVISM



interpretations



EMBODIED COGNITION

- Language is symbolic (amodal)
- Words matched to symbolic referents in an arbitrary manner. Words are stored separately from related imagery in long-term memory.

- Language is non-symbolic (modal) and is deeply embodied.
- Linguistic knowledge is holistic / supported by sensorimotor models (simulations).

TAKEAWAY #3: Knowledge is sensorimotor!

Knowledge is grounded in the real world…..including our interactions with our surroundings and with each other. Therefore:

Language learners should learn language in authentic, multimodal contexts

☑

Point 4: MEANING is UNIVERSAL!

Vendre la mèche!

口が滑る (くちがすべる)

泄露天机
xiè lù tiān jī

ne of these sentences

C It was hard not to **spill the beans** when I heard such a juicy piece of gossip.

Spill the beans is idiomatically universal!

A It was hard not to spill the d on the hot pan

Vuotato il sacco!

Wysypać fasolę

B It was hard not to drop the ny way out of the kitchen.

C It was hard nc he beans when I heard such a juicy piece of gossip.

پھلیاں گرن

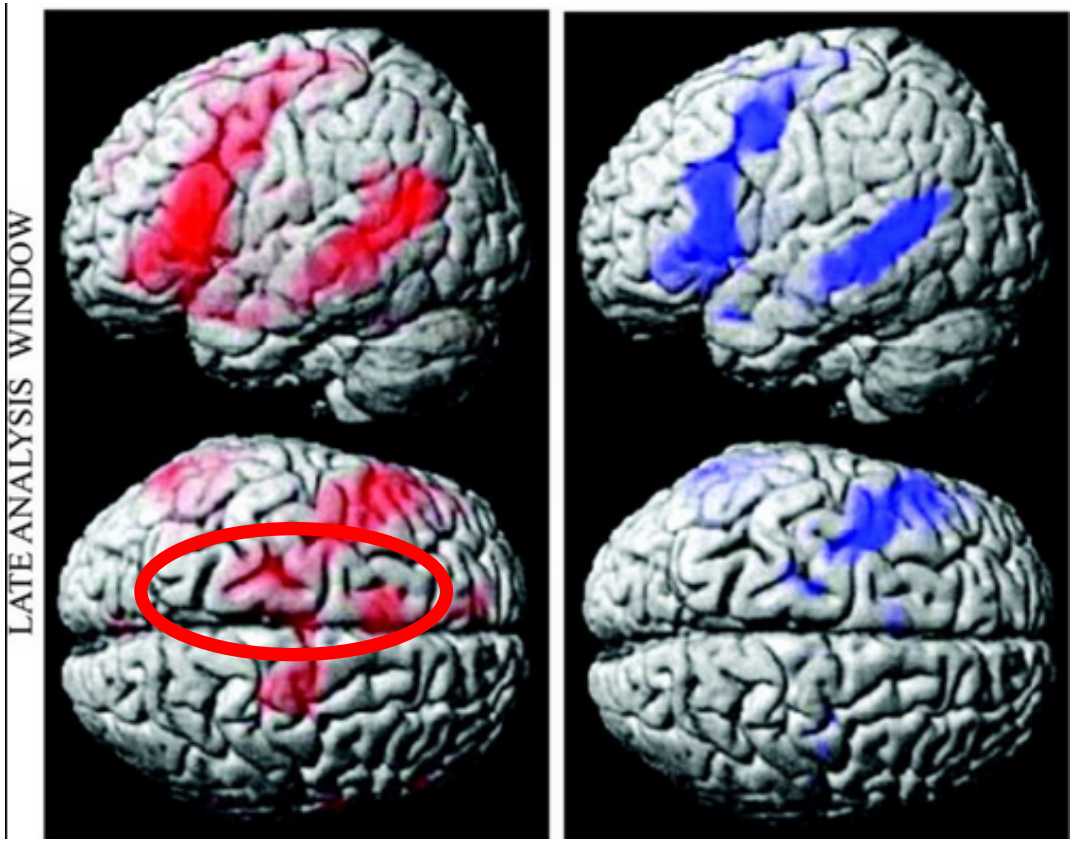
Kumwaga mchele mbele ya kuku.

