Our reality and our brains

How human mind processes information

Can we study what is going on in people's heads?

Behaviour and environment

BEHAVIOURIST PERSPECTIVE

STIMULI

NON-EMPIRICAL
Non-scientific

CONTROL OF BEHAVIOUR

Human cognition

COGNITIVE PSYCHOLOGY

DATA PROCESSING

CONTROL OF BEHAVIOUR

Human cognition

DATA PROCESSING

STIMULI

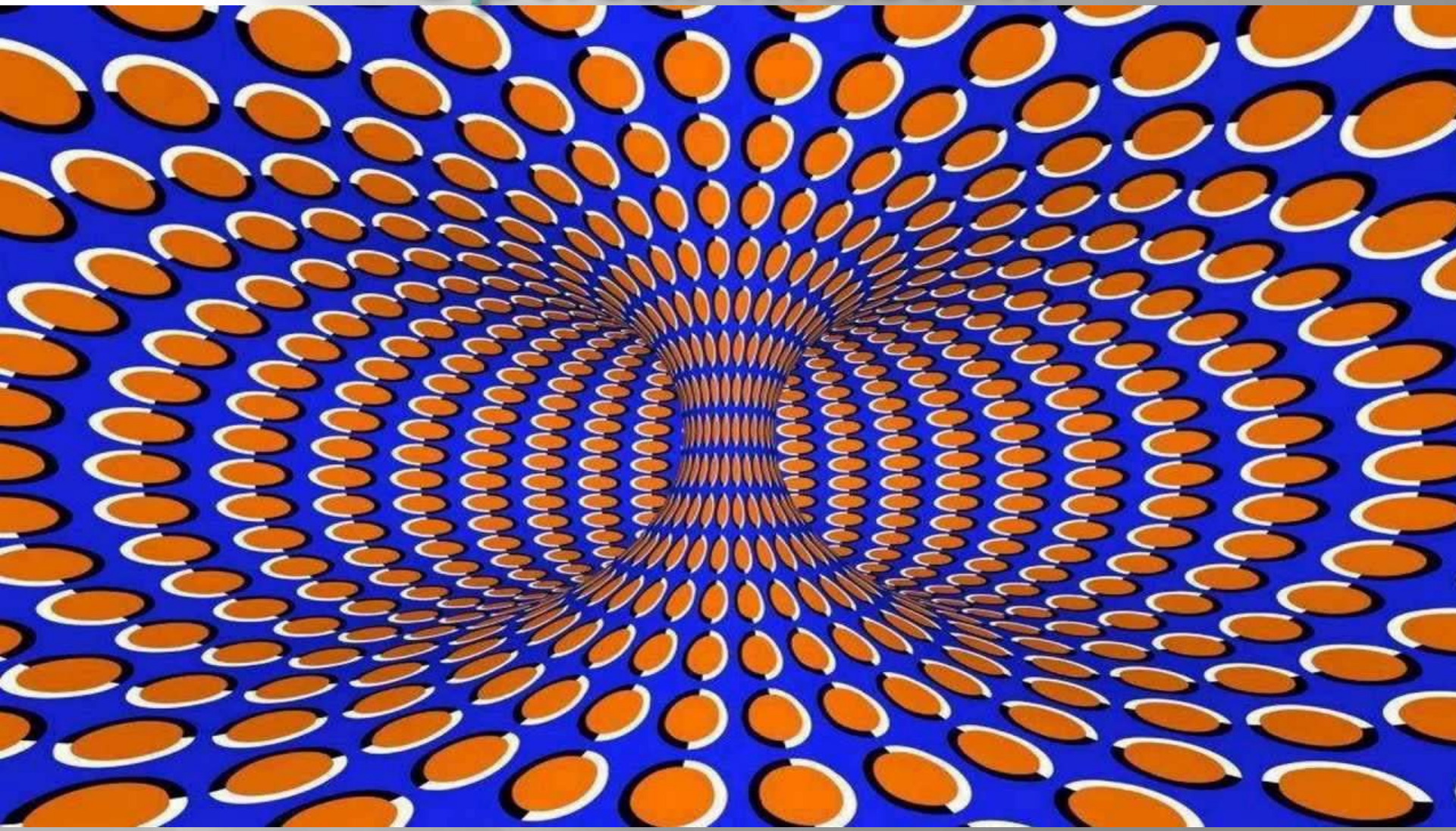
CONTROL OF BEHAVIOUR

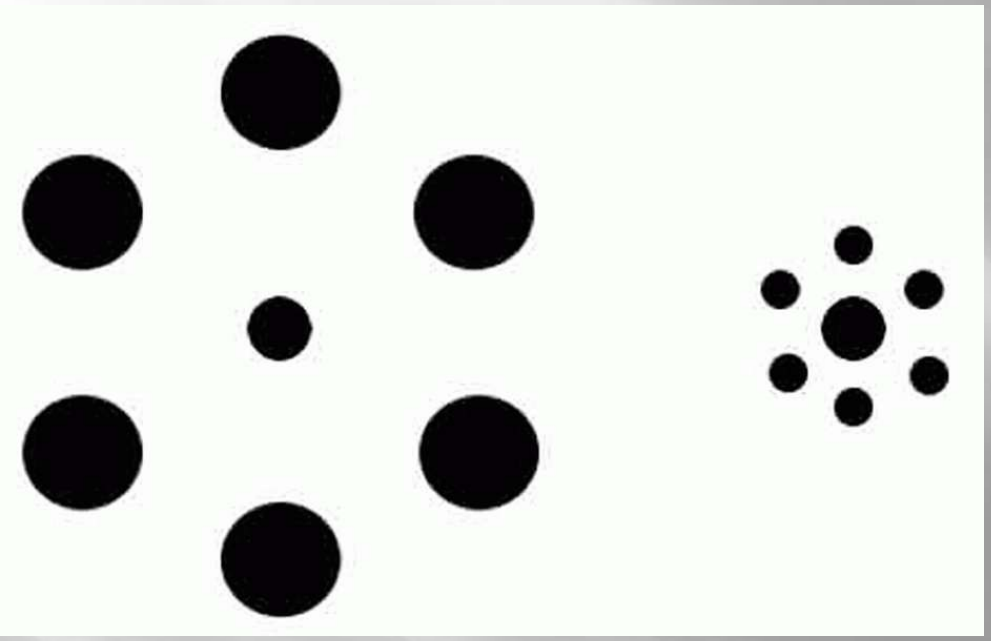
Cognitive psychology

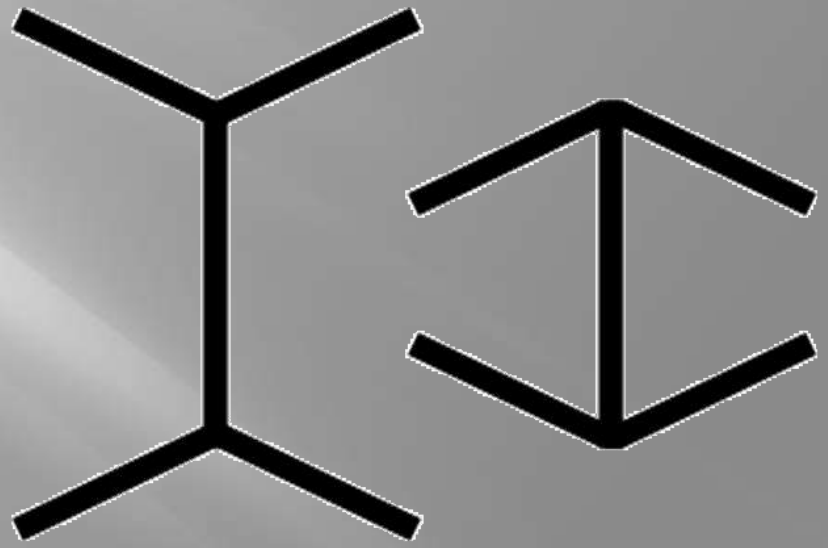
The world of experience is produced by the man who experiences it.

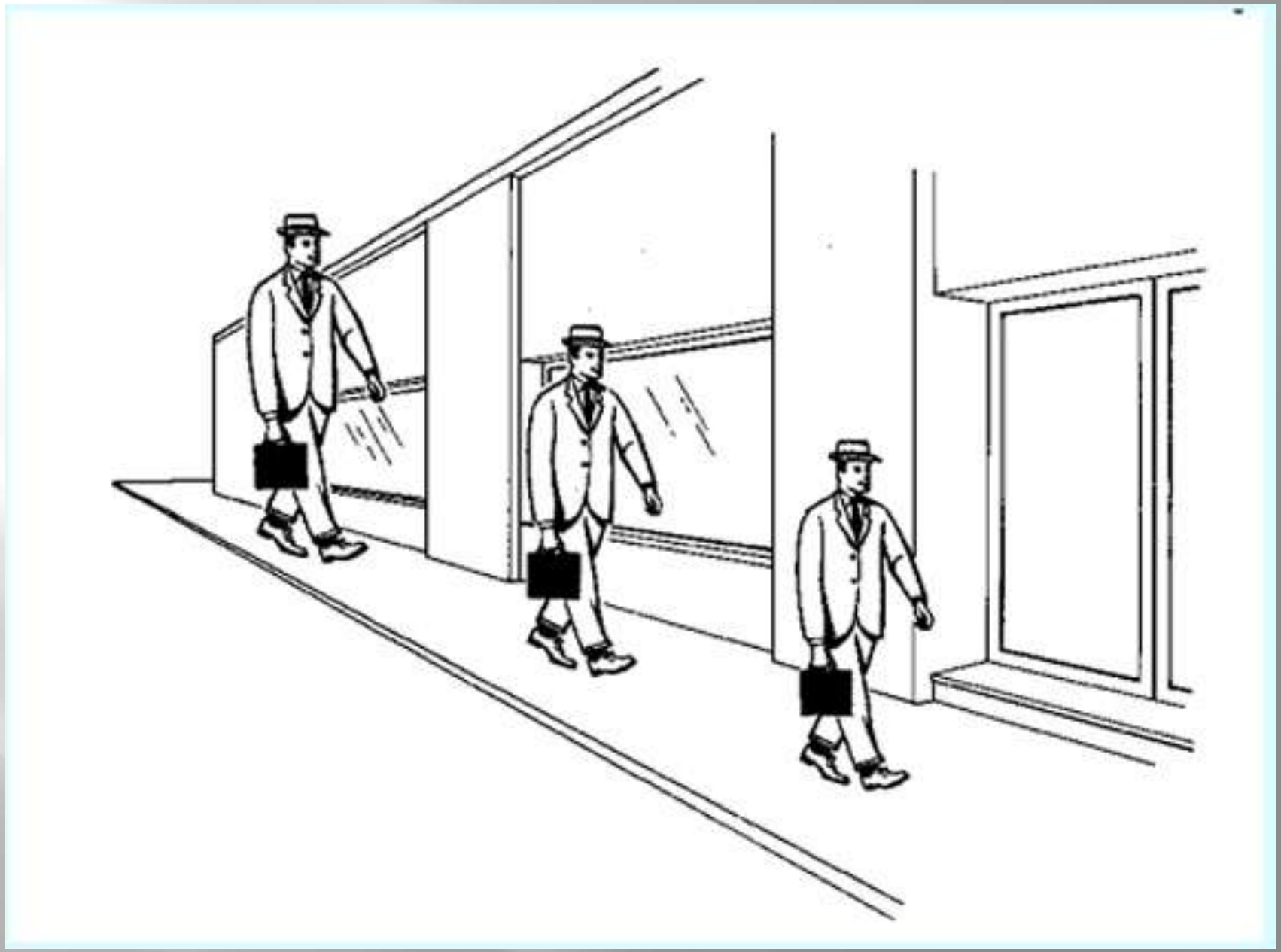
(Ulric G. Neisser, 1967)

