



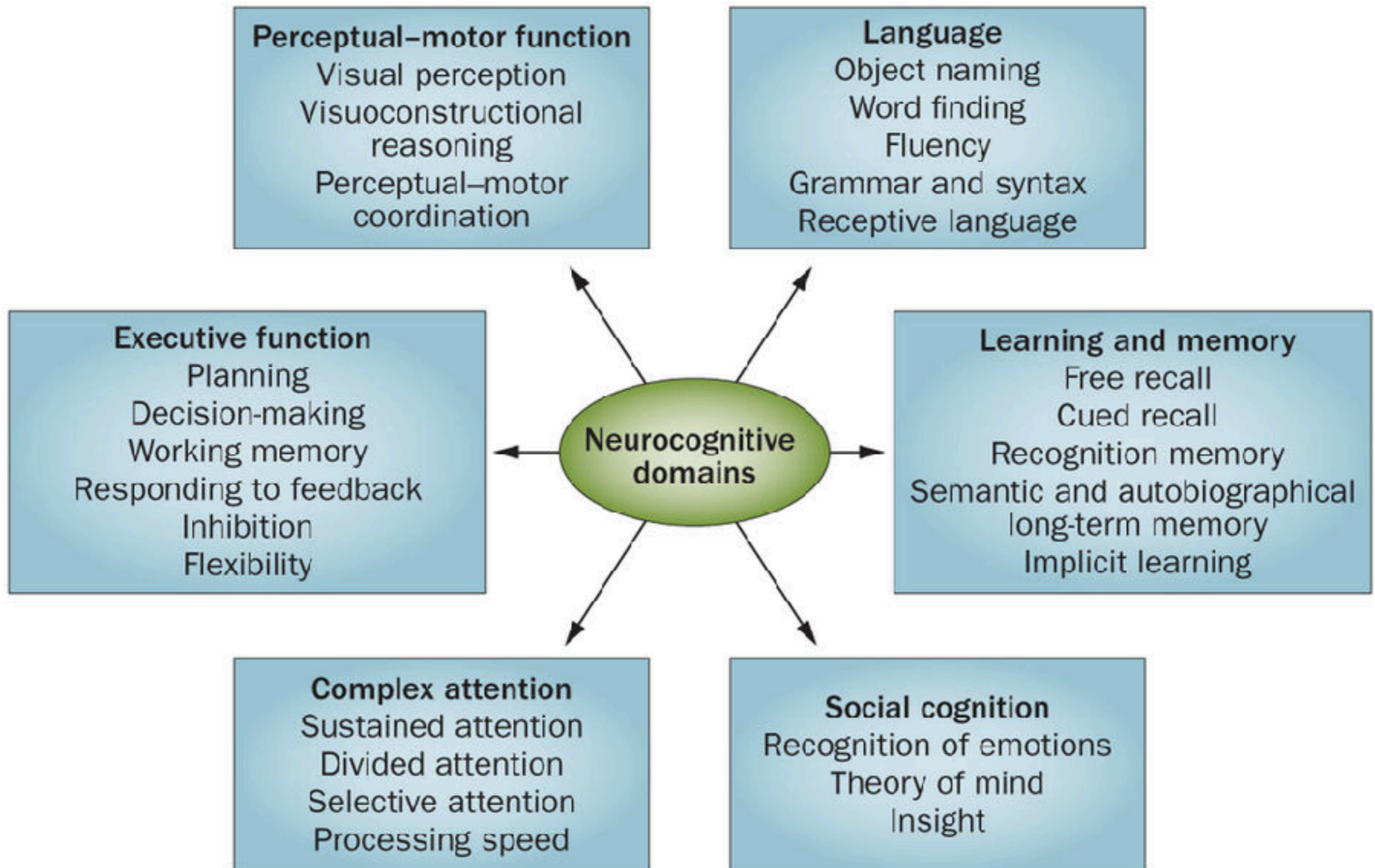
Higher Cortical Functions Bedside Examination

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Cognitive domains

- Memory
- Language
- Visuospatial
- Praxis
- Executive functions

Neurocognitive domains



Cognitive test

- Domain specific cognitive test
- Overall cognitive test

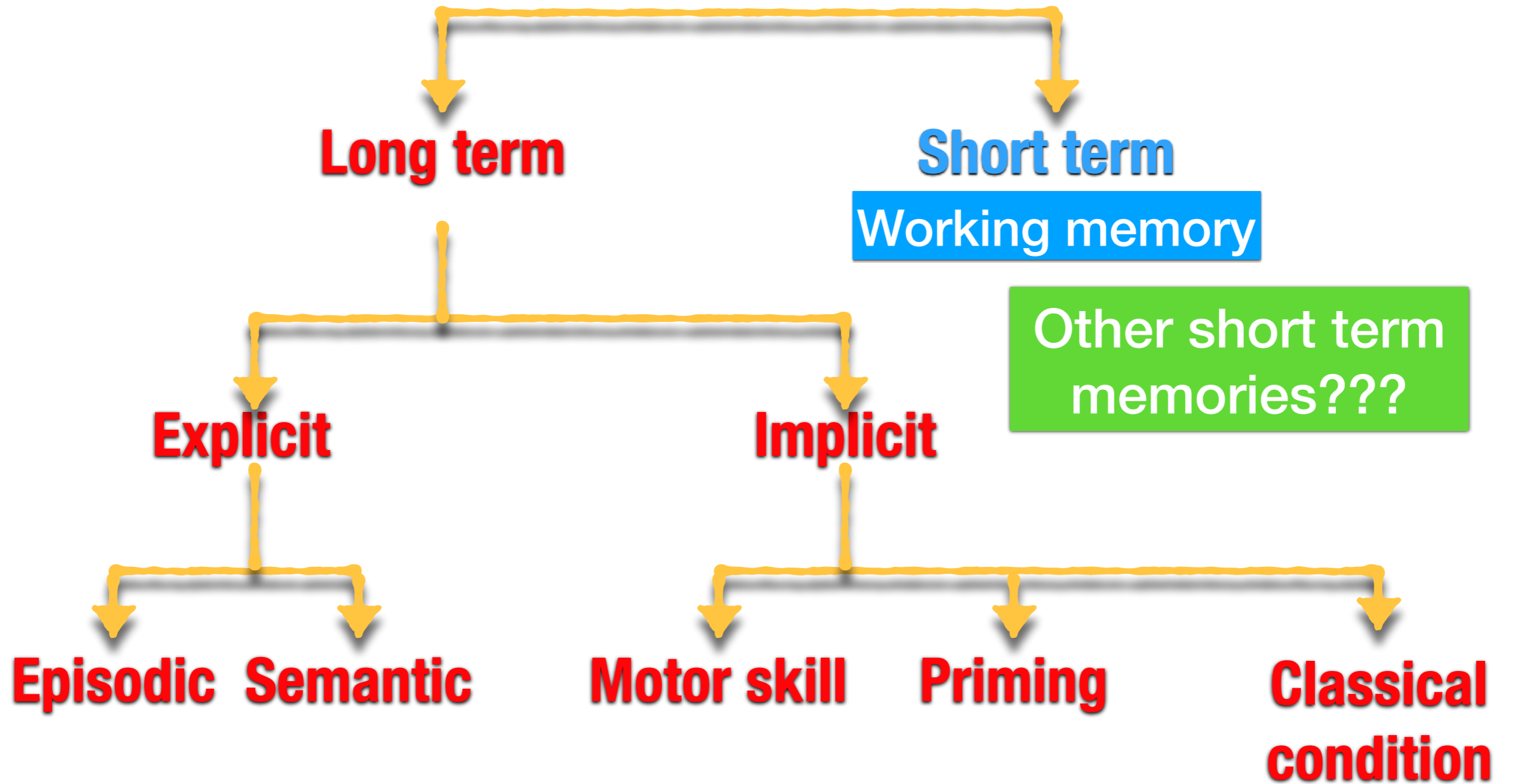
Overall cognitive tests

- Mini-mental state examination (MMSE)
- Montreal cognitive assessment (MoCA)
- Saint Louis university mental status (SLUMS)
- Alzheimer's disease assessment scale (ADAS)
- The Addenbrooke's cognitive examination (ACE)
- Cambridge cognitive examination (CAMCOG)