Brain correlates of idiomatic sentences

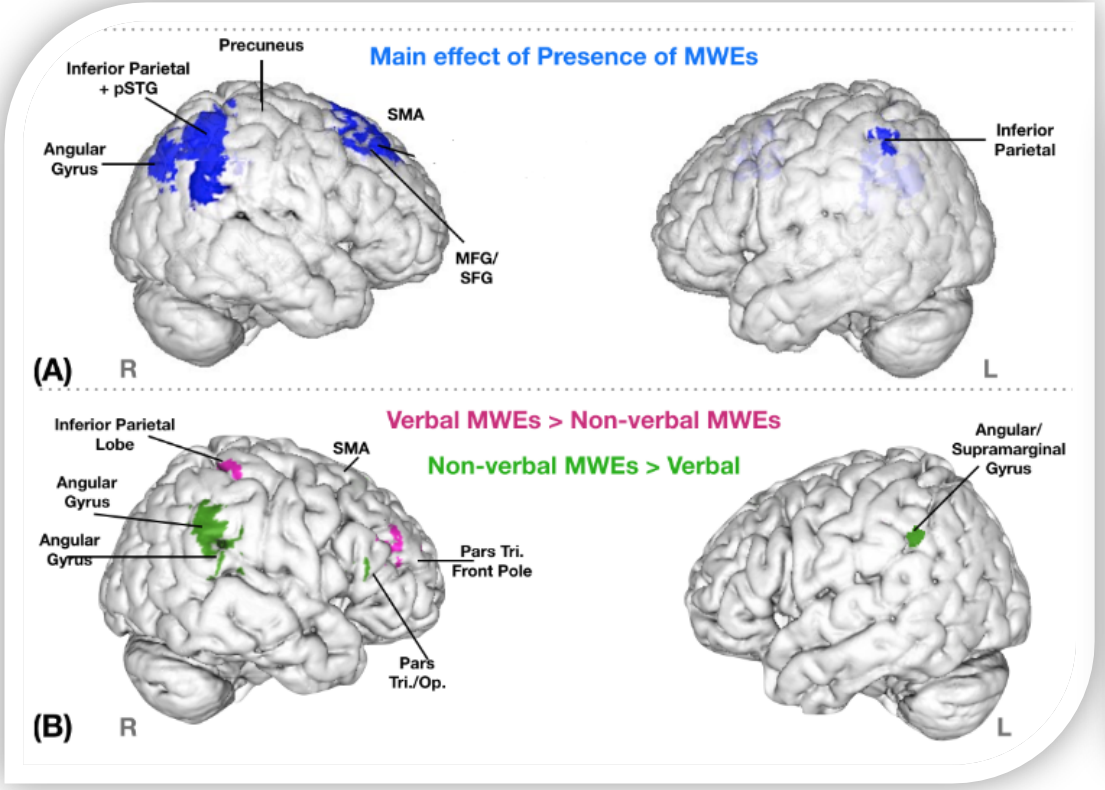
<u>Conclusion</u>: semantic representations grounded in the sensory-motor system are involved in comprehension of idioms!

Idiomatic sentences activated sensory and motor cortex while literal sentences did not.

