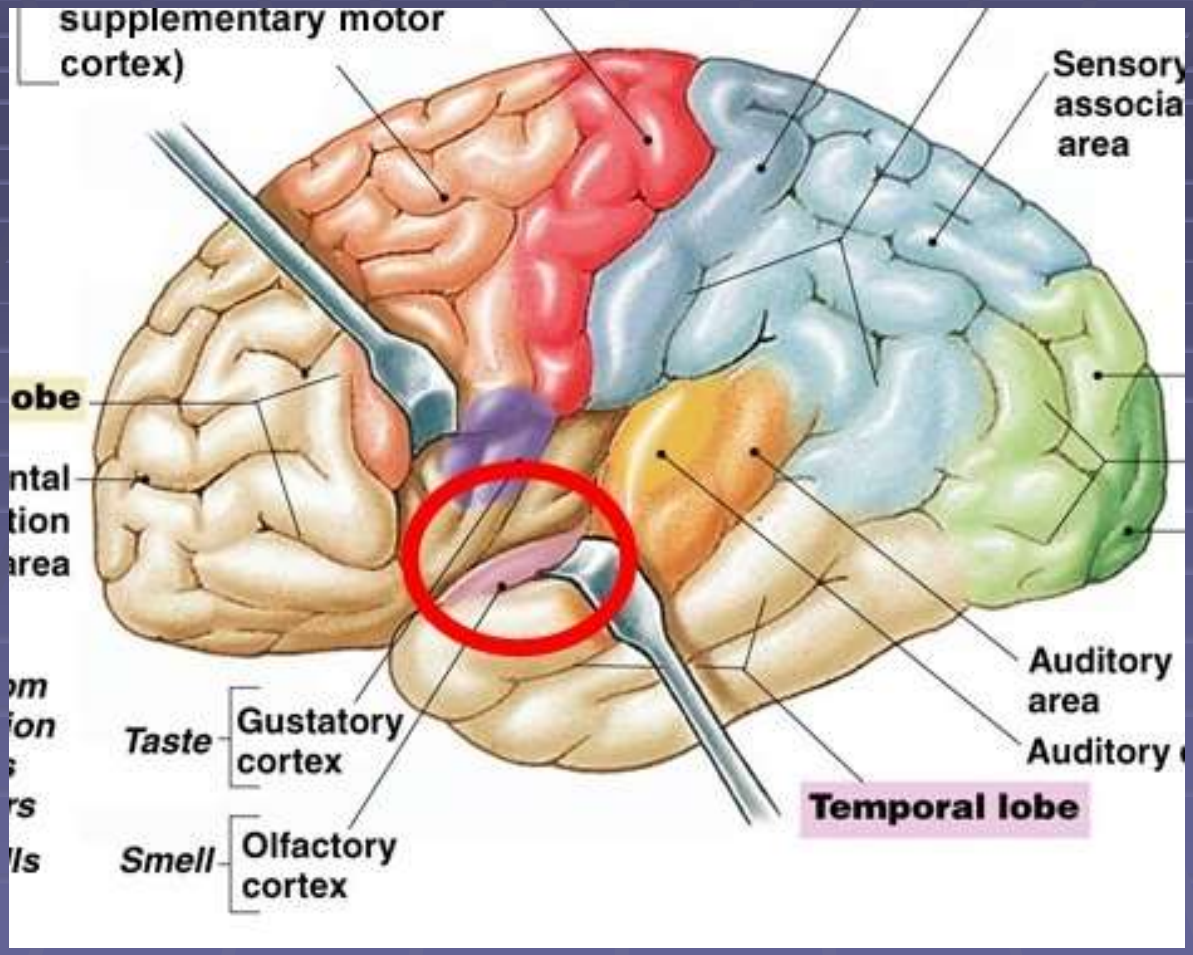
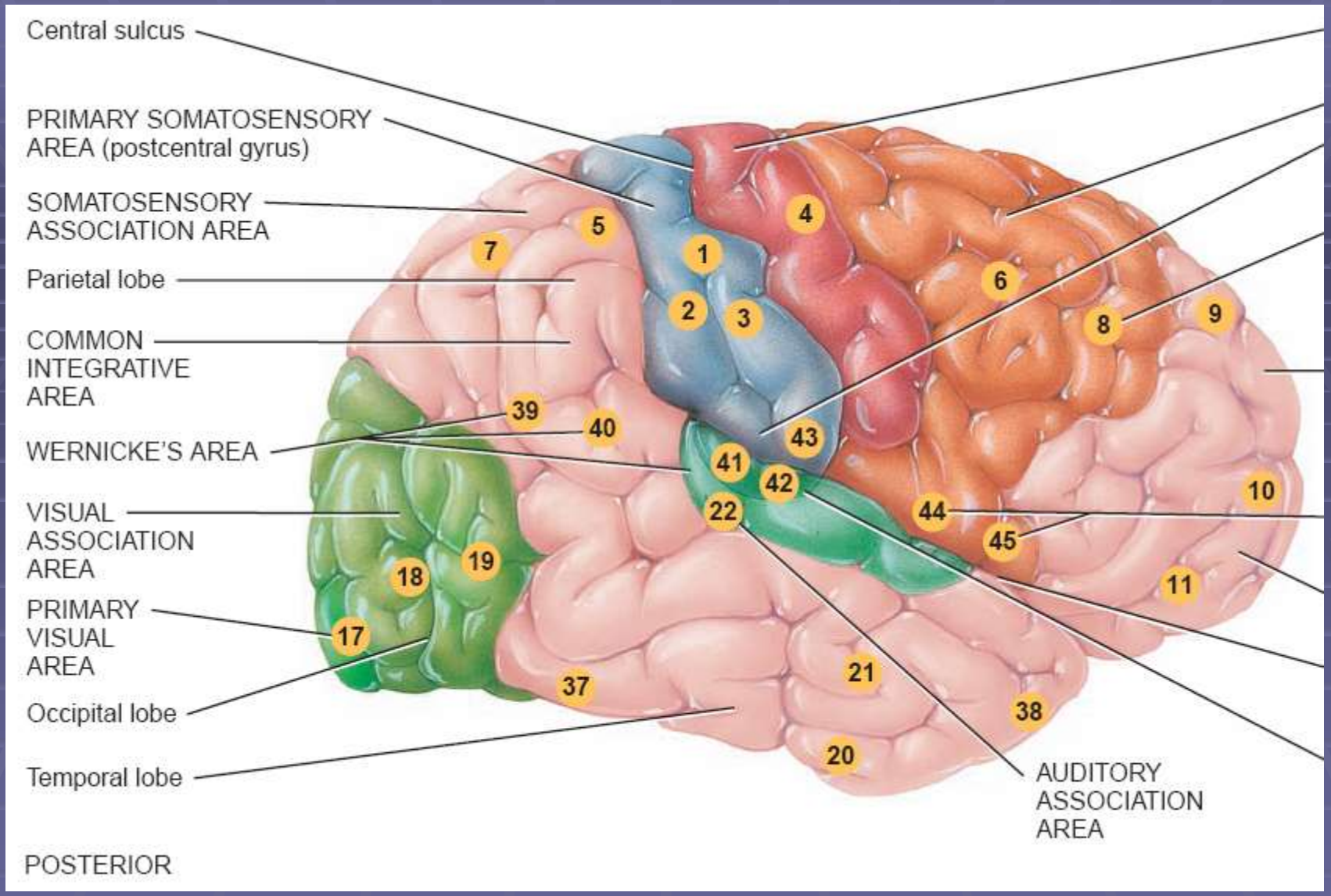
Agnosia and Apraxia