Optical illusion





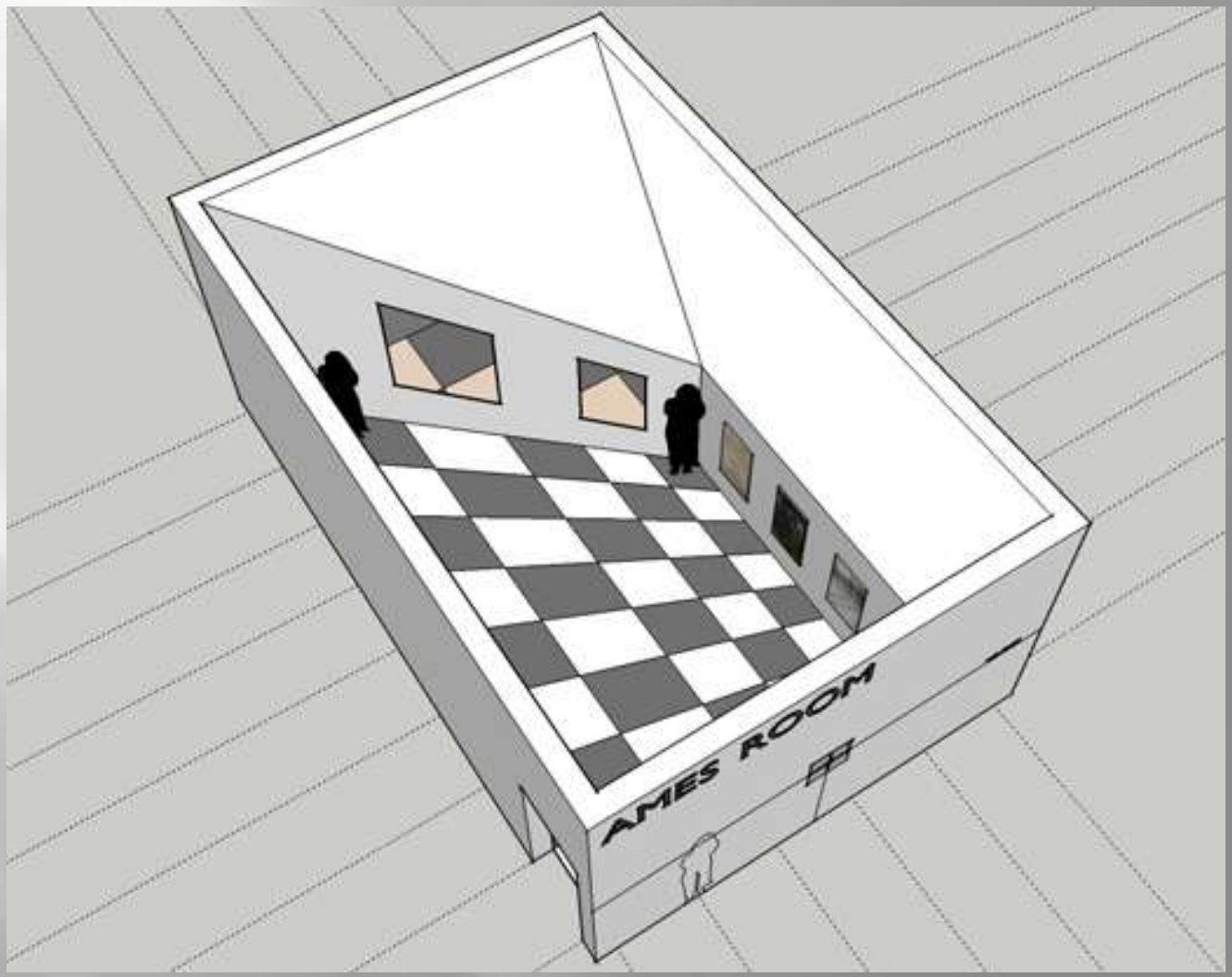




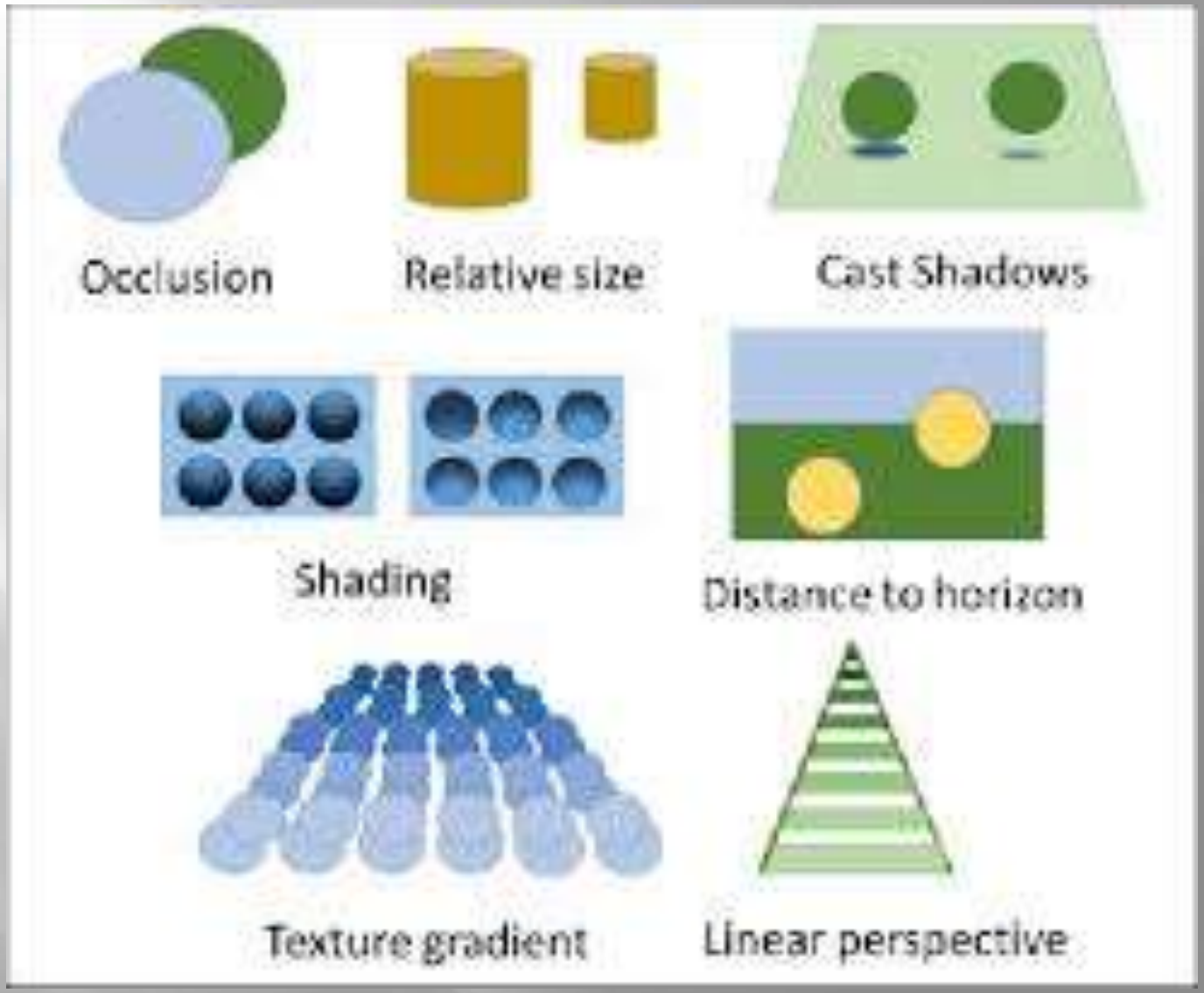
The Ames room

The Ames room

Manipulation of **monocular depth cues**



Monocular depth cues

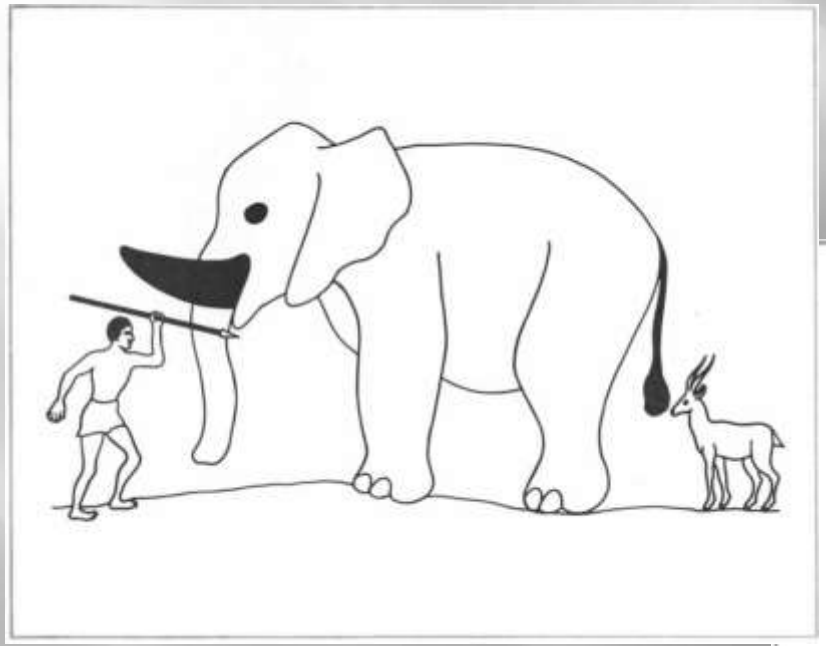


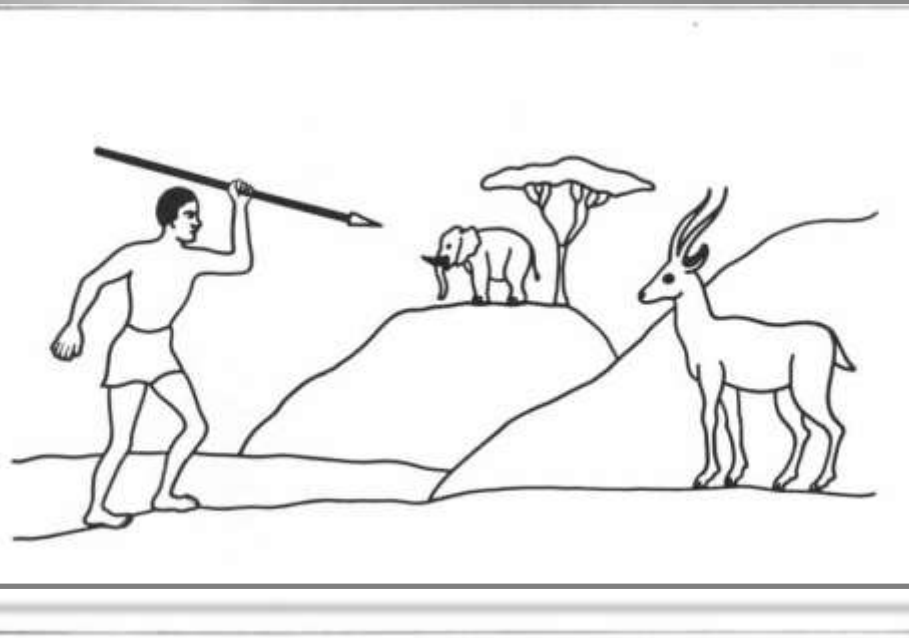
Are depth cues hard-wired? Do they work the same way in all people?