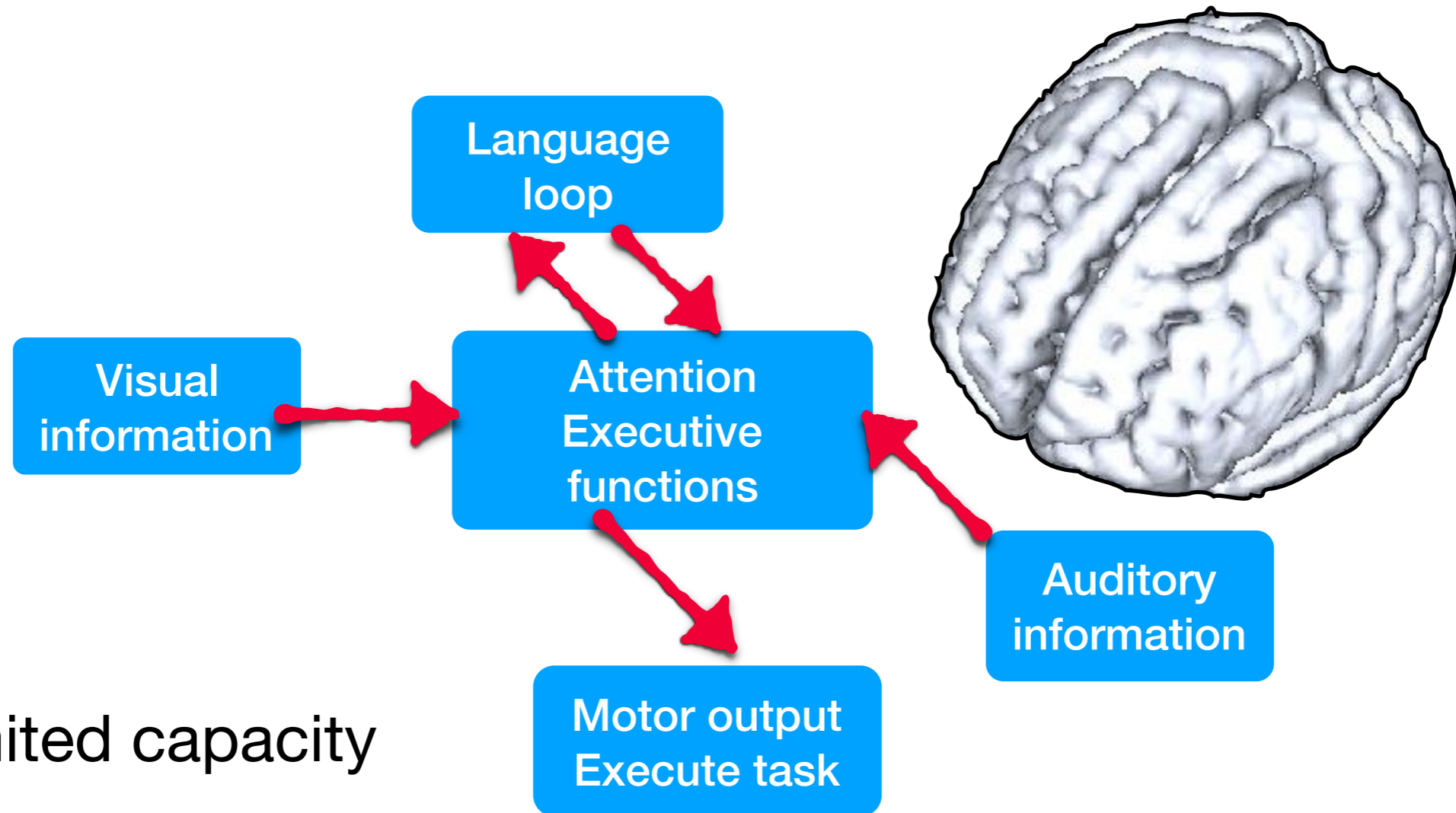
Specific domain cognitive tests

- Memory: delayed recall, digit span
- Language: naming test, category fluency, similarity
- Visuo-perceptual: cancellation test, line bisection, face recognition
- Attention: digit span, serial 7 subtraction, stoop color
- Executive function: Trail making, clock drawing, proverb explanation, tower of London
- Frontal inhibition: Luria's three-step test, go-no-go, copy alternate sequence

Memory



Working memory



- Limited capacity
- Temporarily holding information available for processing
- Attention and rehearsal enhance the memory

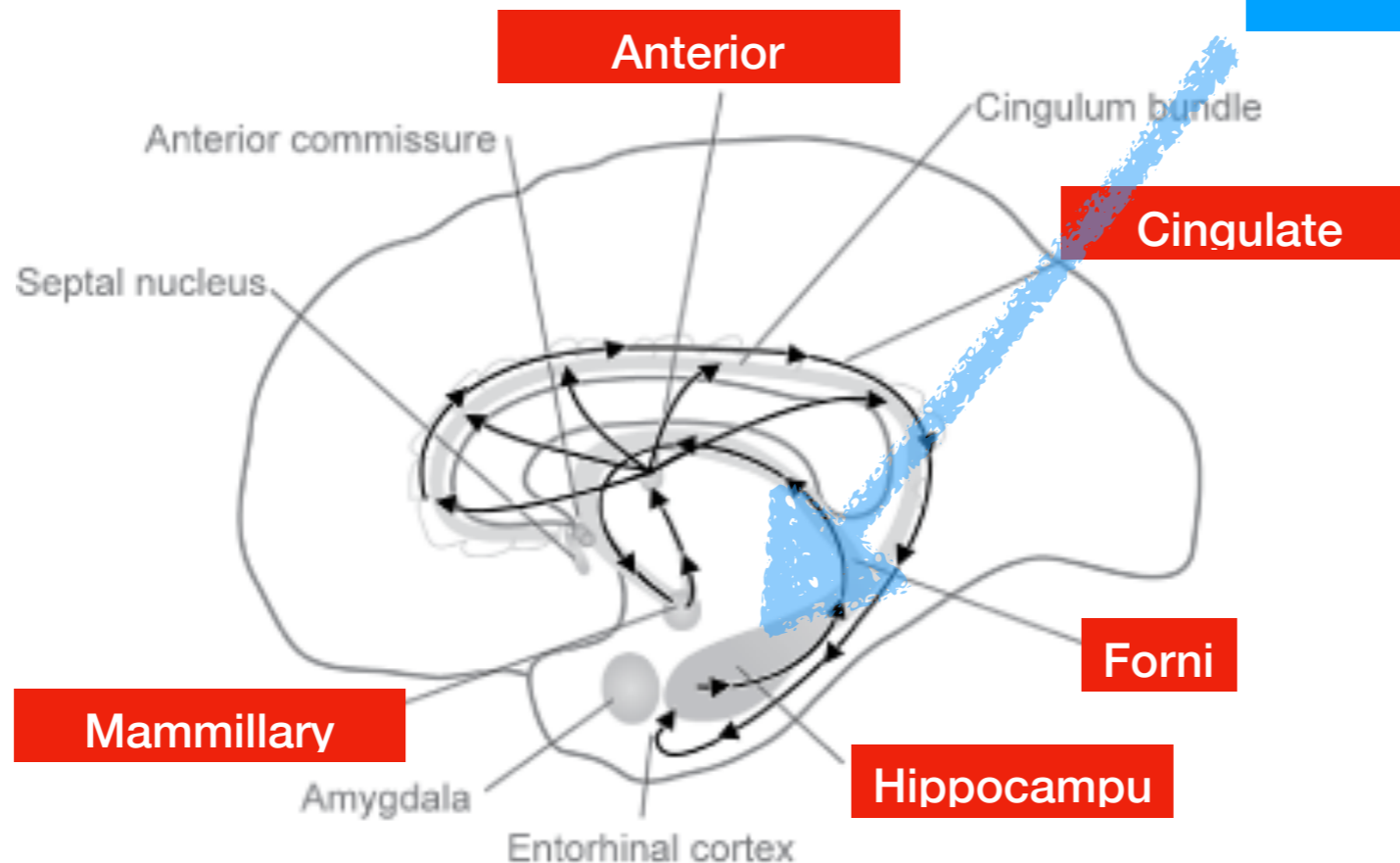
Working memory assessment

- Digit span forward and backward
- Delay recall

Episodic memory

Papaz's circuit

Awareness
Parietal lobe



- Memory about space and time and what has happened
- Awareness and emotion enhance the memory
- Recognize the details of what has happened

Hathout, G., & Ferguson, T. (2008). The cerebral cortex. In *Clinical Neuroradiology: A Case-Based Approach* (pp. 179-223).