Olfactory cortex

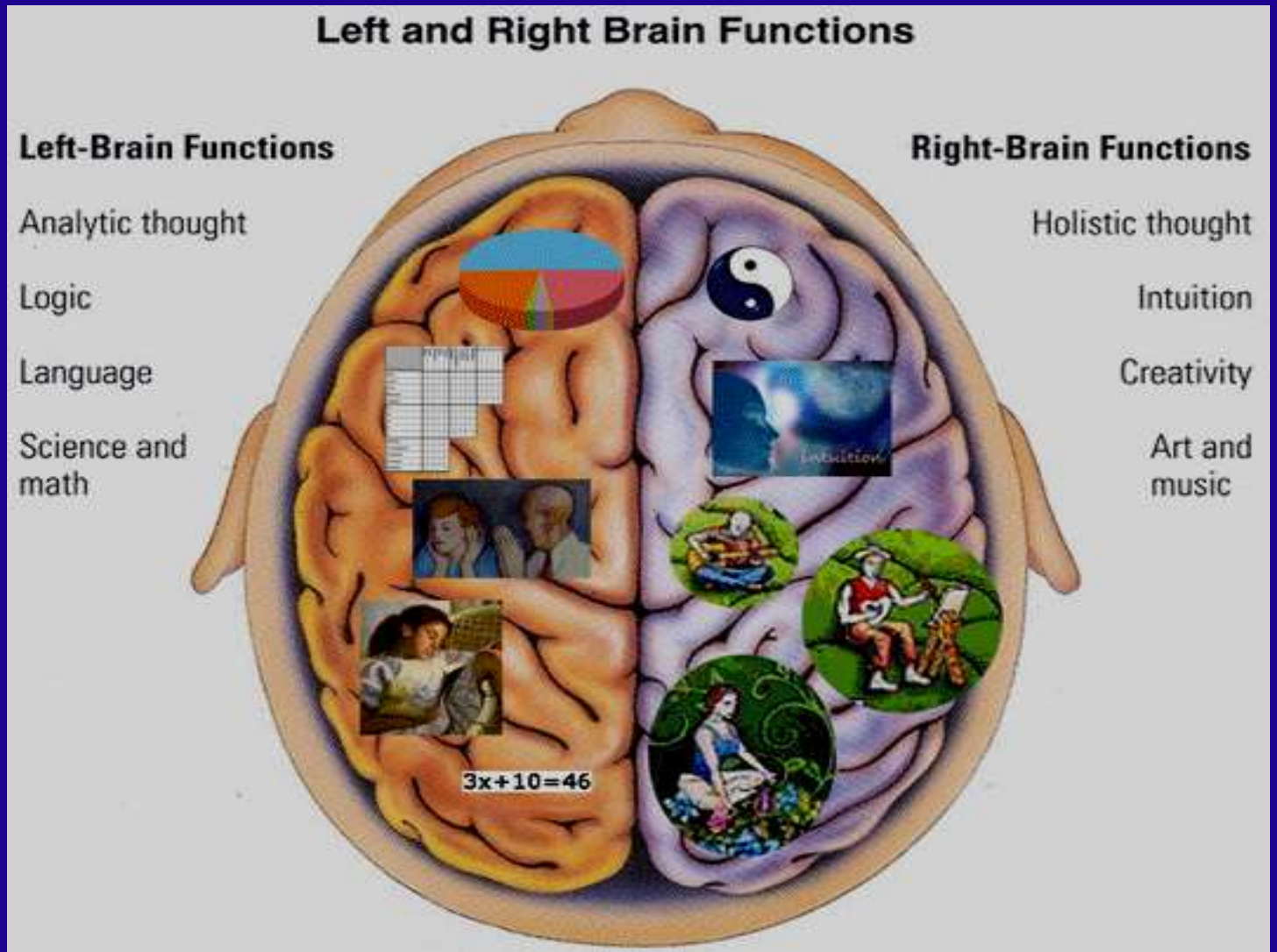


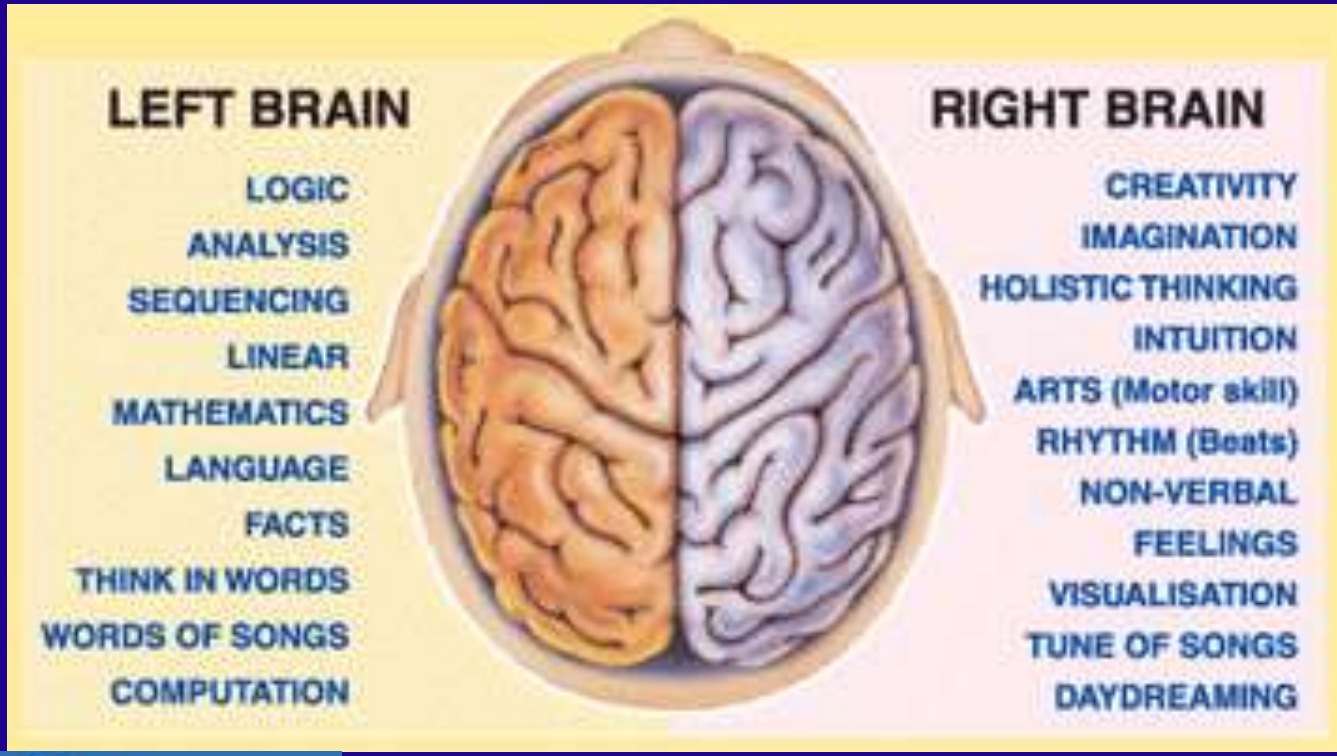
- Inferior and medial surface of temporal lobe