Why is the elephant so tiny…?

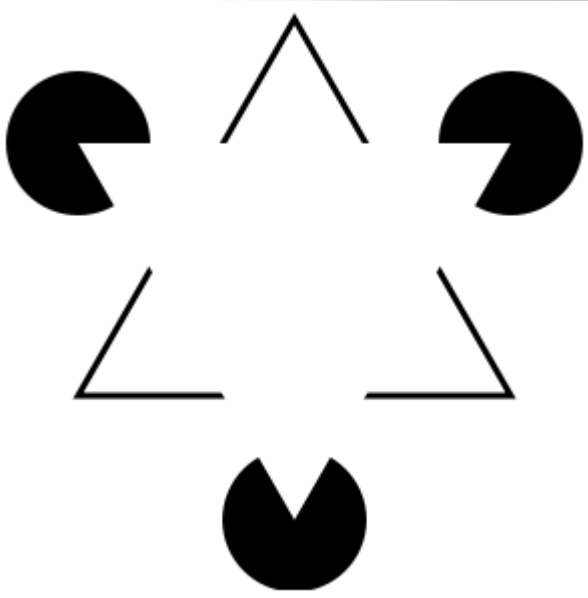
Deregowski, J. B. (1972). Pictorial perception and culture. *Scientific American, 227*(5), 82-88.

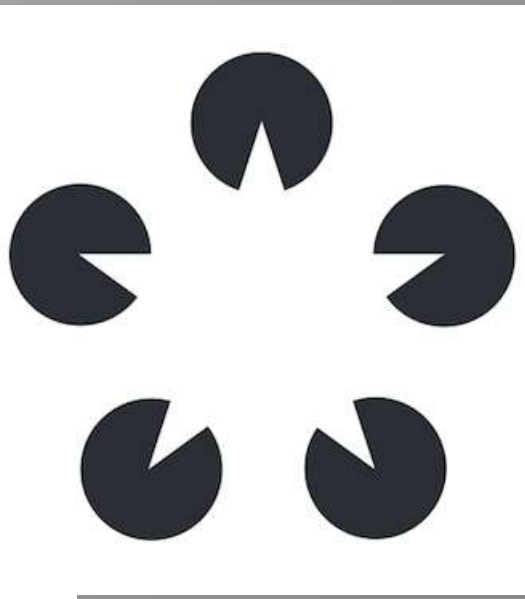
Western clutures vs. African tribes: Hudson's test