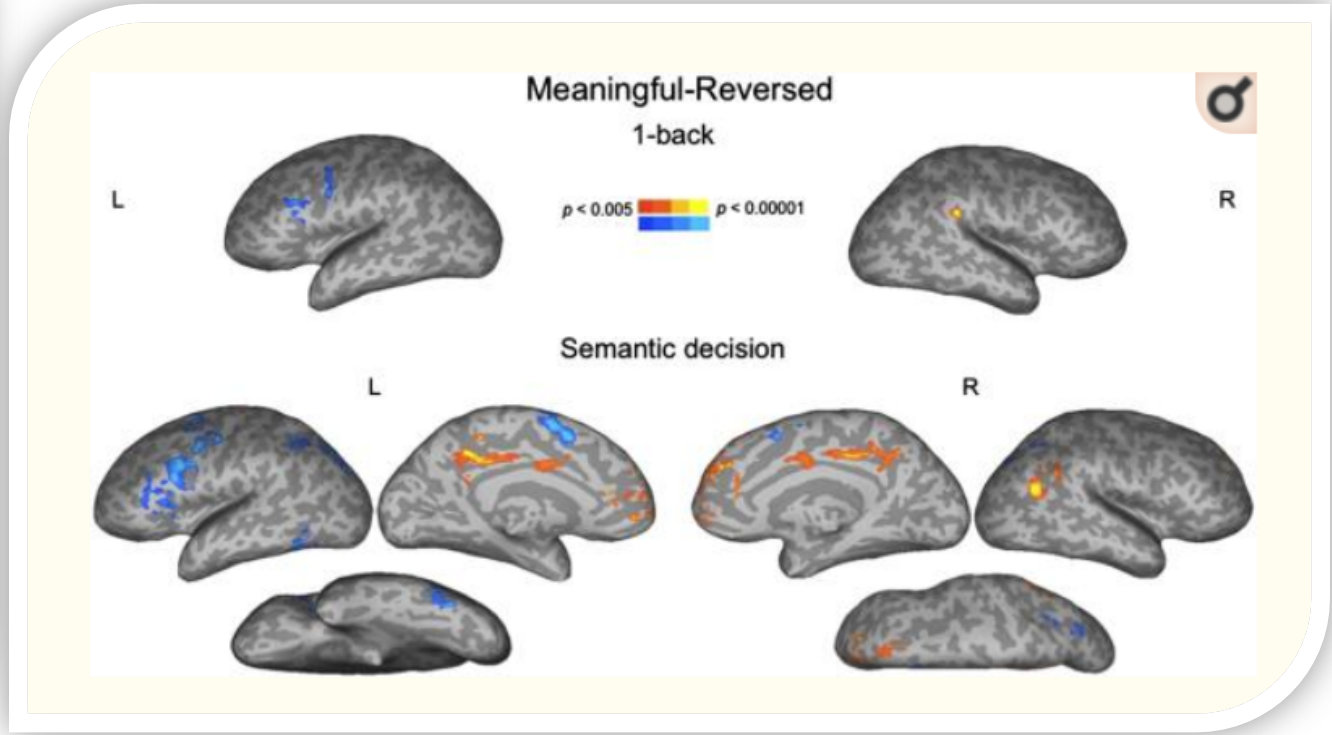
Importantly, they found greatest activation in motor-sensory areas as readers completed reading sentences.



Brain imaging research shows similar results in L1 / L2 learners for **formulaic language**



Multiword expressions (MWEs)



Meaningful collocations (semantic vs lexical processing)

BRACE YOURSELVES!!

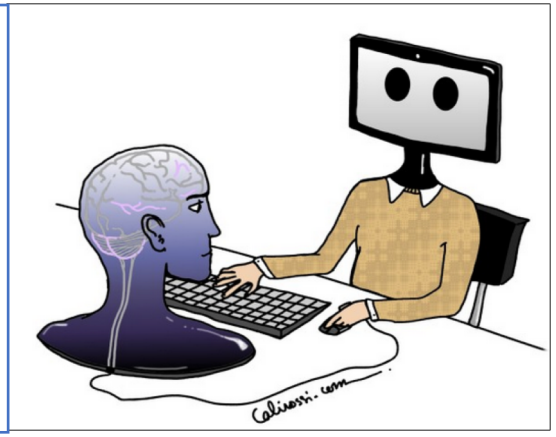
There is no **universal** **grammar!**

However – **MEANING IS UNIVERSAL** as each language (presumably) has equivalent concepts and corresponding formulaic language structures

AND

the brain processes formulaic language similarly via its sensorimotor systems

COGNITIVISM



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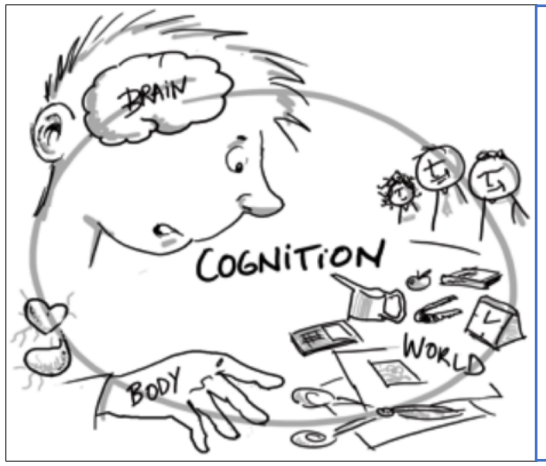


EMBODIED COGNITION

- Semantics operate according to statistical regularities in word processing.