Episodic memory assessment

- Recent events with time or place tag (when, where, what)
- Delay recall
- Head turning signs
- Momentary confabulation

Semantic memory

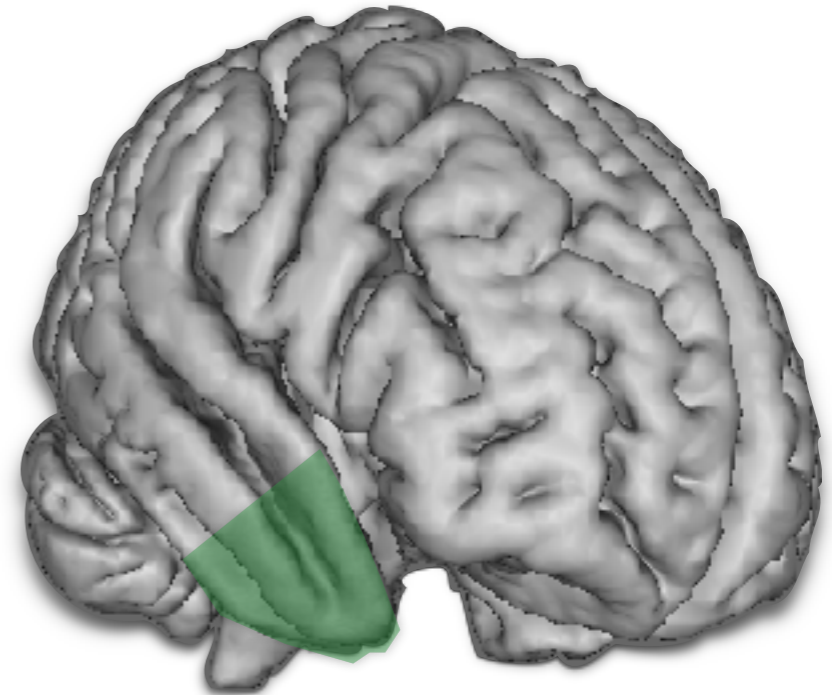
Network

Anterior temporal cortex

Sensory input

Language area

Hippocampus???



- Memory of general knowledge and personal information (autobiography)
- Learning and repeated exposure enhance the memory
- Retrieved when stimulated or internal thought

Semantic memory assessments

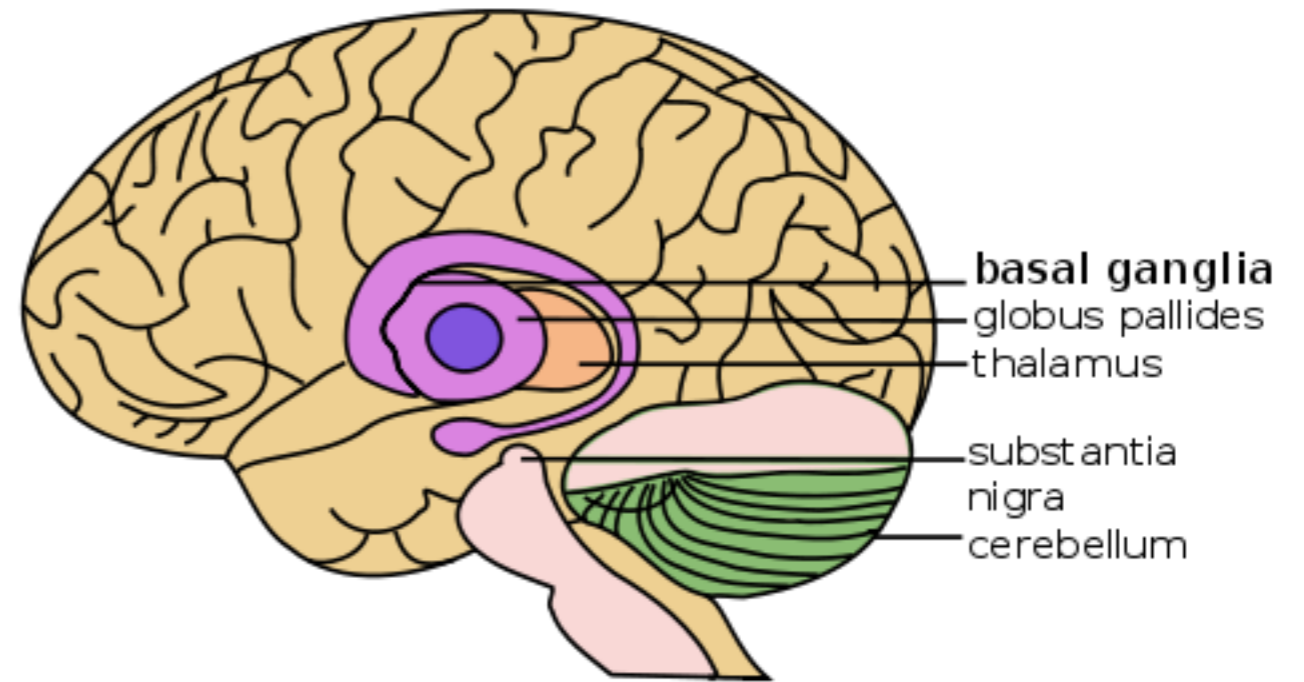
- Naming and semantic knowledge
 - objects, pictures, famous faces
- Category fluency (animals, fruit)
- General knowledge
- Personal knowledge

Procedural memory

Network

Basal ganglia

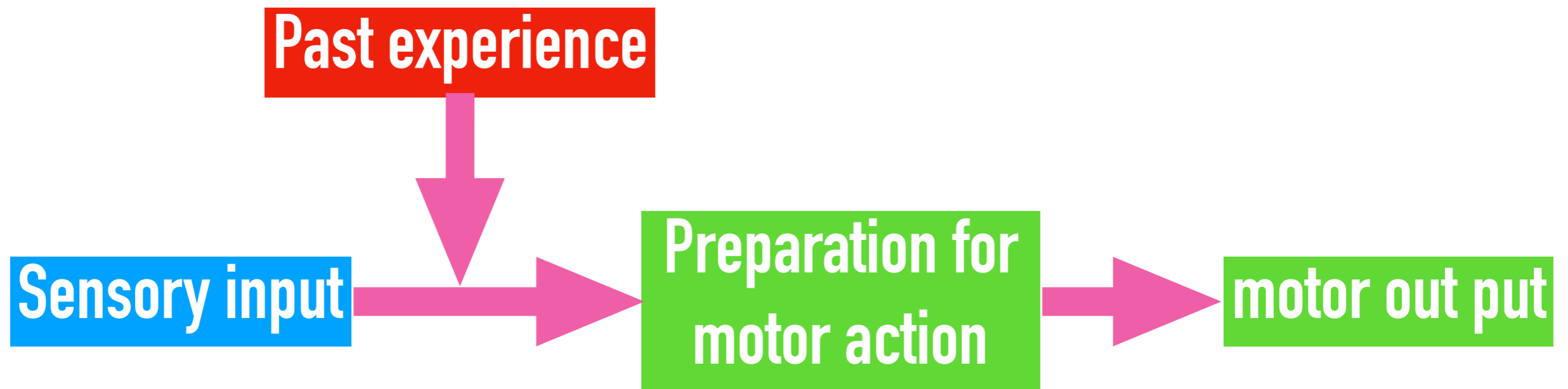
Cerebellum



- Memory about knowing to do things, motor skills
- Learning and practicing enhance the memory

Priming

- Memory of effect in which exposure to one stimulus influences the response to another stimulus