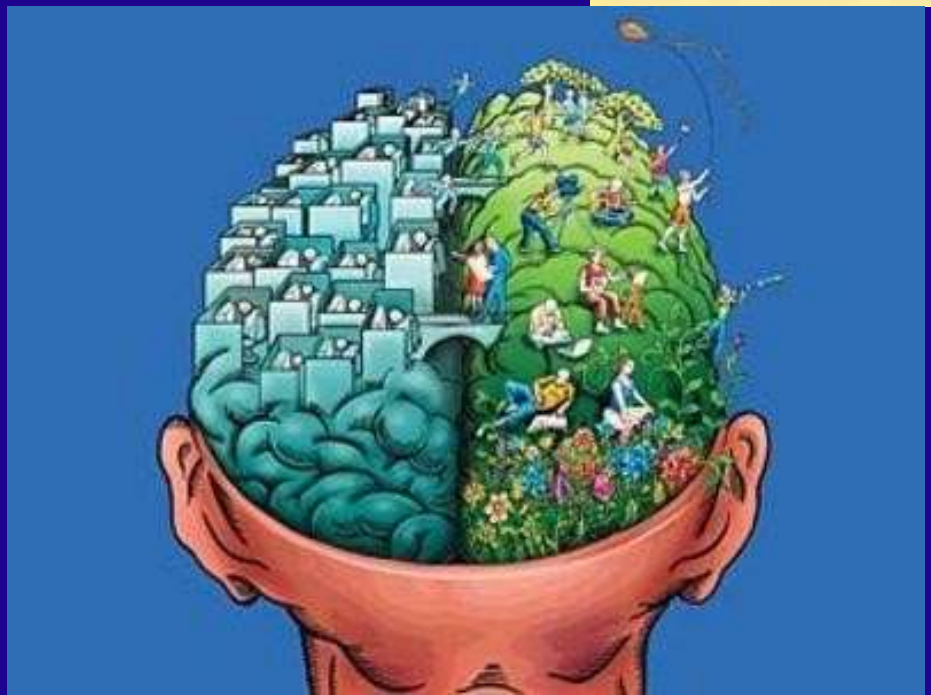


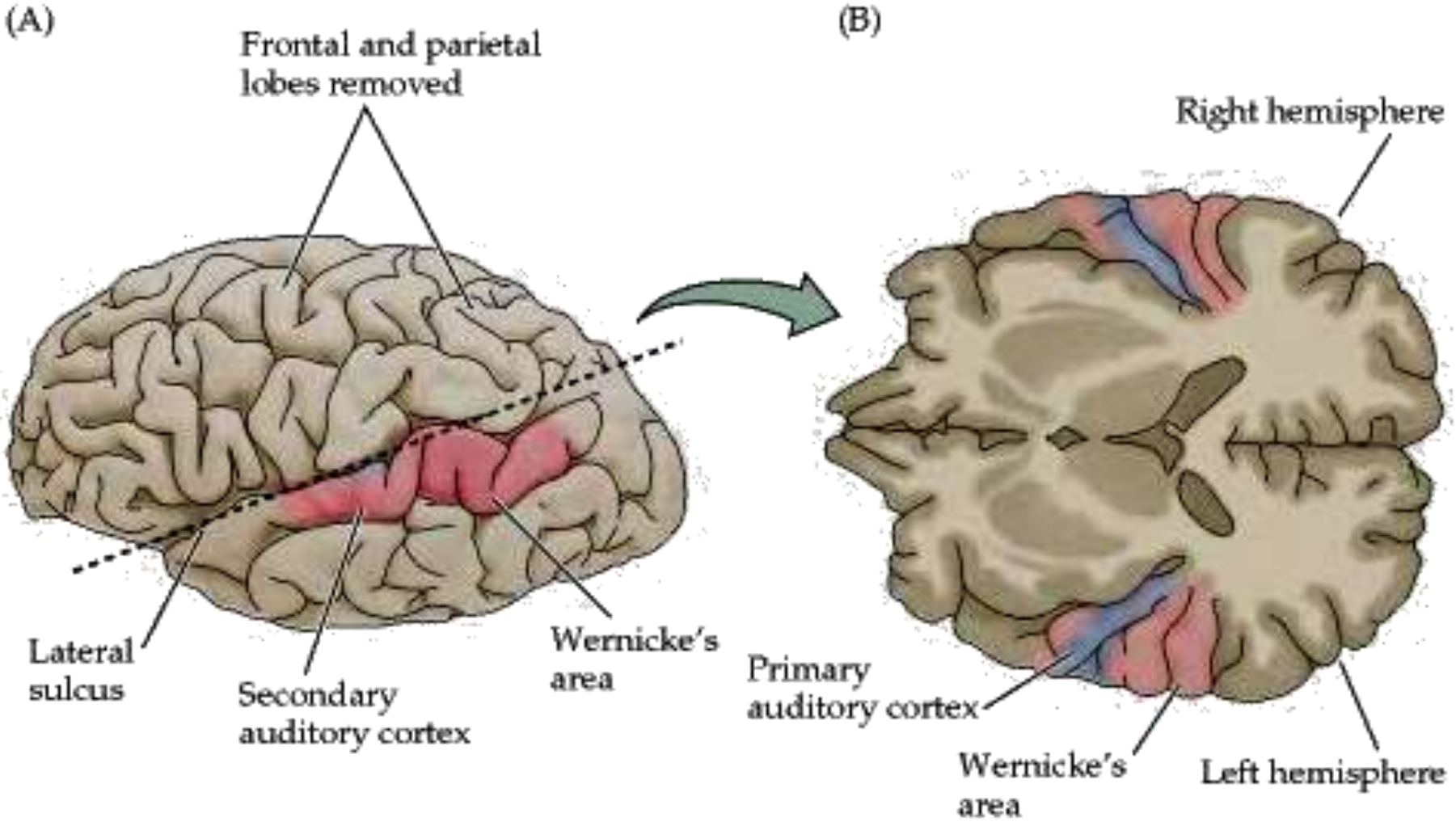
- Orbitofrontal cortex : one of olfactory association cortex.
  - Odors identification (right side)

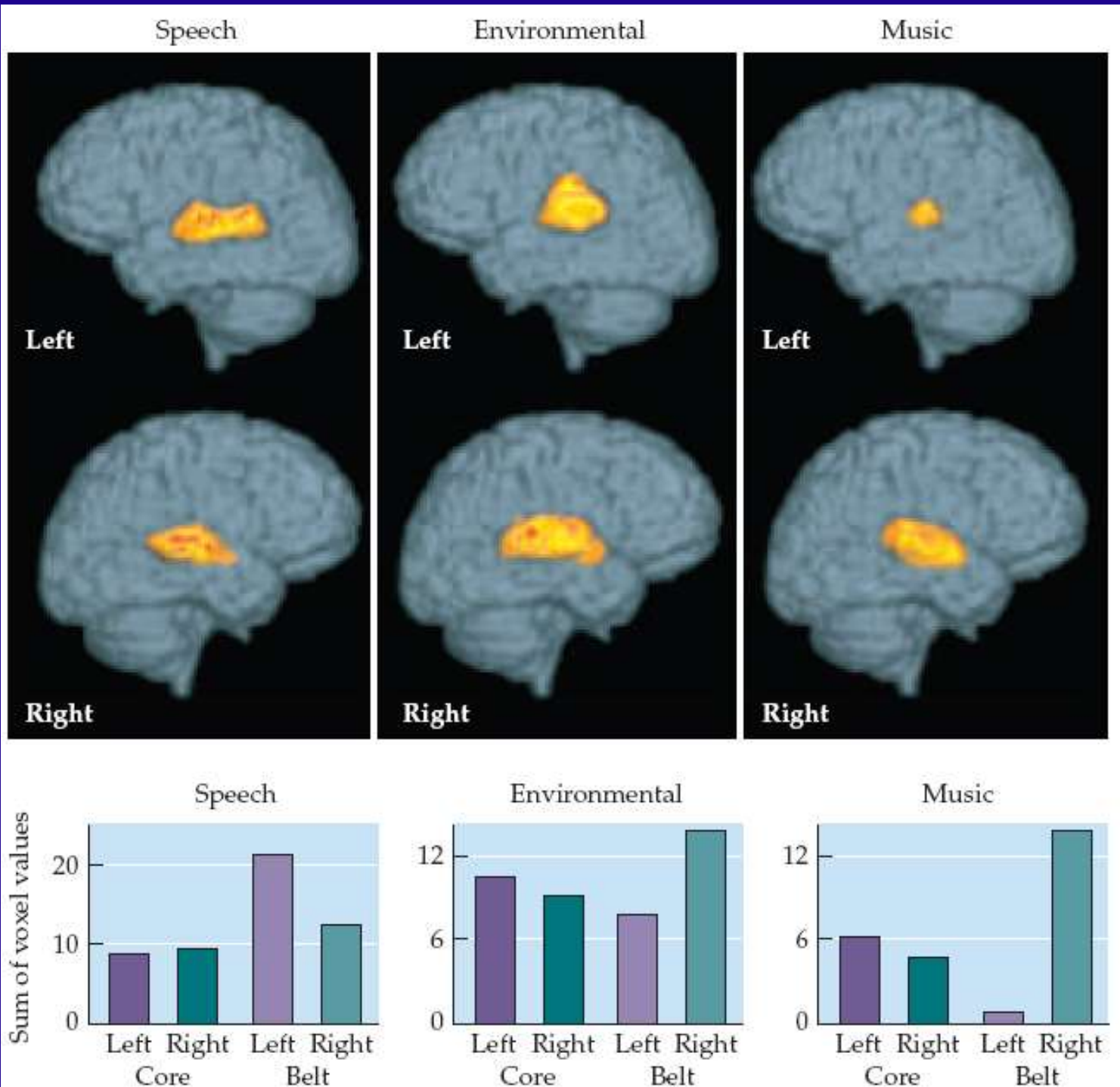
Brain and higher cortical functions




LEFT BRAIN
LOGIC
ANALYSIS
SEQUENCING
LINEAR
MATHEMATICS
LANGUAGE
FACTS
THINK IN WORDS
WORDS OF SONGS
COMPUTATION
RIGHT BRAIN
CREATIVITY
IMAGINATION
HOLISTIC THINKING
INTUITION
ARTS (Motor skill)
RHYTHM (Beats)
NON-VERBAL
FEELINGS
VISUALISATION
TUNE OF SONGS
DAYDREAMING