- Semantics operates due to the convergence of emotional, sensory, and motor information.

- Sensorimotor involvement may occur as a consequence of symbolic cognition.

- Sensorimotor activity is present at all stages of language learning / processing.

Meaning is universal!

TAKEAWAY #4:

Language learners should be exposed to meaningful multiword expressions which convey meaning across languages. ☑

Learning vocabulary in isolation may be inadequate for simulatory reactivation. ☑

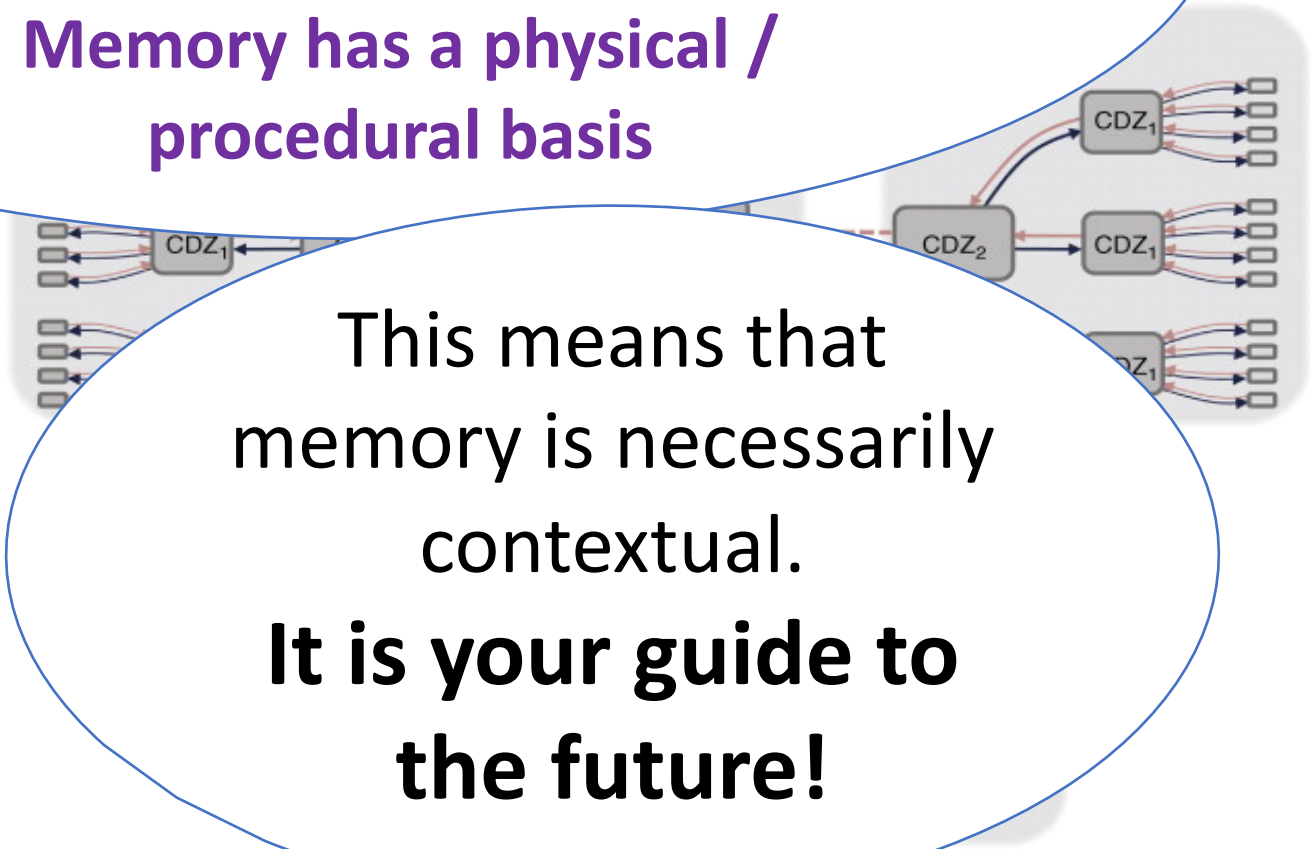
What were your feelings?