Priming

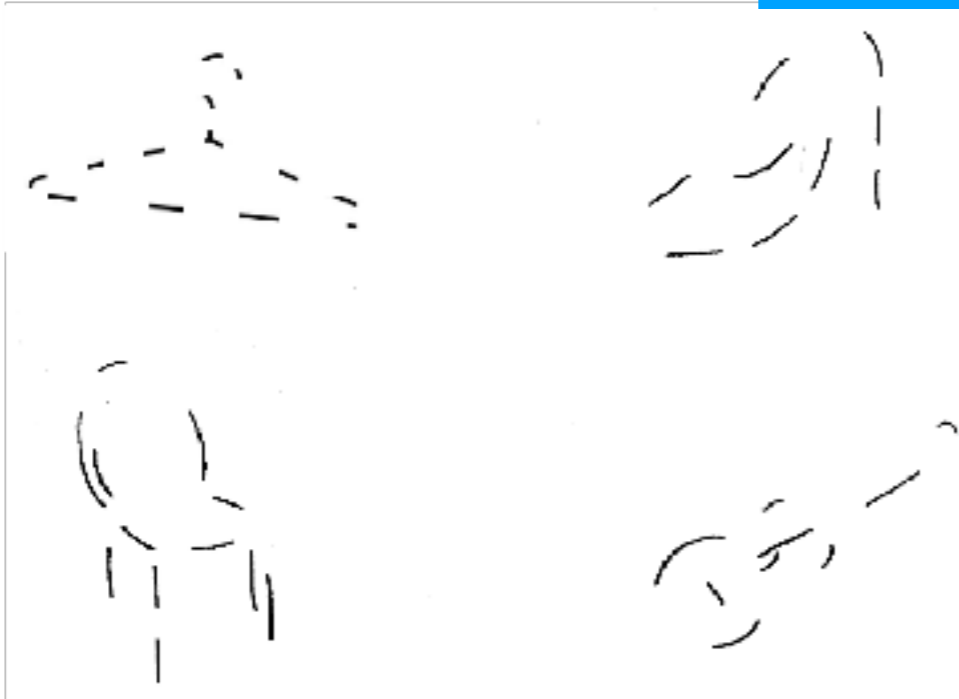
Word fragment

อาหาร
ข้า_ม่_ไ_
ม่_ม่_

Word stem

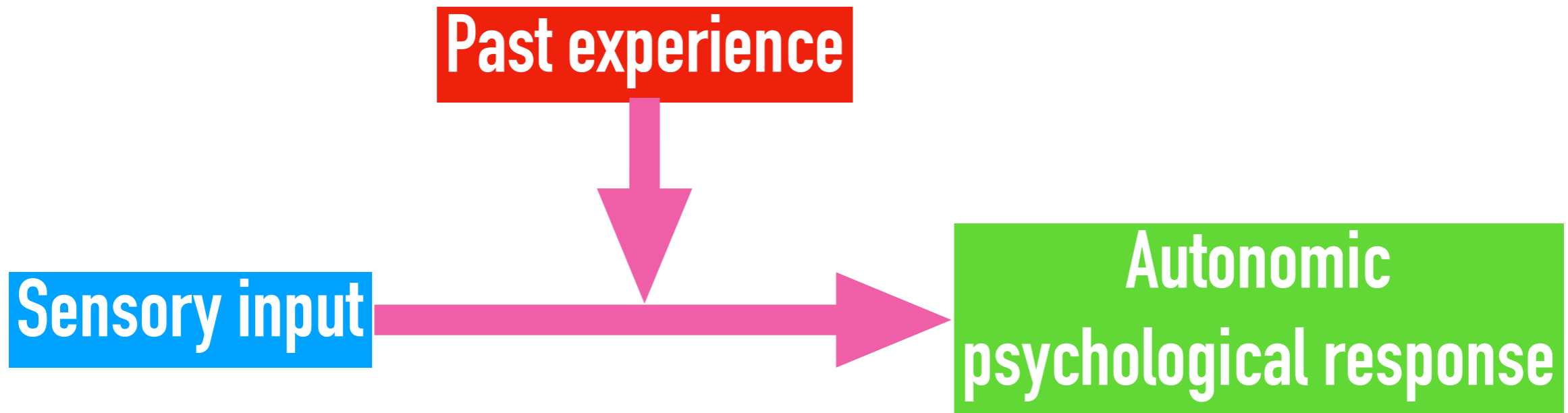
เครื่องแต่งกาย
เสื้อ ็ _
กาง _ _ ็ _ ็

Picture fragment



Classic condition

- Pavlovian
- Amygdala

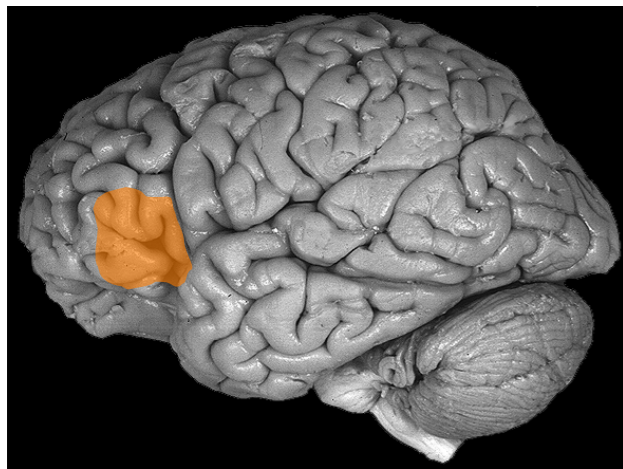


Language

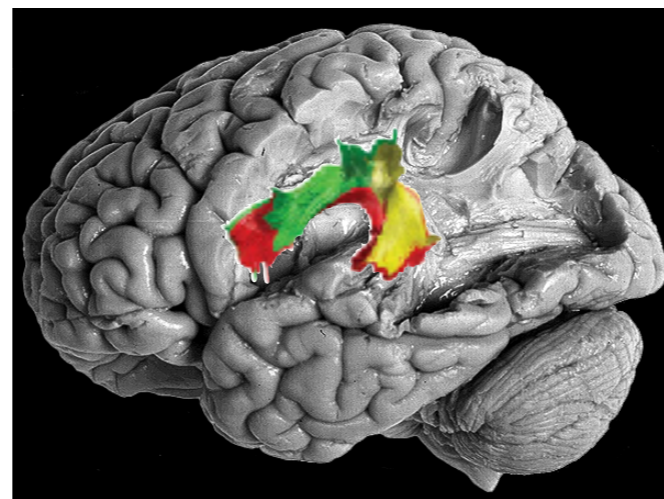
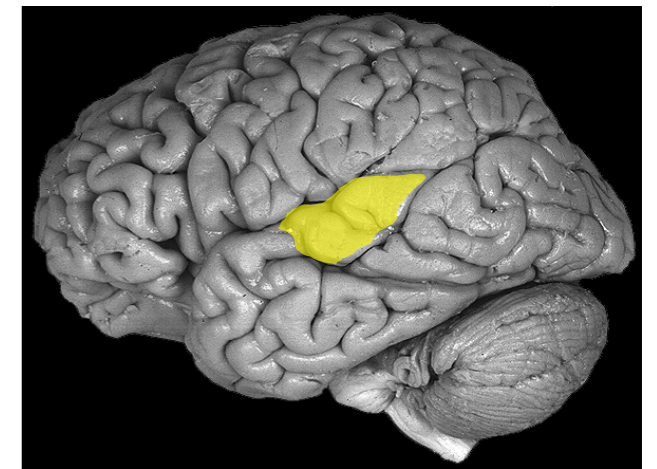
Lichtheim's diagram