(A)
Frontal and parietal lobes removed
Lateral sulcus
Secondary auditory cortex
Wernicke's area
(B)
Right hemisphere
Primary auditory cortex
Wernicke's area
Left hemisphere


Speech
Environmental
Music
Left
Right
Left
Right
Left
Right
Speech
Environmental
Music
Sum of voxel values
20
10
0
12
6
0
12
6
0
Left Right Left Right
Core Belt
Left Right Left Right
Core Belt
Left Right Left Right
Core Belt

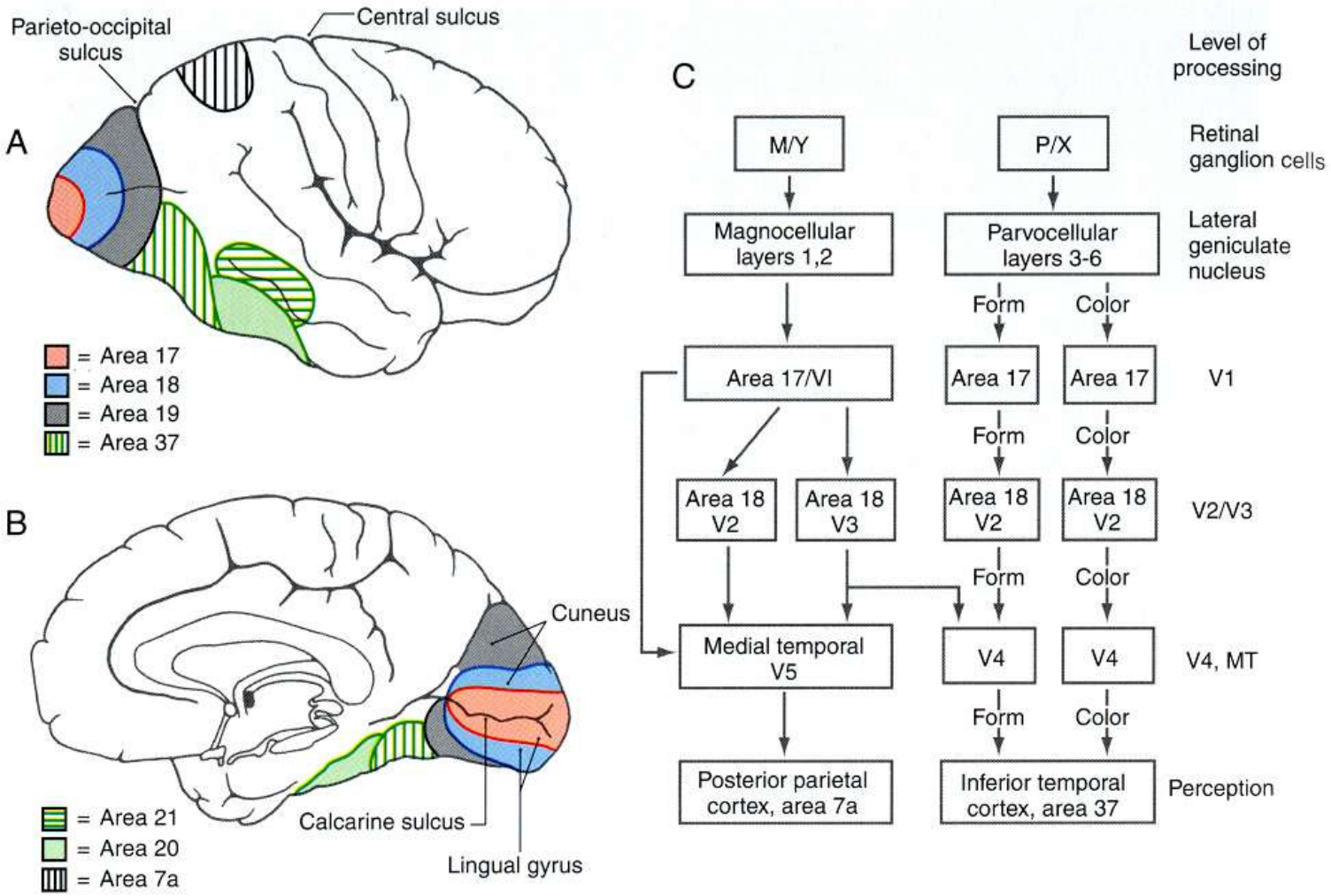
Video

Cortical processing

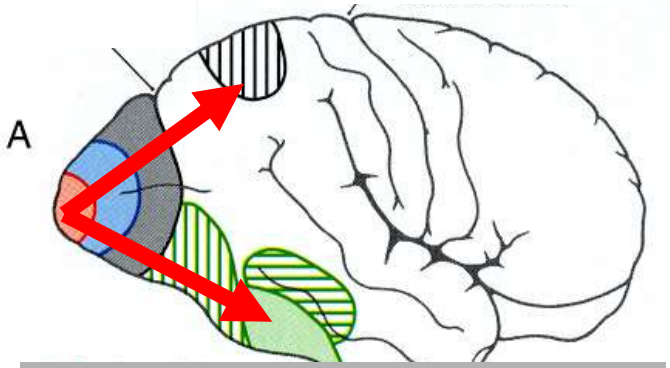
- Parallel
- Continues

Cortical processing

Visual processing as example

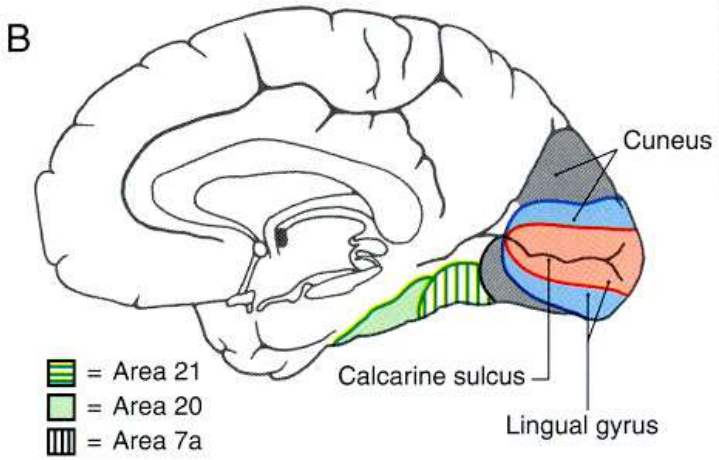

A
Parieto-occipital sulcus
Central sulcus
= Area 17
= Area 18
= Area 19
= Area 37
B
Cuneus
= Area 21
= Area 20
= Area 7a
Calcarine sulcus
Lingual gyrus
C
Level of processing
M/Y
P/X
Retinal ganglion cells
Magnocellular layers 1,2
Parvocellular layers 3-6
Lateral geniculate nucleus
Form
Color
Area 17/VI
Area 17
Area 17
V1
Area 18 V2
Area 18 V3
Area 18 V2
Area 18 V2
V2/V3
Medial temporal V5
V4
V4
V4, MT
Posterior parietal cortex, area 7a
Inferior temporal cortex, area 37
Perception