“Gestalt” principles





Semantic priming

TAE CAT

AAT

Analyzing exprience – how cognitive science works

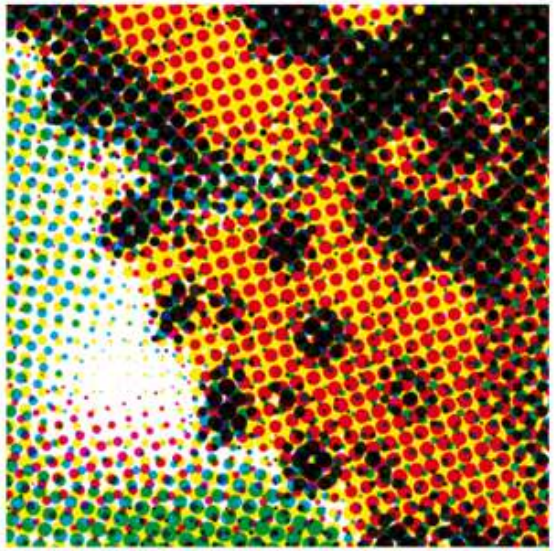
CYAN

MAGENTA

YELLOW

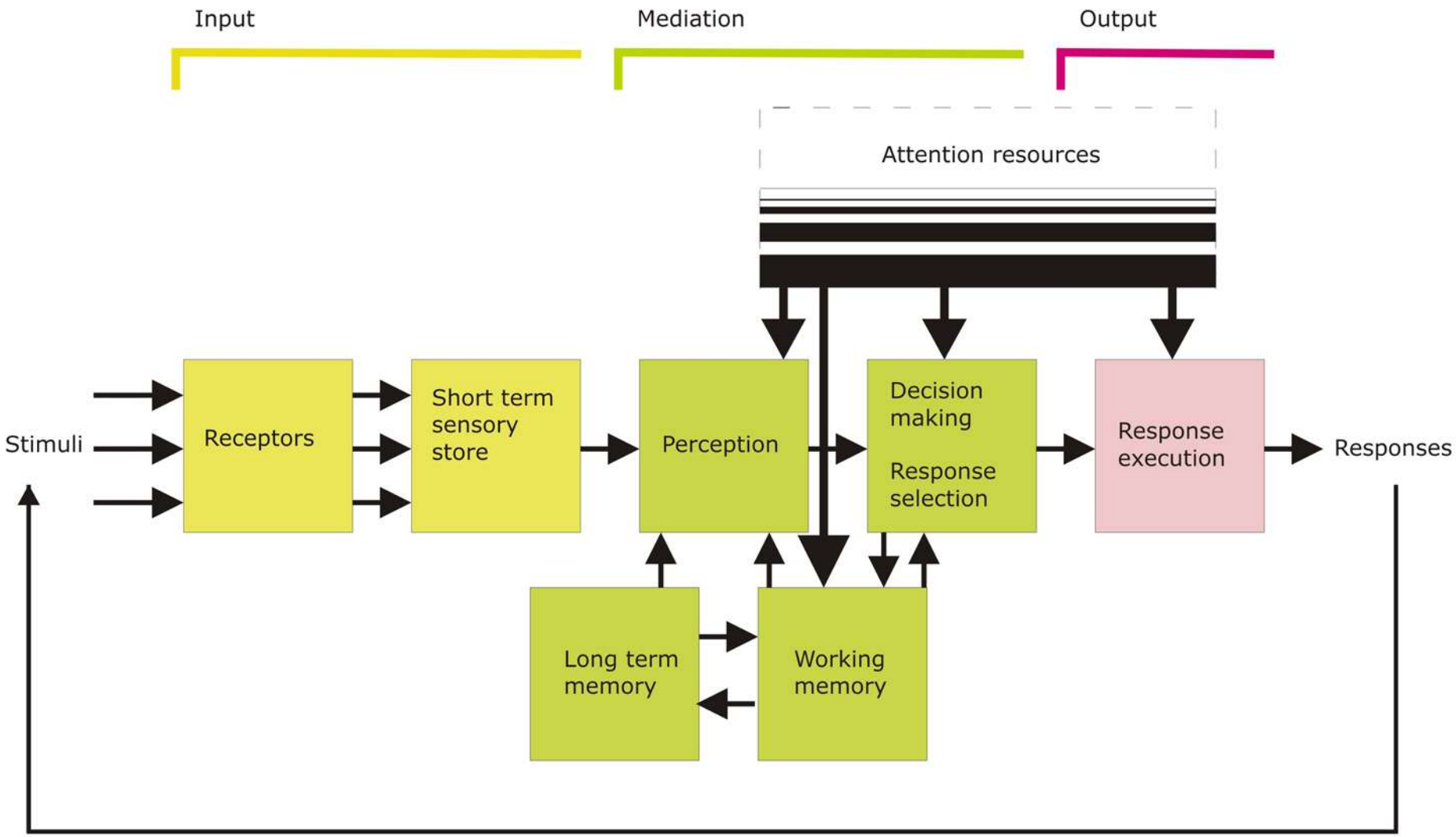
BLACK

FINAL CMYK



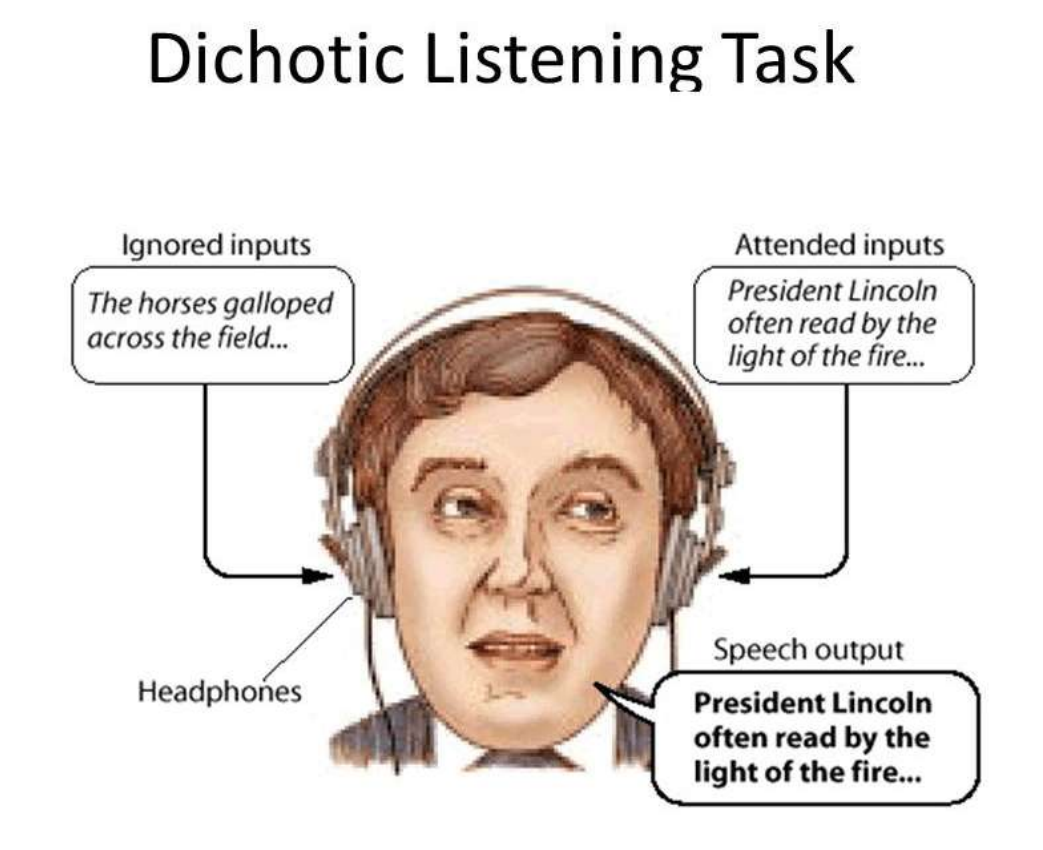
DETAIL VIEW

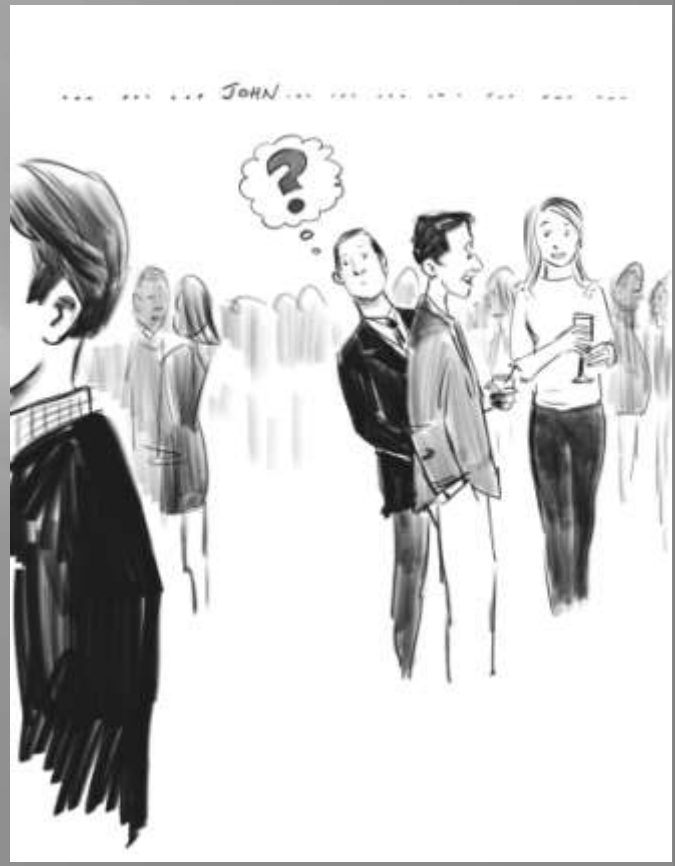
Cognitive processing



Attention

Selective attention – the "coctail party problem"





Selective and divided attention

https://www.youtube.com/watch?v=vJG698U2Mvo

The "Invisible Gorilla" experiment

Simons, D. J., & Chabris, C. F. (1999). Gorillas in our midst: Sustained inattentional blindness for dynamic events. *Perception*, *28*(9), 1059-1074.

INATTENTIONAL BLINDNESS

The "Invisible Gorilla" experiment

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INATTENTIONAL BLINDNESS – results:

"Did you notice anything unusual?" **(only54% DID notice)**

	Easy White team	Easy Black team	HARD White team	HARD Black team
TRANSPARENT Umbrella	58	92	33	42
TRANSPARENT Gorilla	8	67	8	25
OPAQUE Umbrella	100	58	83	58
OPAQUE Gorilla	42	83	50	58

The "Invisible Gorilla" experiment

Simons, D. J., & Chabris, C. F. (1999). Gorillas in our midst: Sustained inattentional blindness for dynamic events. *Perception*, *28*(9), 1059-1074.

INATTENTIONAL (CHANGE) BLINDNESS

- Occurs when attention is not drawn to the stimuli at the moment of change
- Perceptual salience (≠ unusual occurrence of the element) reduces change blindness

Would I do better at this task?

Beware of change blindness blindness ☺

(type of metacognitive *error)*

How vivid is your memory?

“Flashbulb” memories

Remember that time when you got lost in a shopping mall…

Do you remember that time when you…? Can you give details?

Lost in the shopping mall

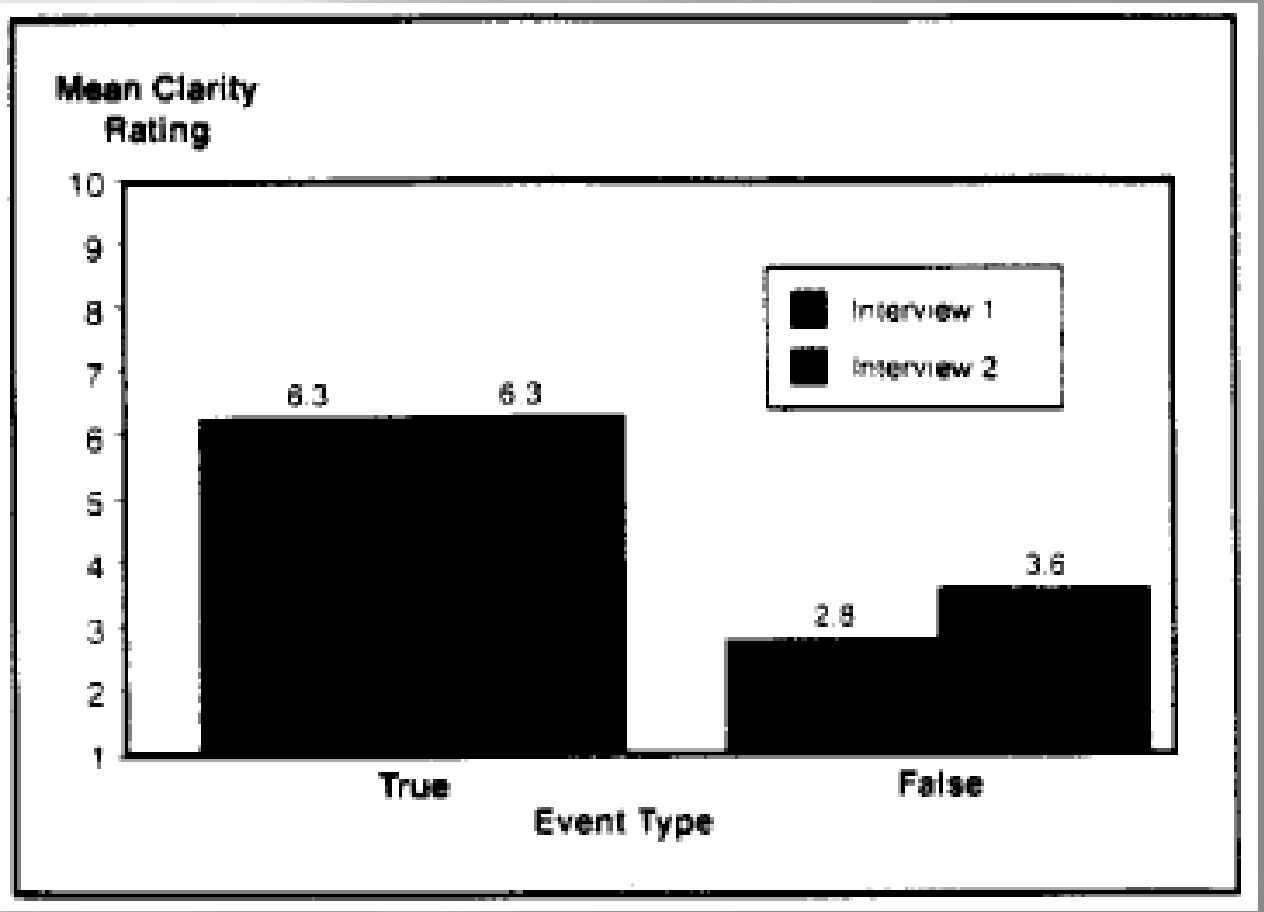
Loftus, E. F., & Pickrell, J. E. (1995). The formation of false memories. *Psychiatric Annals*, *25*(12), 720-725.

Tell us whether you remember this and provide details.

	True events (3 × 24 = 72)	**False event (out of 24)**
"Remembered" events	49 (68%) Described by more words	**6 (25%)** Described by less words

Lost in the shopping mall

Loftus, E. F., & Pickrell, J. E. (1995). The formation of false memories. *Psychiatric Annals*, *25*(12), 720-725.



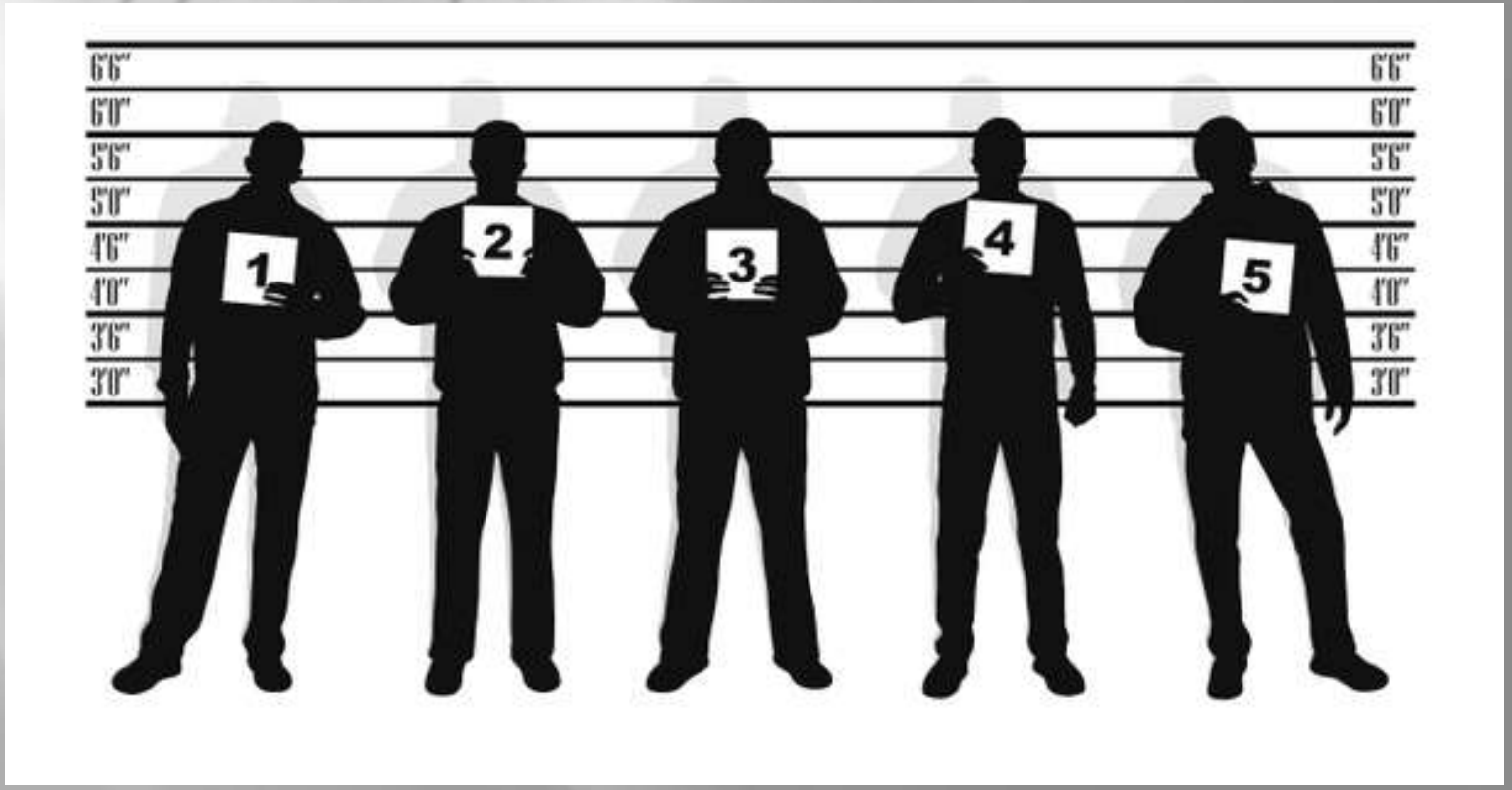
Does it matter whether our memories are accurate or not?