Concept center
Semantic knowledge

Broca's area



Wernike's area



Non-fluent aphasia

Fluent aphasia

Language assessment

Naming

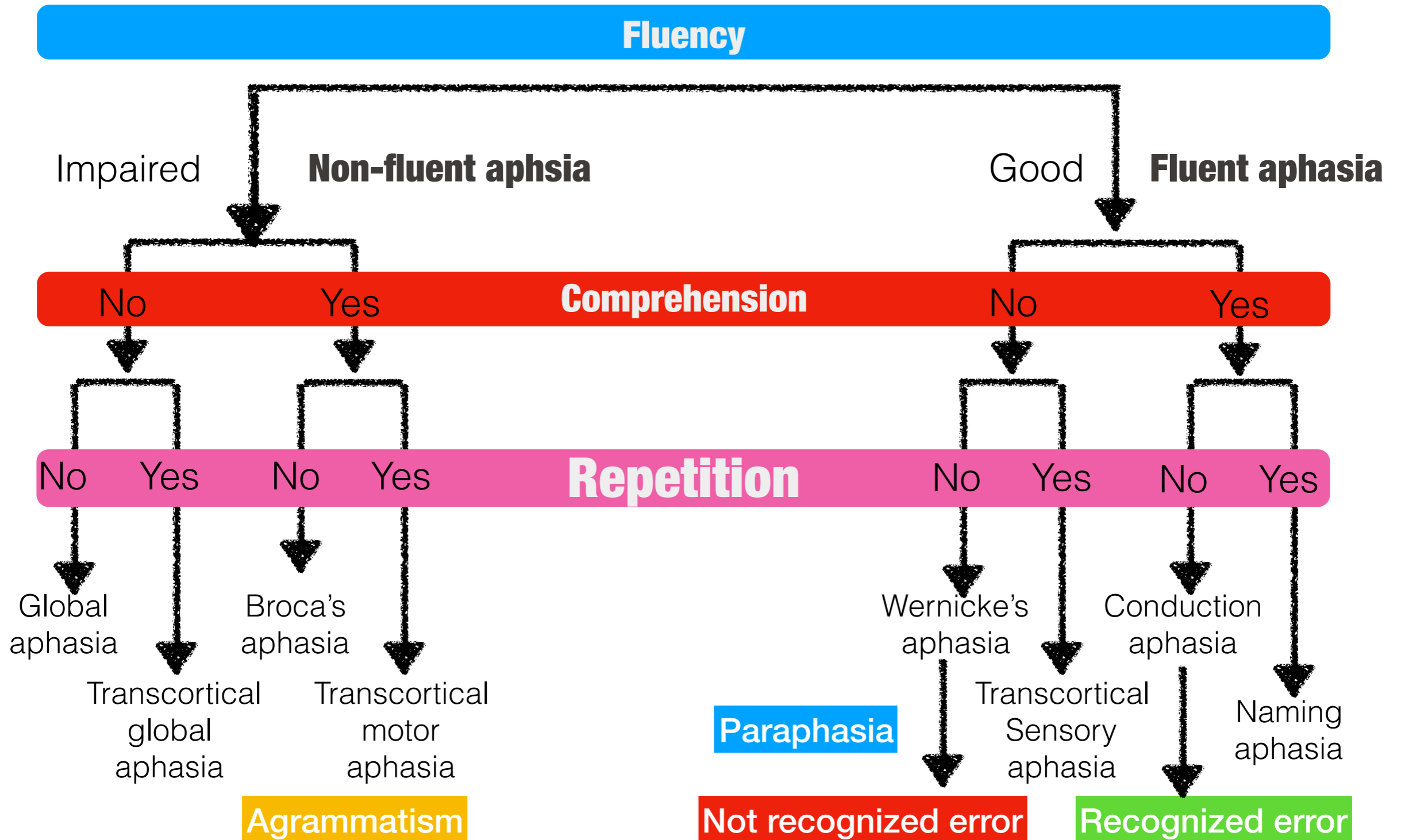
Verbal fluency: Alphabet, category

Comprehension: 3-step command, yes-no questions

Repetition

Reading and writing

Assess speech disorders



Praxis

Apraxia

- Disorder of skill to execute tasks
- Not caused by weakness, abnormal tone, movement disorders, akinesia, intellectual disorders
- Usually involving dominant hemisphere frontal and parietal area

Limb-kinetic apraxia

- Inability to handle tools for the purpose intended
- Anatomy
 - Supplementary motor area
 - Basal ganglia

Assess apraxia with tool

Give patient a tool

Let the patient show how to use

Cannot hold or manipulate properly

Can hold the tool properly

Limb-kinetic

Wrong sequence

Ideational

Use the tool wrong way

Conceptual

Ideomotor apraxia

- Impair of sensori-motor programs that generate motor control
- Timing and spatial organization of action
- Anatomy
 - Left parietal

Assess apraxia without tool

Transitive

Perform imaginary activity such as combing, ironing, hammering

Ideomotor apraxia

Intransitive

Command

Perform example

Meaningful gesture

Meaningless gesture

Conduction apraxia

Visuoimitation apraxia

Ideational apraxia

Sequence error

- Cannot perform purposeful task in order
 - Error preparing cups of coffee

Conceptual error

- Error of single action task
- Demonstrate inappropriate use of tools
 - Brushing teeth with spoon

Anatomy

- Left temporal

Assess apraxia with tool

Give patient a tool

Let the patient perform task

Cannot hold or manipulate properly

Can hold the tool properly

Limb-kinetic

Wrong sequence

Sequence error

Use the tool wrong way

Conceptual

Type of apraxia

- Limb-kinetic (supplementary motor, basal ganglia) motor
- Ideomotor (left parietal) spatial
- Ideational (left temporal) semantic