How would you describe
the memory of something so familiar?

Memory is a consequence of how the brain organises input by sensory modality

- **Emotions are linked with reward or avoidance**
- **Memory has a physical / procedural basis**

Antonio Damasio (founder and director of the USC Brain and Creativity Institute)



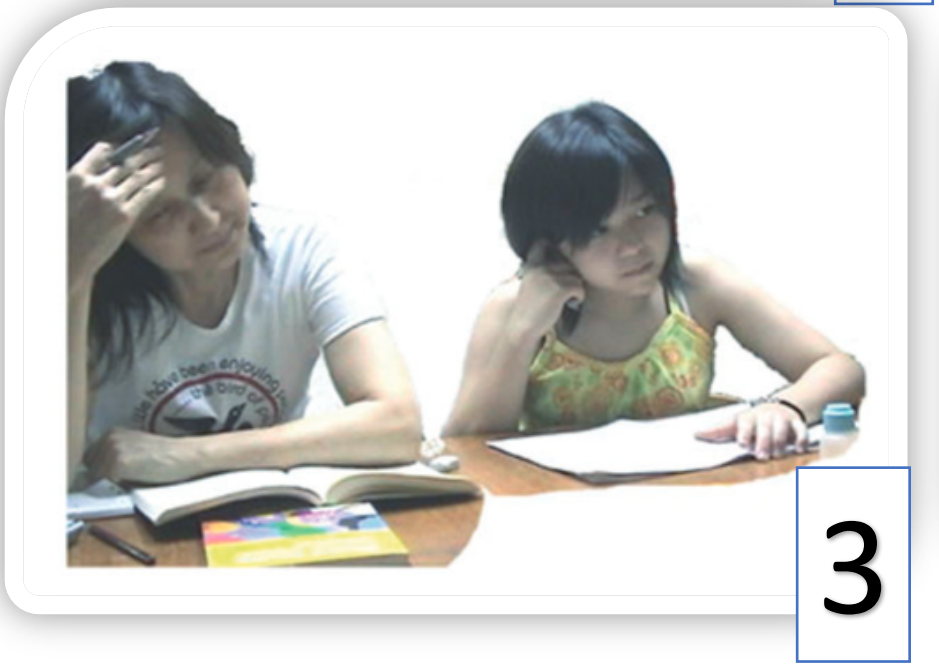
This means that memory is necessarily contextual.

It is your guide to the future!

1

2

1. Who is this?
2. What is she doing?
3. Where and when?
4. Why



3

4

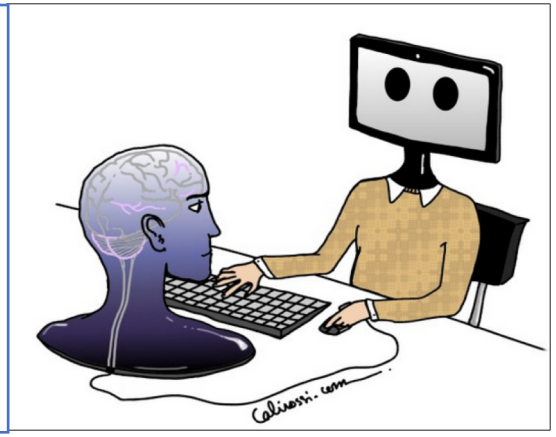
4

In the final picture we can easily answer all of the questions including ‘why’

Appropriate context = sensorimotor / emotional simulation

The normal context includes:
bodies, cognitive tools, social practices and expected environmental features.