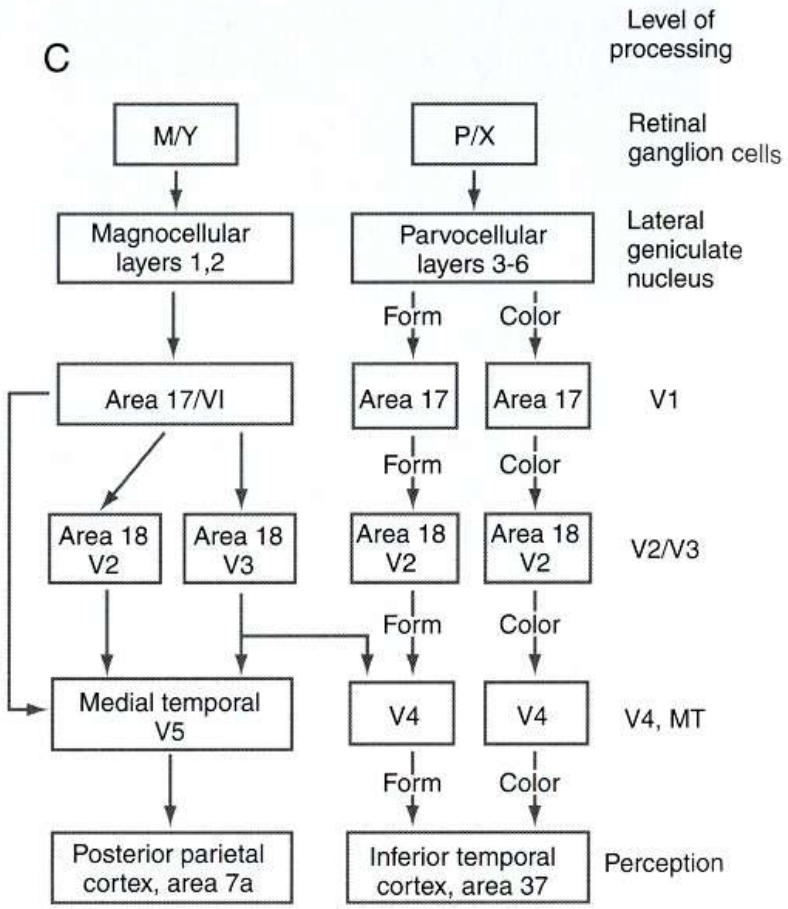
Dorsal “Where” pathway

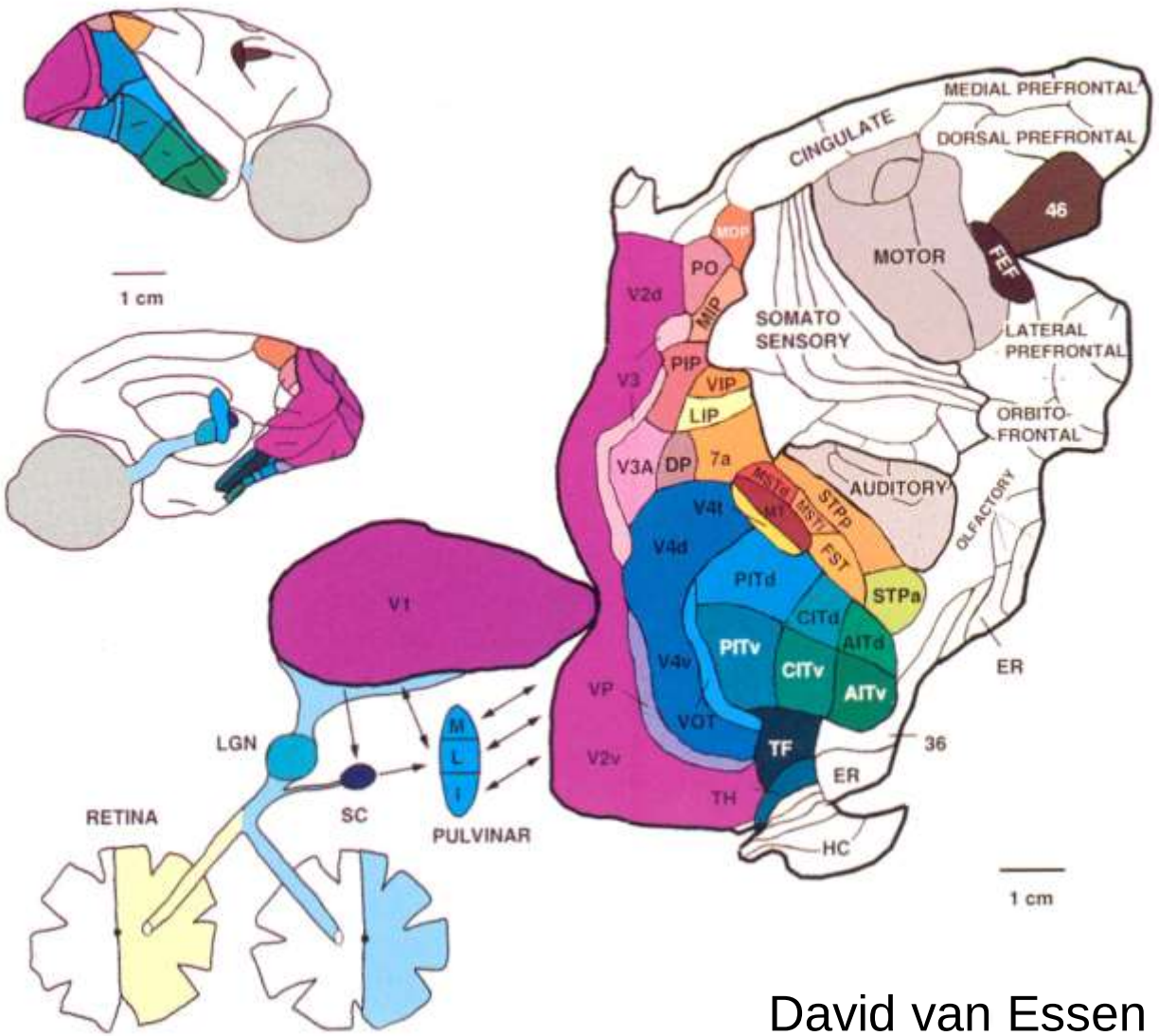


Ventral “What” pathway