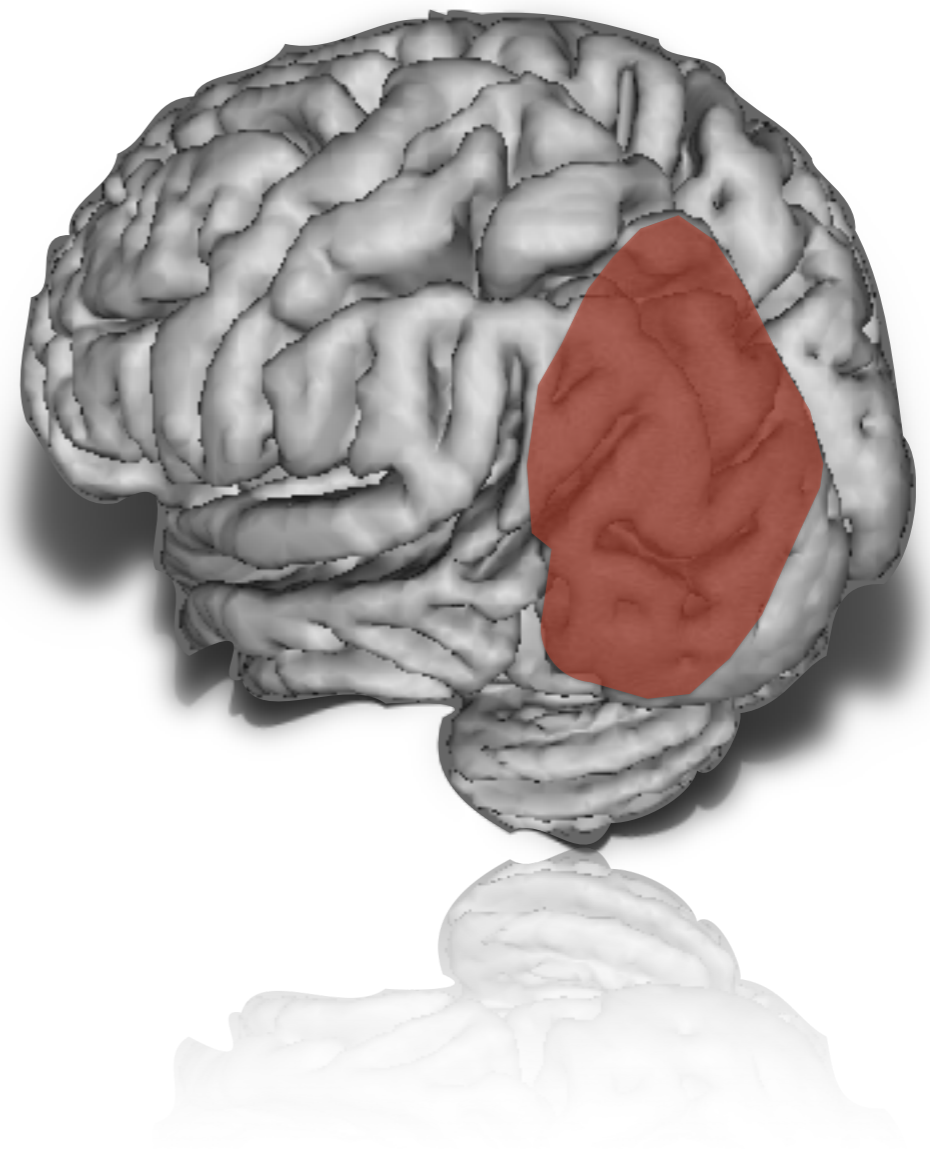
Specific apraxia

- Construction
- Dressing
- Speech
- Gait
- Gaze

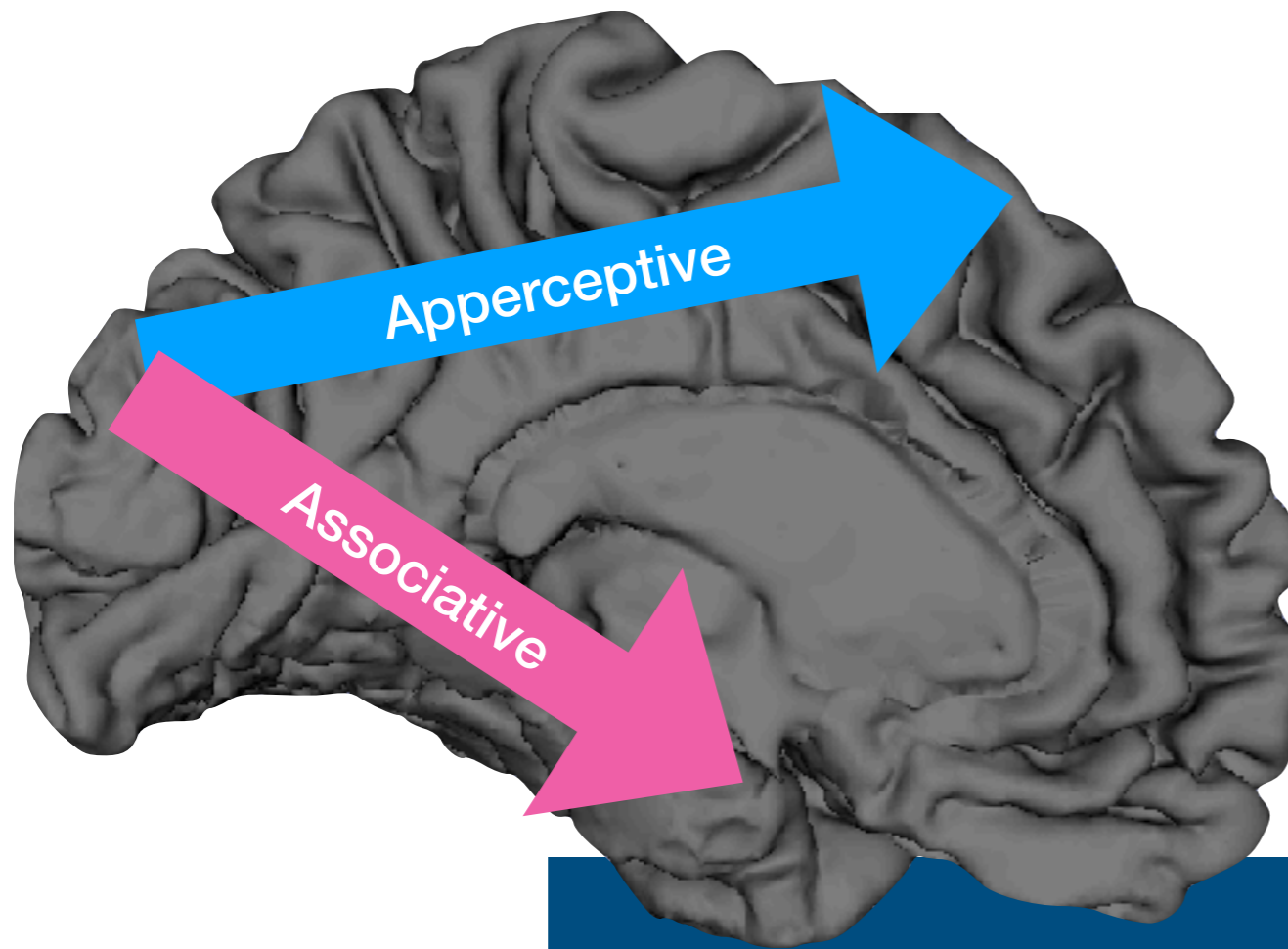
Visuospatial

Visuos-perceptual ability

- Ability to interpret visual and spatial information about objects and space



Agnosia



	Apperceptive	Associative
Object description	Affected	Spared
Visual identification	Affected	Affected
Copying drawing	Affected	Spared
Object matching	Affected	Spared
Object knowledge	Spared	Affected
Tactile naming	Spared	Affected

Alternate hand movement



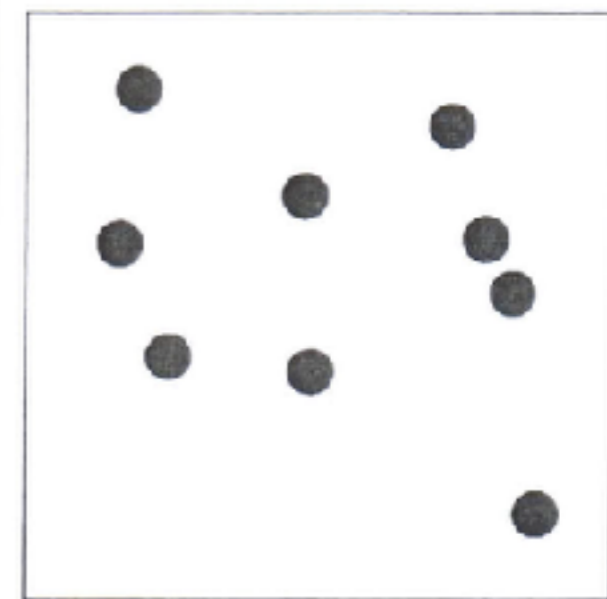
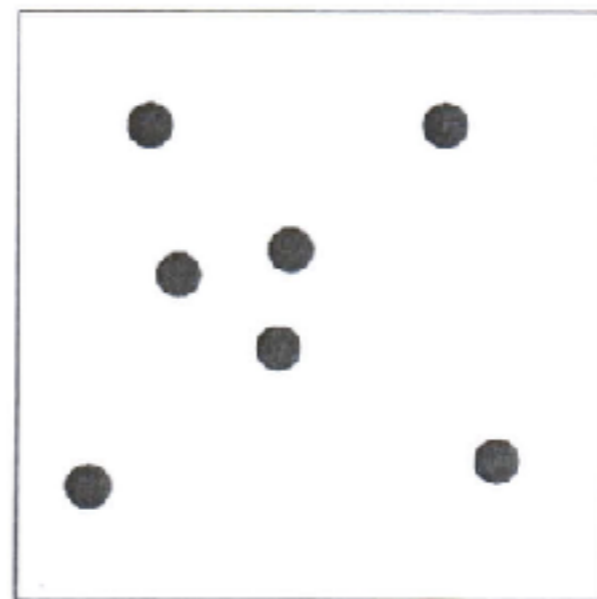
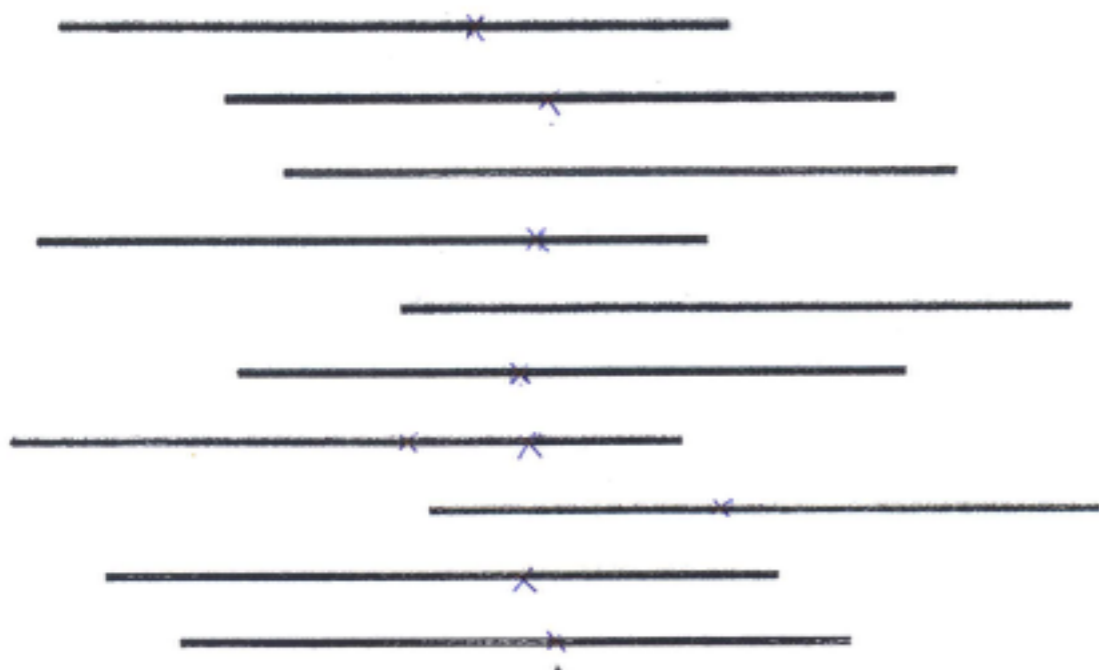
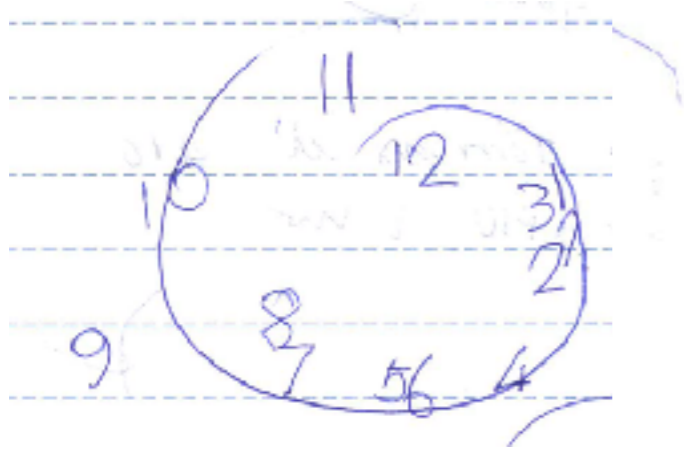
Visuos-perceptual assessment