Elizabeth F. Loftus

Eyewitness testimony

Loftus, E. F., & Palmer, J. C. (1974). Reconstruction of automobile destruction: An example of the interaction between language and memory. *Journal of Verbal Learning and Verbal Behavior*, *13*(5), 585-589.

The way you ask questions matters…



Eyewitness testimony

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"Car speed…?"

	Estimated speed (mph)
Cars smashed…	40.8
Cars collided…	39.3
Cars bumped…	38.1
Cars hit…	34.0
Cars contacted…	31.8

Eyewitness testimony

Loftus, E. F., & Palmer, J. C. (1974). Reconstruction of automobile destruction: An example of the interaction between language and memory. *Journal of Verbal Learning and Verbal Behavior*, *13*(5), 585-589.

"Car speed…?"

	Estimated speed (mph)
Cars smashed…	40.8
Cars collided…	39.3
Cars bumped…	38.1
Cars hit…	34.0
Cars contacted…	31.8

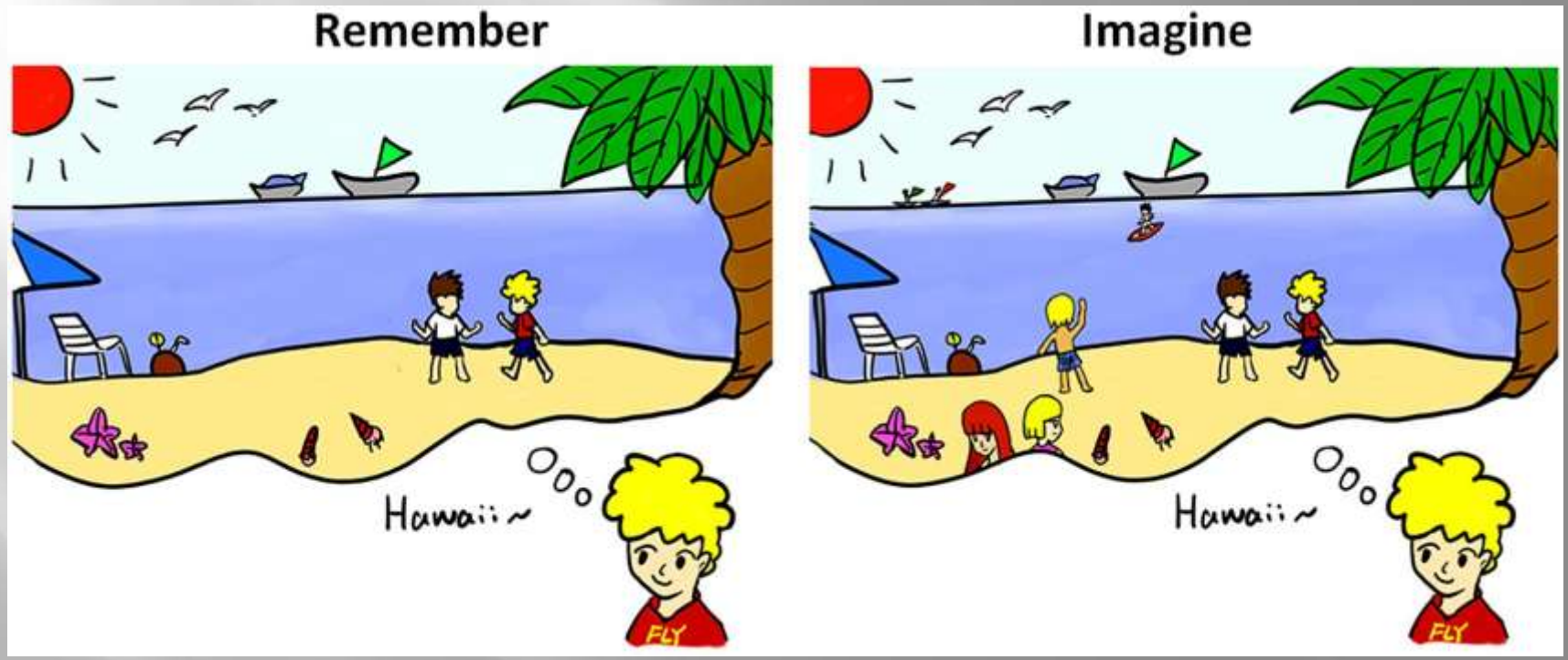
One week later:

"Any broken glass…?"

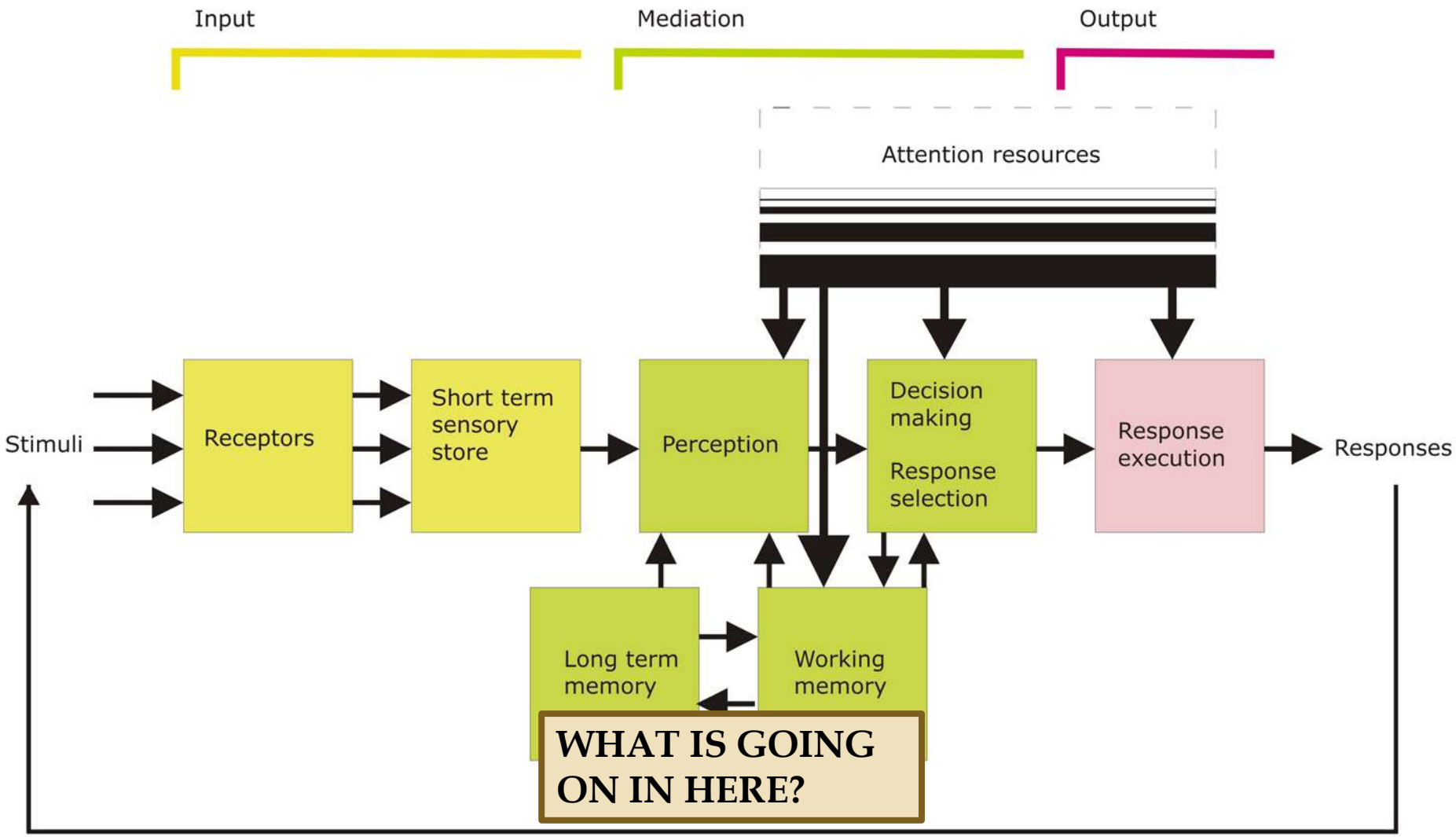
	Yes	No
Smashed	16	34
Hit	7	45
Control	6	44

Constructive nature of memory

Do I distinguish between what happened and what I imagined…?