COGNITIVISM



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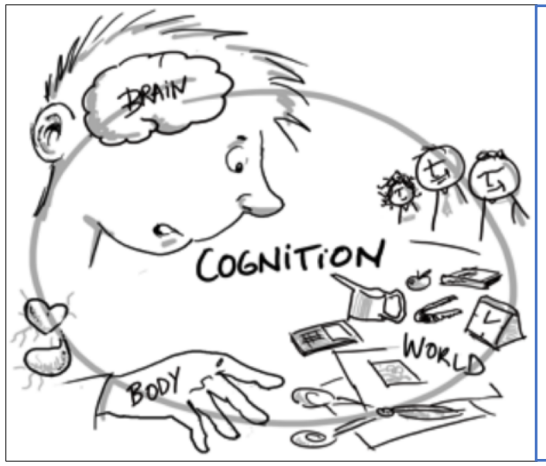
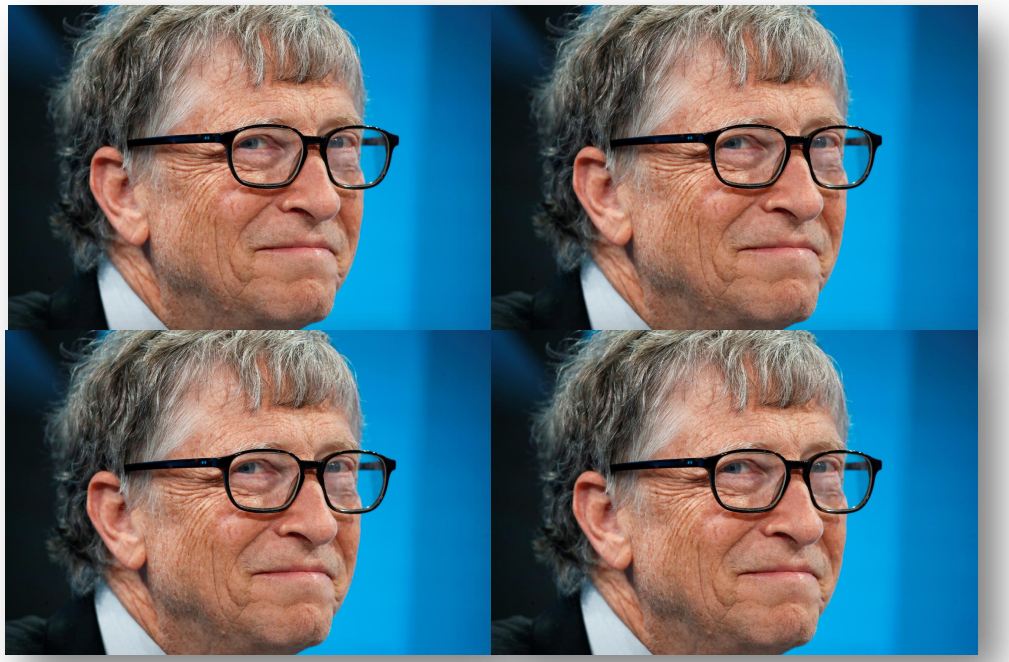


EMBODIED COGNITION

- Memory is divided between working and long-term memory.
- Memory is comprised of schema and procedural and declarative memory is distinct.
- Memory is holistic and linked to the original mode/s of perception including emotion.
- Memory contains ‘internal models’ which are comprised of (largely) automated declarative and procedural knowledge.

Memory is contextual and procedural!

TAKEAWAY #5:



Meaningful memory processes for language learners are activated by socioemotional and procedural contexts.

☑

Now, recall the word or phrase that you learnt earlier…

What is Th

Condition 1:

Condition 2:

Condition 3

TASK: Me

Karn-w

Karn-w

TASK: Memorise the bolded word (below):

Thai	English
Karn-wai-nam ku kwam sanuk!	Swimming is great fun!

Karn-wai-nam = swimming / Ku kwarm = is / sanuk = fun

Fake news! So sad…

In Summary...

COGNITION is SOCIAL

Language learners should learn in contexts defined by social interactions (and not ONLY from abstract rules).

☑

LANGUAGE is EMBODIED

Prioritise physical enactment when teaching language.

☑

LANGUAGE is SENSORIMOTOR

Language learners should learn language in authentic, multimodal contexts

MEANING is UNIVERSAL

Language learners should be exposed to meaningful multiword expressions which convey meaning across languages.

☑

MEMORY is CONTEXTURAL and PROCEDURAL

Meaningful memory processes for language learners are actuated by socioemotional and procedural contexts.

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"If I had known this was a grammar lesson, I would have stayed home"

Based on the rule (2nd Conditional):
if + simple past,… would + infinitive

"I will pretend to talk to this guy if that other guy keeps

Based on the rule (3rd Conditional): if + past perfect,… perfect conditional or perfect continuous conditional

Based on the
if + simple present,… simple future