Object recognition

Description of presented objects
Matching objects
Copy drawing objects
Verbal knowledge of objects
Tactile naming

Face recognition

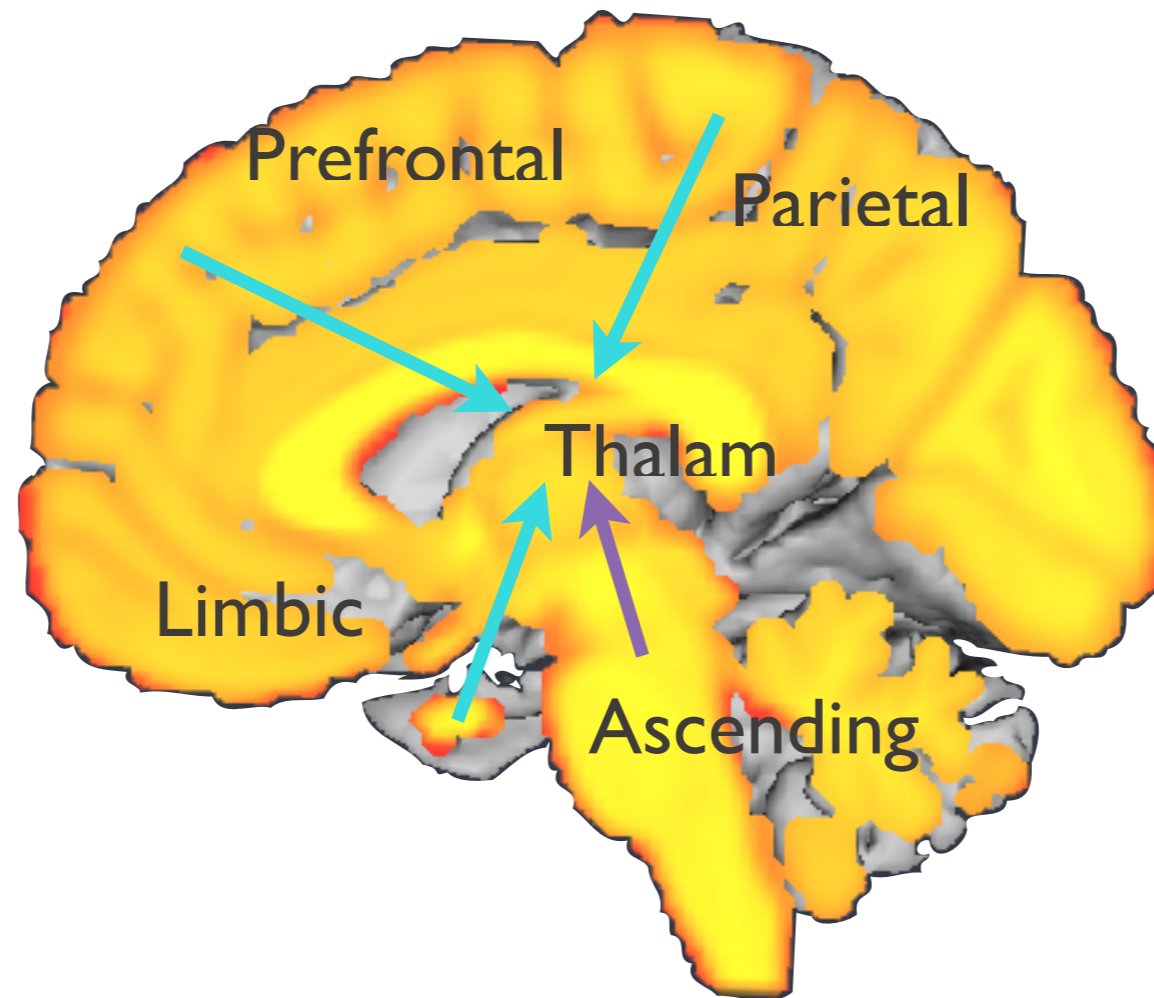
Famous face naming
Face matching
Face description