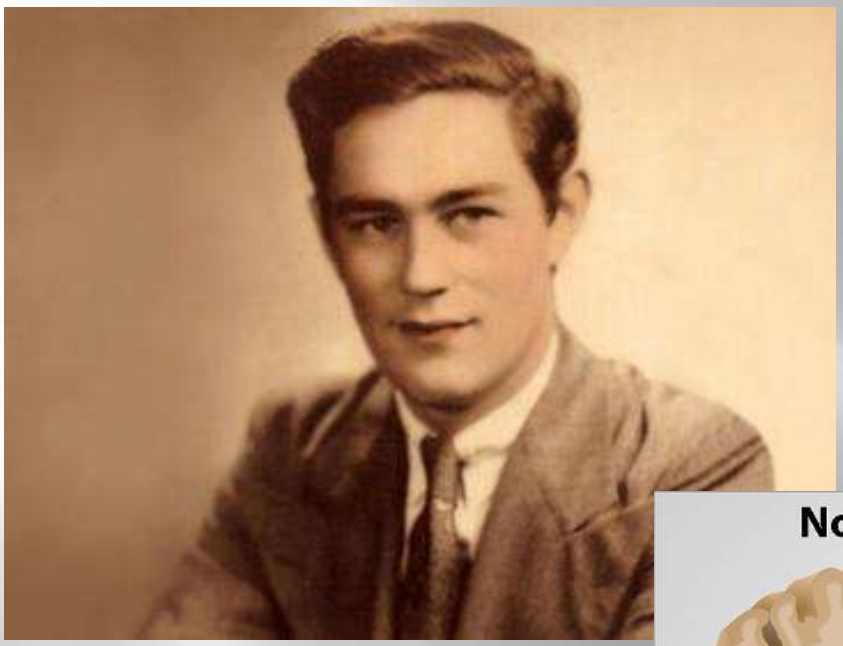


How memory works



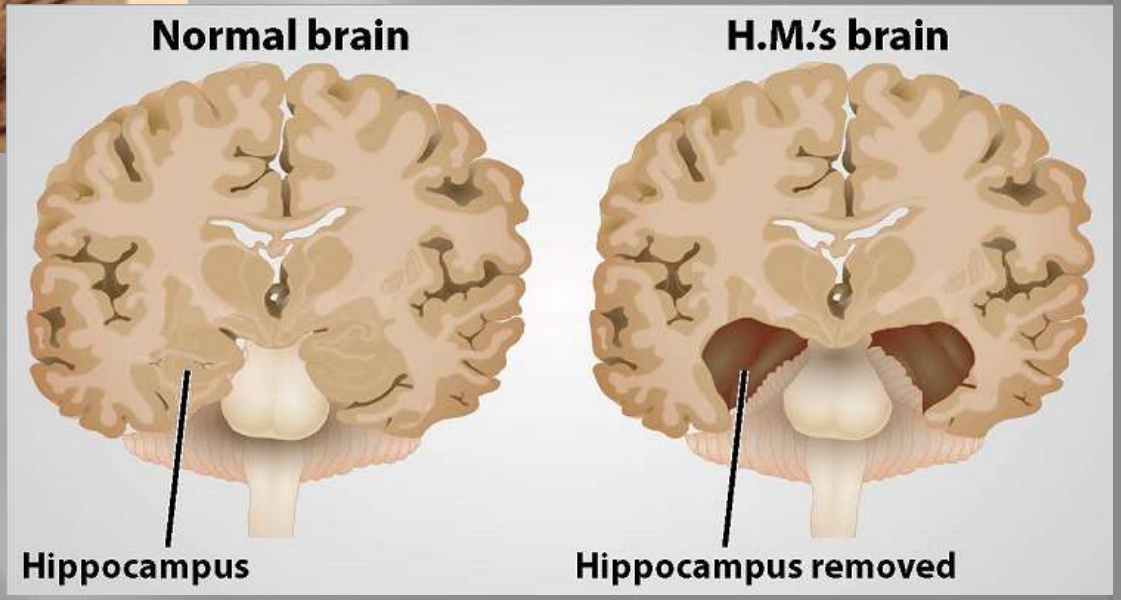
Workings of our brain

The case of H. M.