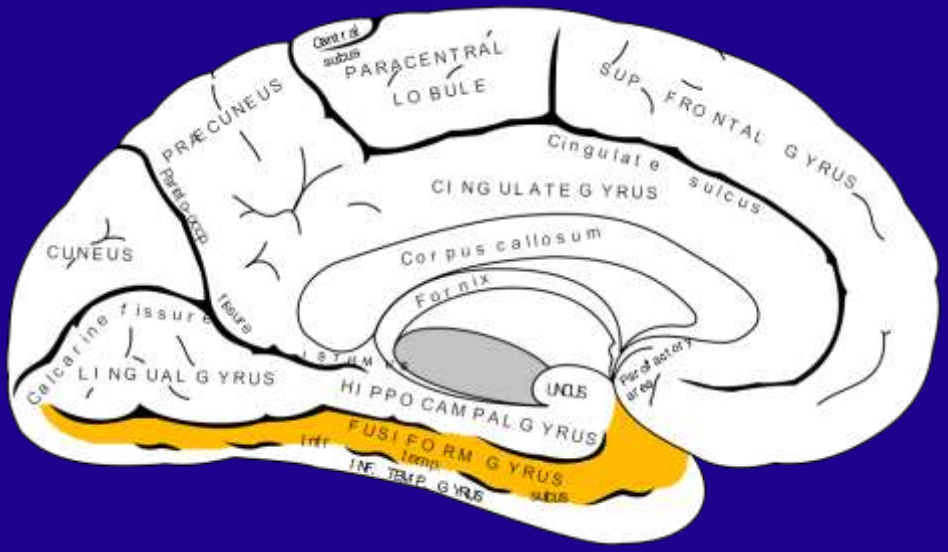
= Area 37

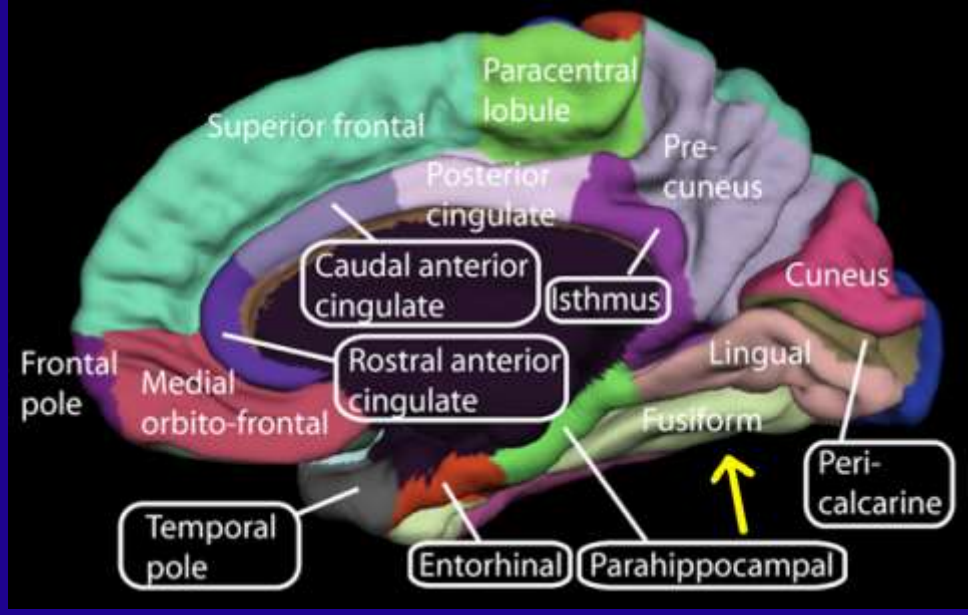