Attention

Attention and Awareness

Attention



Awareness

Orientation

Wakefulness

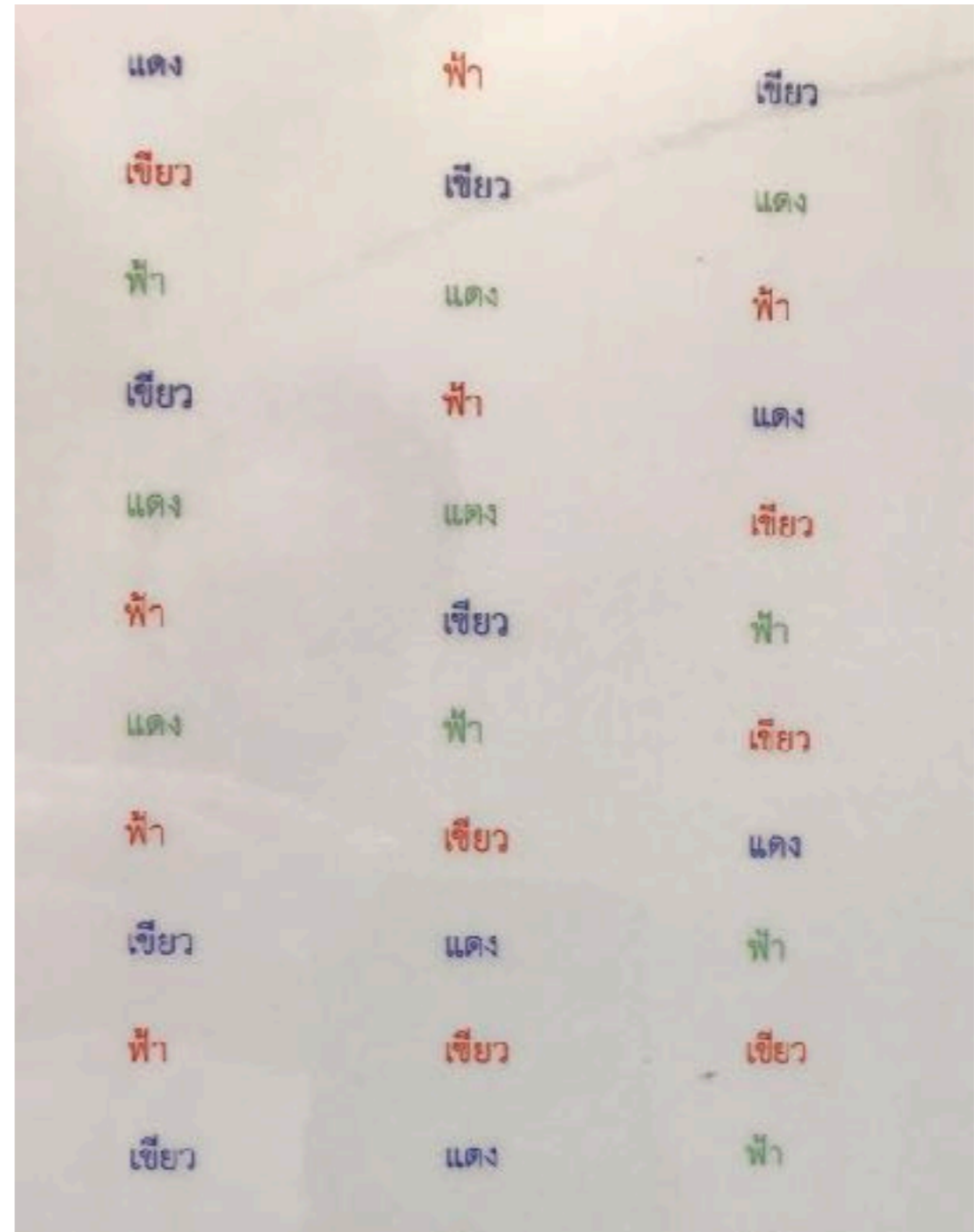
Attention assessments

- Digit span
- Day of the week
- Month of the year
- Serial 7 subtraction
- Stoop color

<i>Digits forwards</i>		<i>Digits backwards</i>	
9—7	2		
4—1	2		
4—8—1	3	6—2	2
6—3—2	3	1—9	2
6—4—3—9	4	2—8—3	3
7—2—8—6	4	4—1—5	3
4—2—7—3—1	5	3—2—7—9	4
7—5—8—3—6	5	4—9—6—8	4
6—1—9—4—7—3	6	1—5—2—8—6	5
3—9—2—4—8—7	6	6—1—8—4—3	5
5—9—1—7—4—2—3	7	5—3—9—4—1—8	6
4—1—7—9—3—8—6	7	7—2—4—8—5—6	6
5—8—1—9—2—6—4—7	8	8—1—2—9—3—6—5	7
3—8—2—9—5—1—7—4	8	4—7—3—9—1—2—8	7
Forward score	—	Backward score	—

Attention assessments

- Digit span
- Day of the week
- Month of the year
- Serial 7 subtraction
- Stoop color

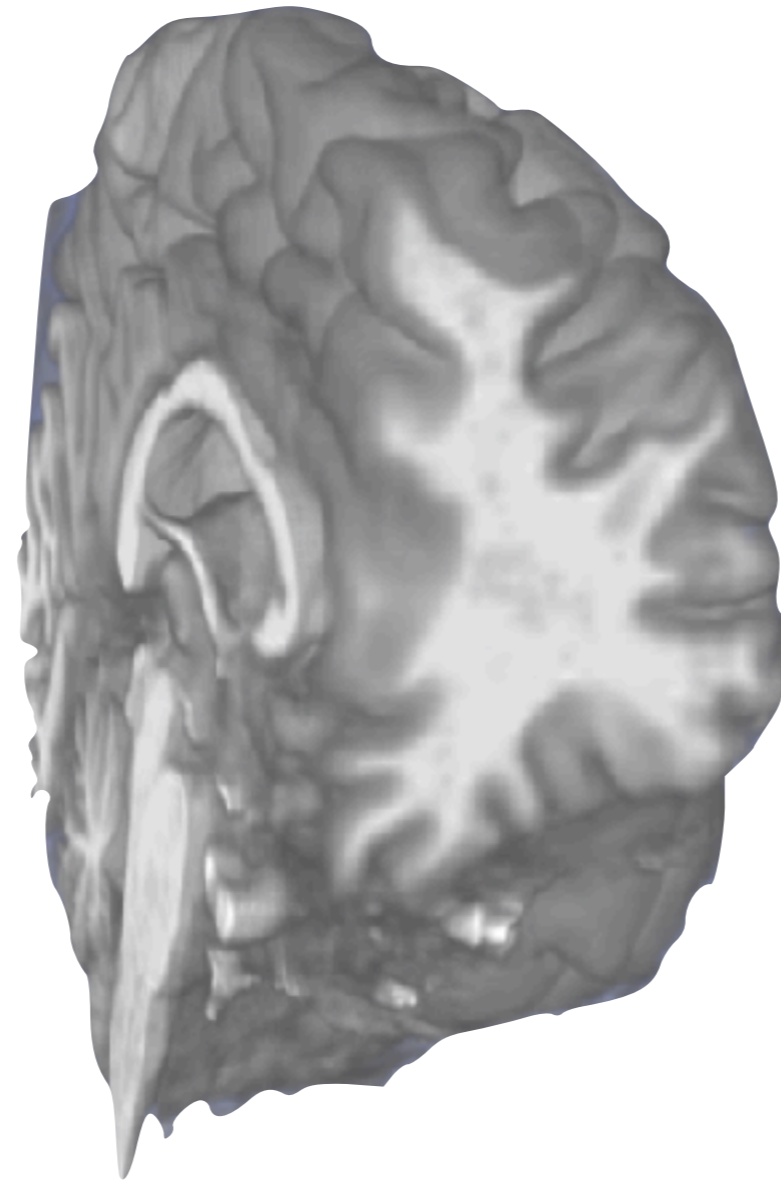


Orientation assessments

Time	Day of week	Place	Building
	Date		Floor
	Month		Town
	Season		County
	Year		Country

Social cognition
Behavioural symptoms

Frontal lobe syndrome



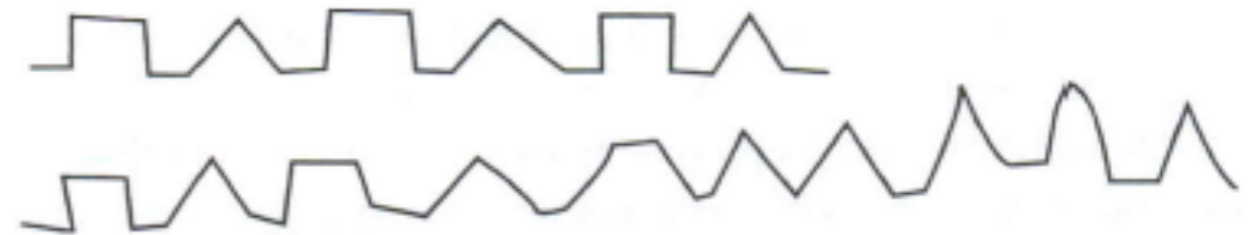
Medial frontal
Apathy

Dorsolateral frontal
Dysexecutive

Inferior frontal
Disinhibition

Inhibition

- Luria's three-step test
- Alternate hands movement
- Go-No-GO
- Copy alternate sequence



Frontal lobe releasing signs

- Grasping reflex
- Palmomentental reflex
- Glabella tap
- Snouting reflex
- Rooting reflex