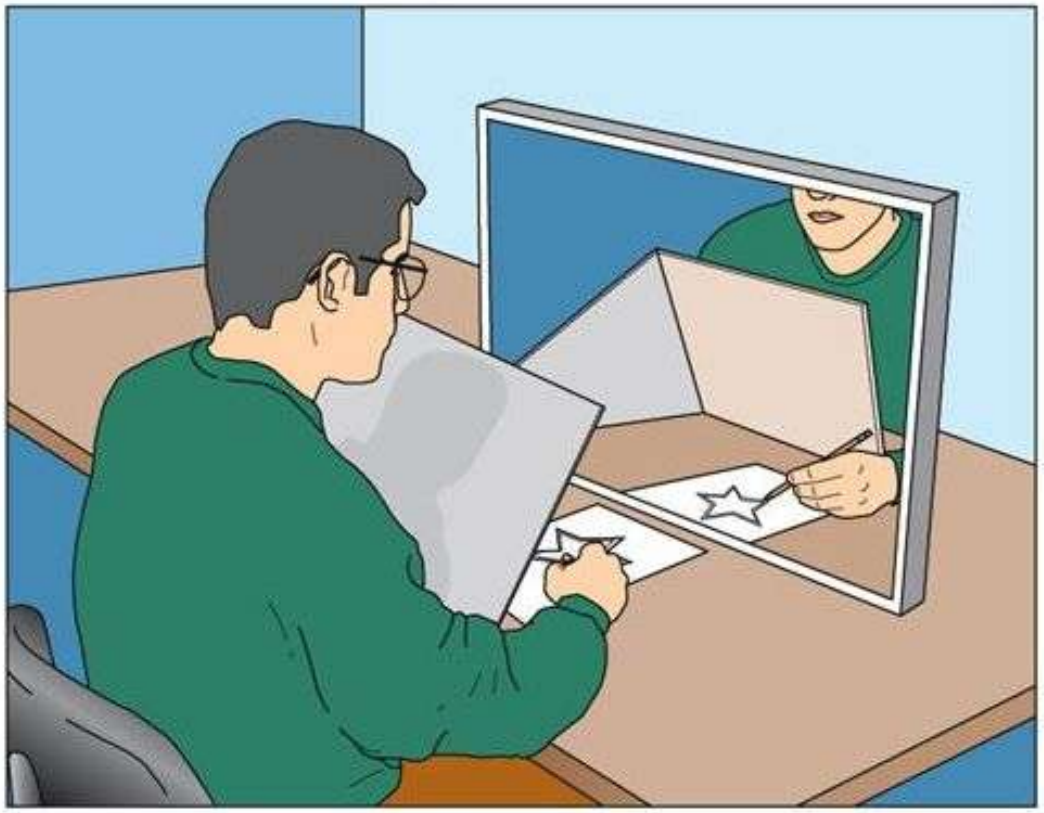


Henry Molaison
1953

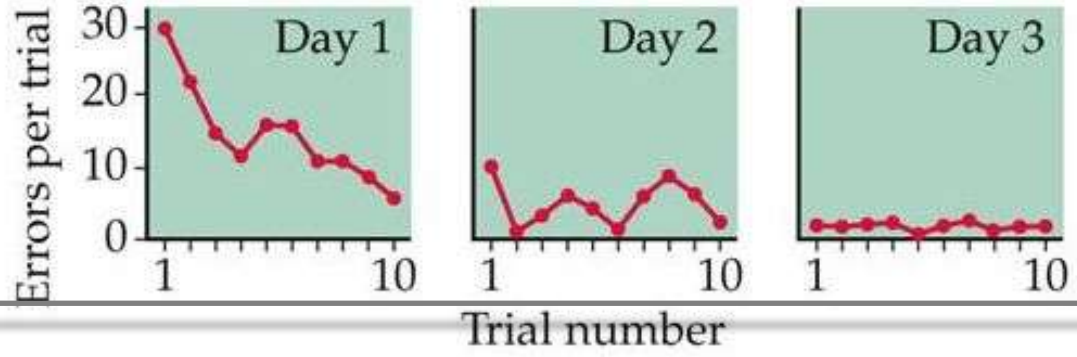
Anterograde amnesia



(a) The mirror-tracing task



(b) Performance of H.M. on mirror-tracing task

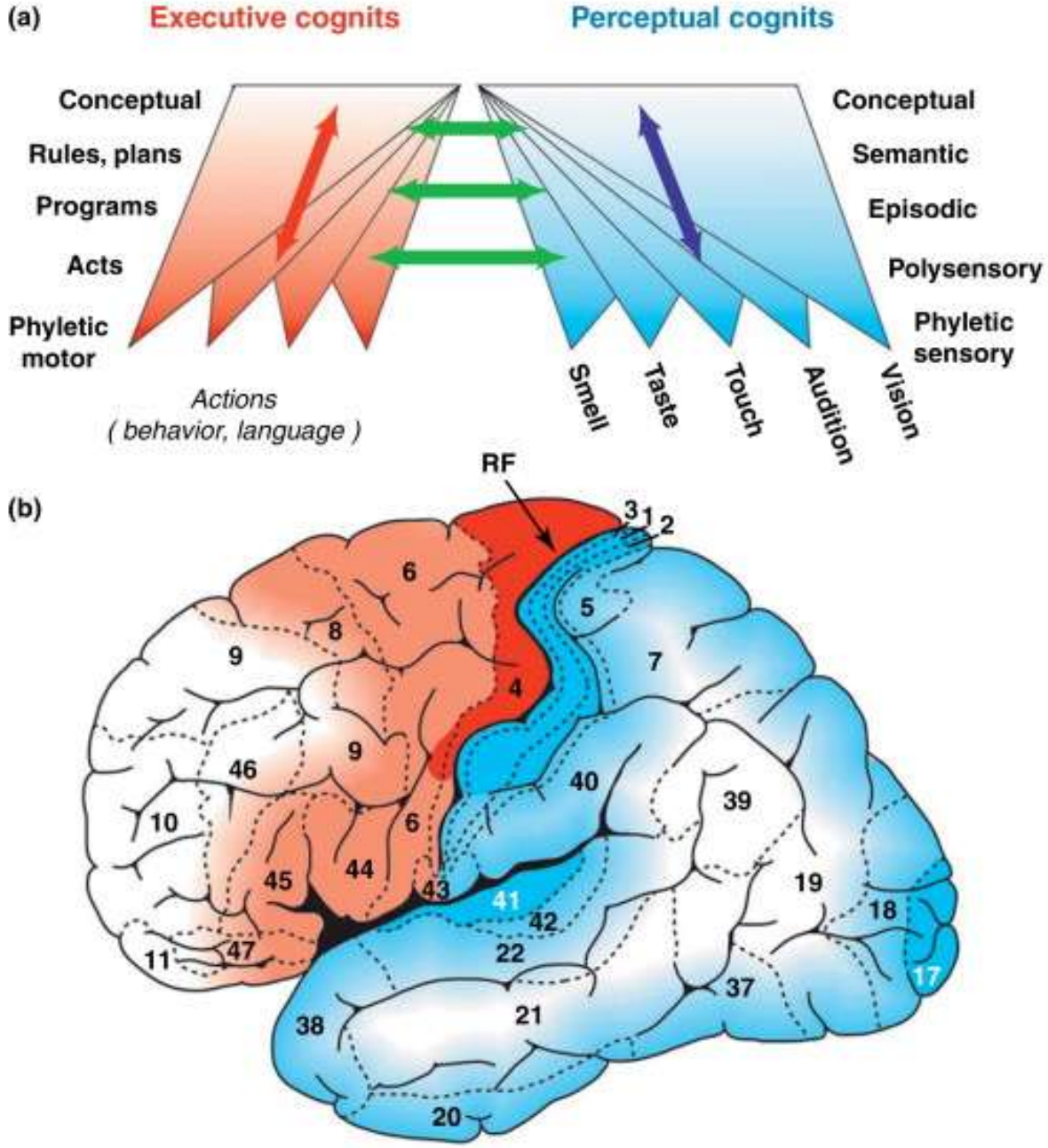


Not all memory is the same…

Episodic memory

Semantic memory

Procedural memory


(a)
Executive cognits
Perceptual cognits
Conceptual
Rules, plans
Programs
Acts
Phyletic motor
Actions (behavior, language)
Conceptual
Semantic
Episodic
Polysensory
Phyletic sensory
Smell
Taste
Touch
Audition
Vision
(b)
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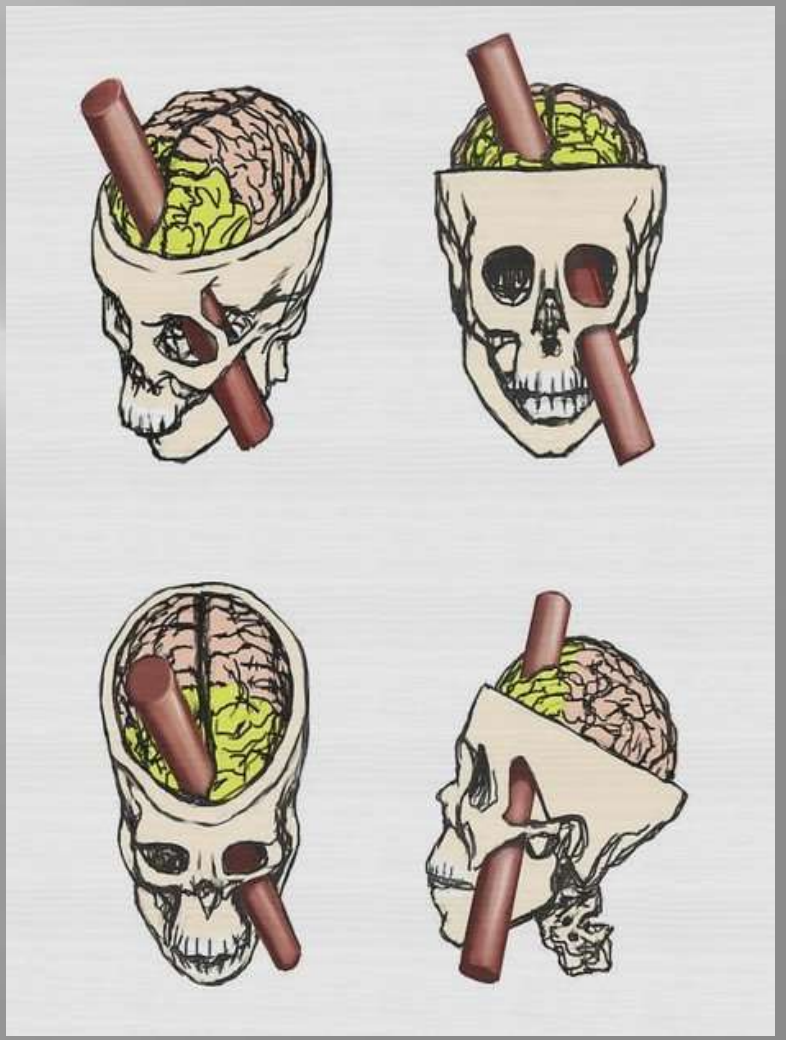
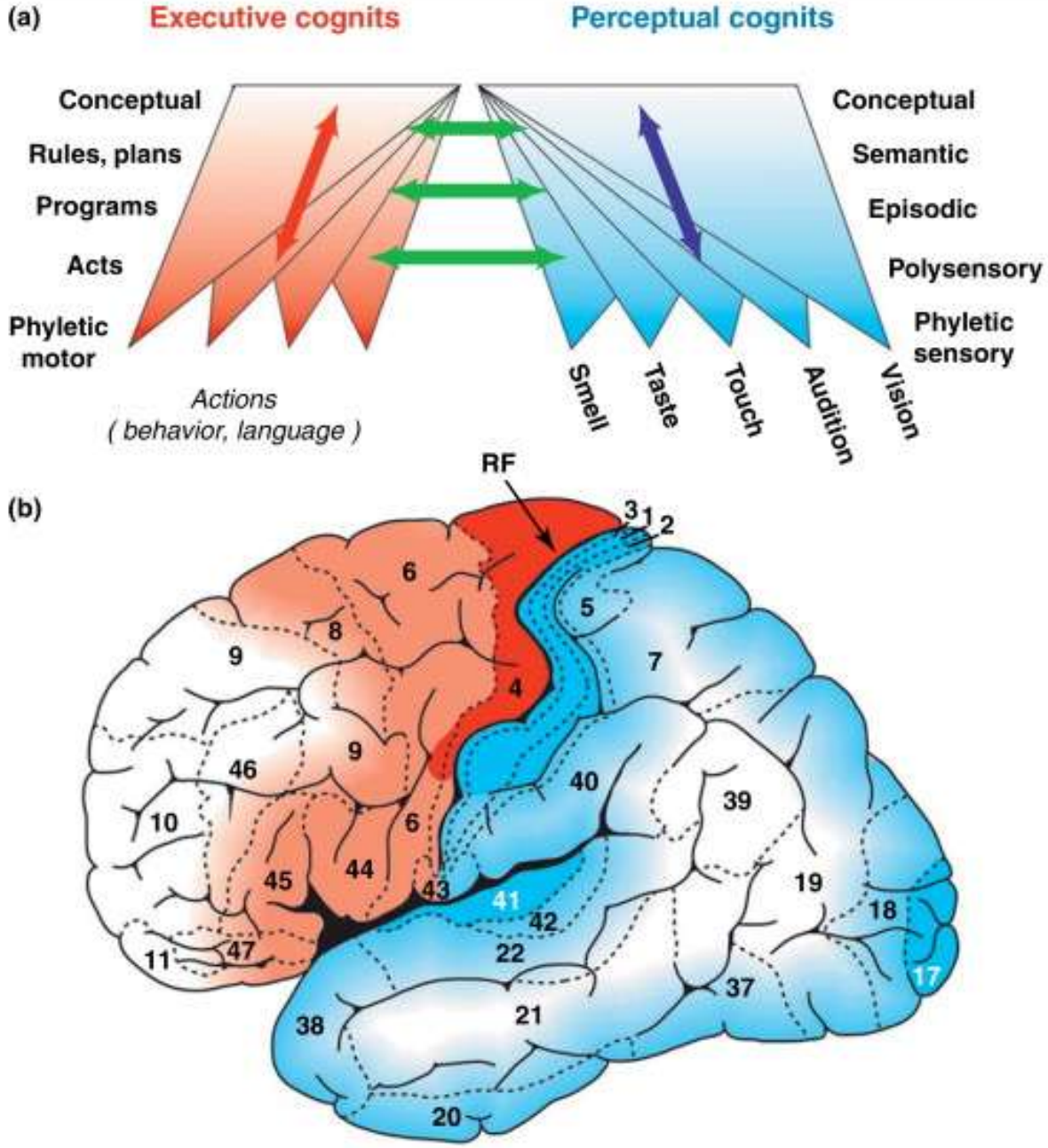
The Phineas Gage Case



The Phineas Gage Case

The equilibrium or balance, so to speak, between his intellectual faculties and animal propensities, seems to have been destroyed. He is ***fitful, irreverent, indulging at times in the grossest profanity*** *(which was not previously his custom), manifesting but little deference for his fellows,* ***impatient of restraint or advice when it conflicts with his desires****, at times* ***pertinaciously obstinate, yet capricious and vacillating****, devising many plans of future operations, which are no sooner arranged than they are abandoned in turn for others appearing more feasible. A child in his intellectual capacity and manifestations,* ***he has the animal passions of a strong man****. Previous to his injury, although untrained in the schools, he possessed a well-balanced mind, and was looked upon by those who knew him as a shrewd, smart business man, very energetic and persistent in executing all his plans of operation. In this regard his mind was radically changed, so decidedly that his friends and acquaintances said he was "no longer Gage."*

Harlow, 1868


(a)
Executive cognits
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Audition
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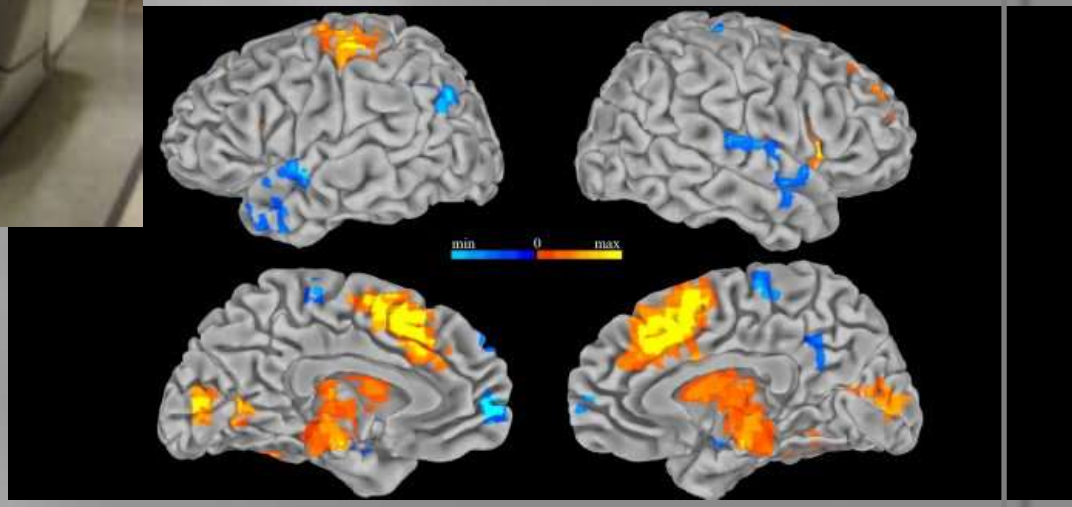
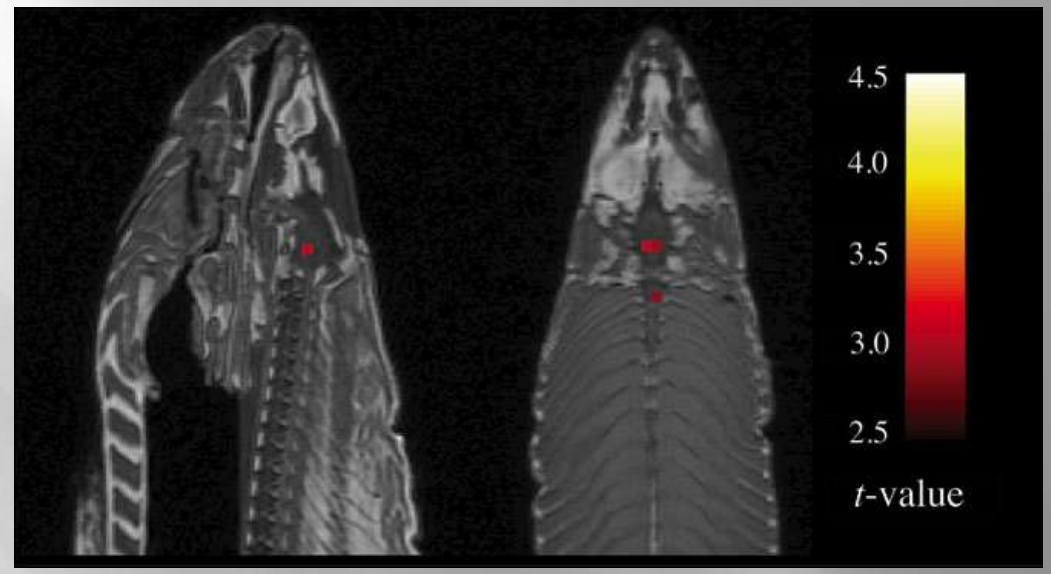
“The brain craze”

Functional brain imaging revolution

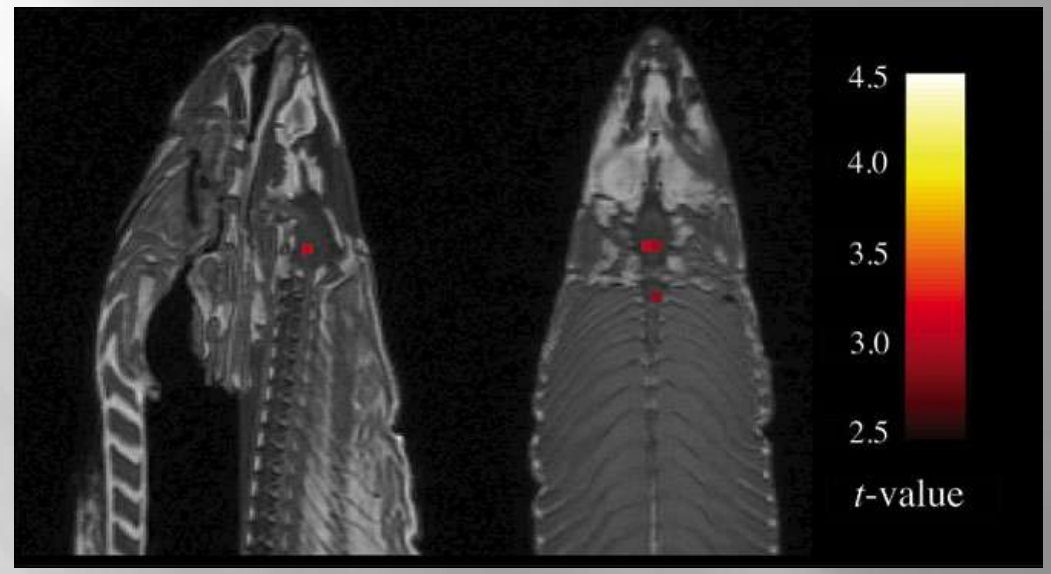


“The brain craze”

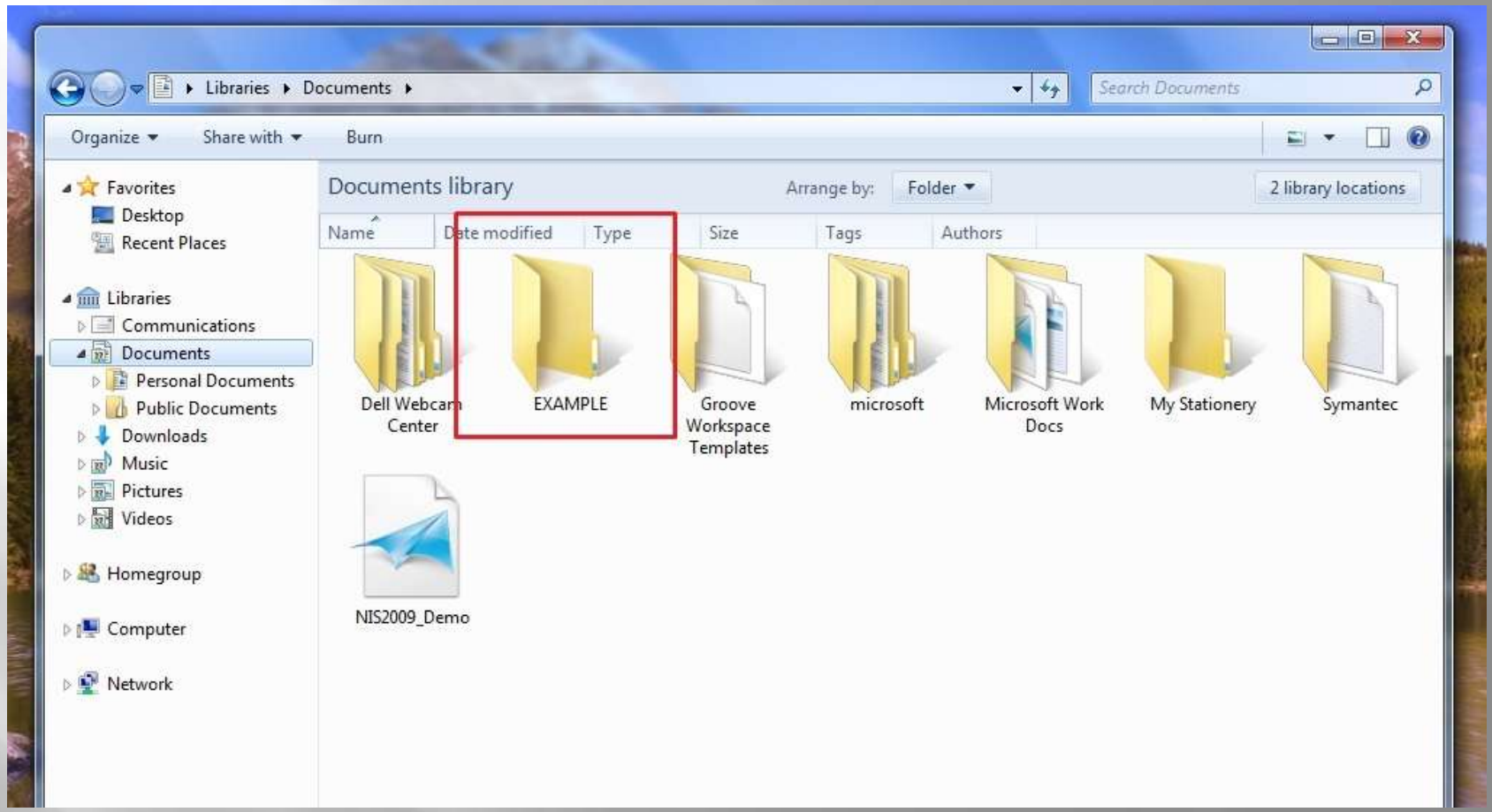


Are dirty plastic cups crucial for the expansion of knowledge?

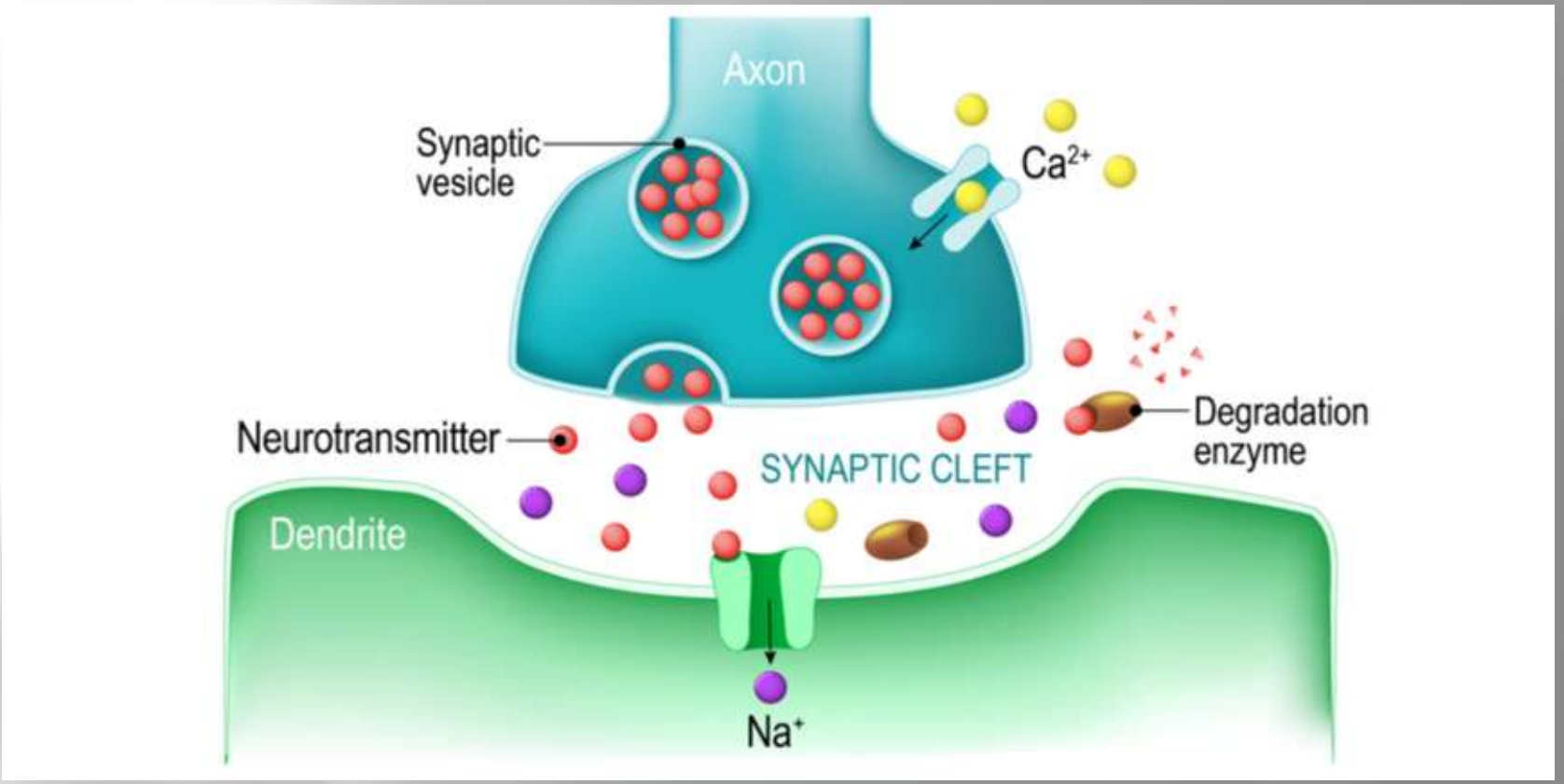
"The brain craze"



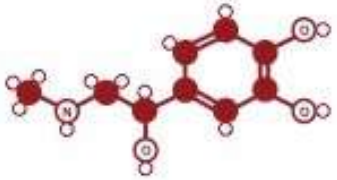
- Most of our brain is active all the time – very complex actions
- More activity ≠ this part is important for the task
- What about less activity?
- **The brain isn't parcelled out according to our psychological categories!**


Libraries ▸ Documents ▸
Search Documents
Organize
Share with
Burn
Favorites
Desktop
Recent Places
Libraries
Communications
Documents
Personal Documents
Public Documents
Downloads
Music
Pictures
Videos
Homegroup
Computer
Network
Documents library
Arrange by: Folder
2 library locations
Name
Date modified
Type
Size
Tags
Authors
Dell Webcam Center
EXAMPLE
Groove Workspace Templates
microsoft
Microsoft Work Docs
My Stationery
Symantec
NIS2009_Demo


OPENNESS
CONSCIENTIOUSNESS
THE
BIG
FIVE
NEUROTICISM
EXTRAVERSION
AGREEABLENESS

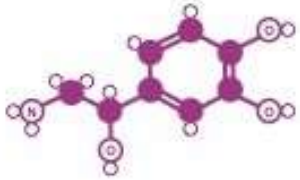

Axon
Synaptic vesicle
Ca^{2+}
Degradation enzyme
Neurotransmitter
SYNAPTIC CLEFT
Dendrite
Na^{+}

ADRENALINE



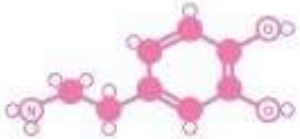
Fight or flight neurotransmitter

NORADRENALINE



Concentration neurotransmitter

DOPAMINE



Pleasure neurotransmitter

SEROTONIN

Mood neurotransmitter

GABA

Calming neurotransmitter

ACETYLCHOLINE

Learning neurotransmitter

GLUTAMATE

Memory neurotransmitter

ENDORPHINS

Euphoria neurotransmitter

Thank you!