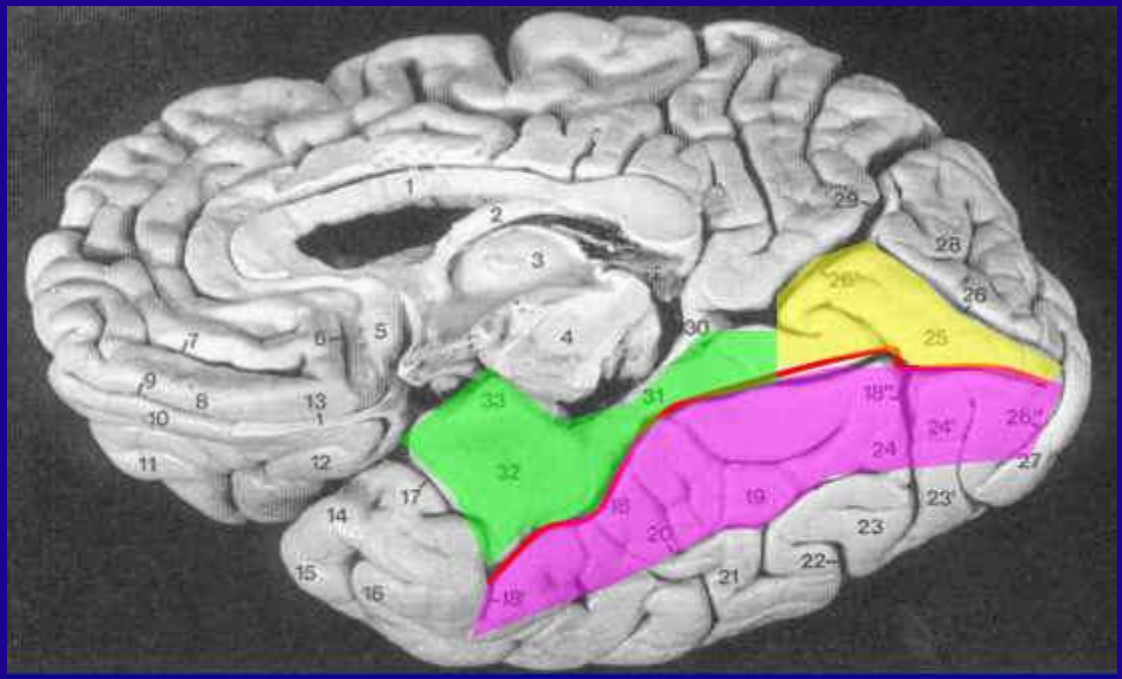


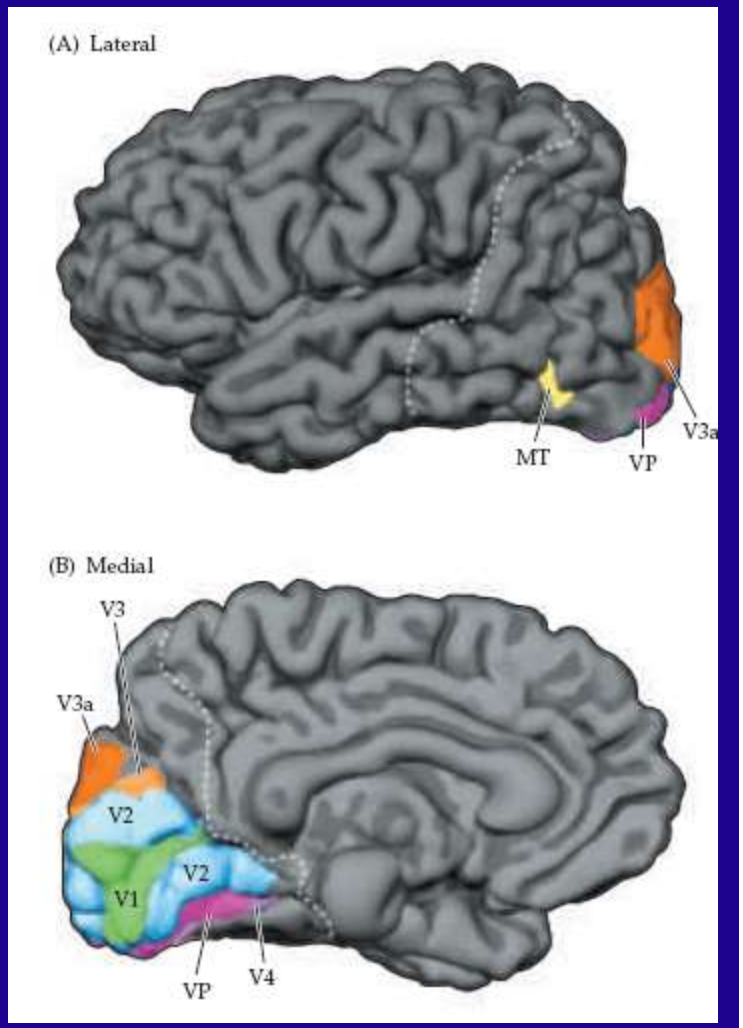


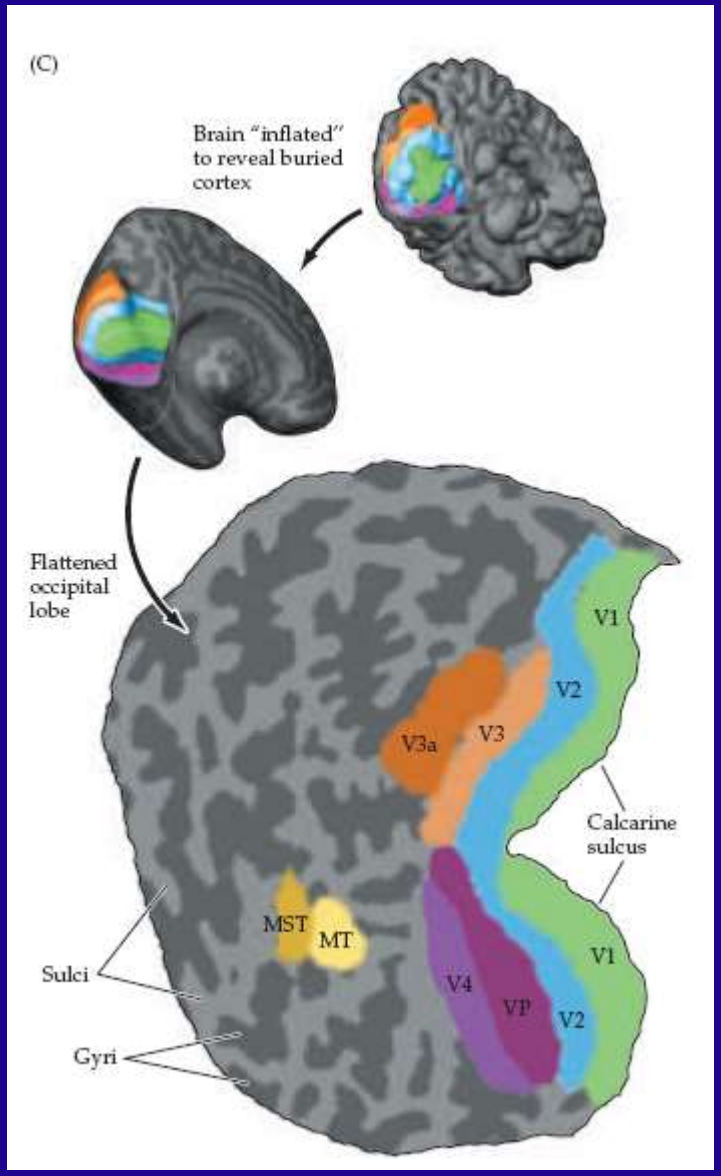
David van Essen

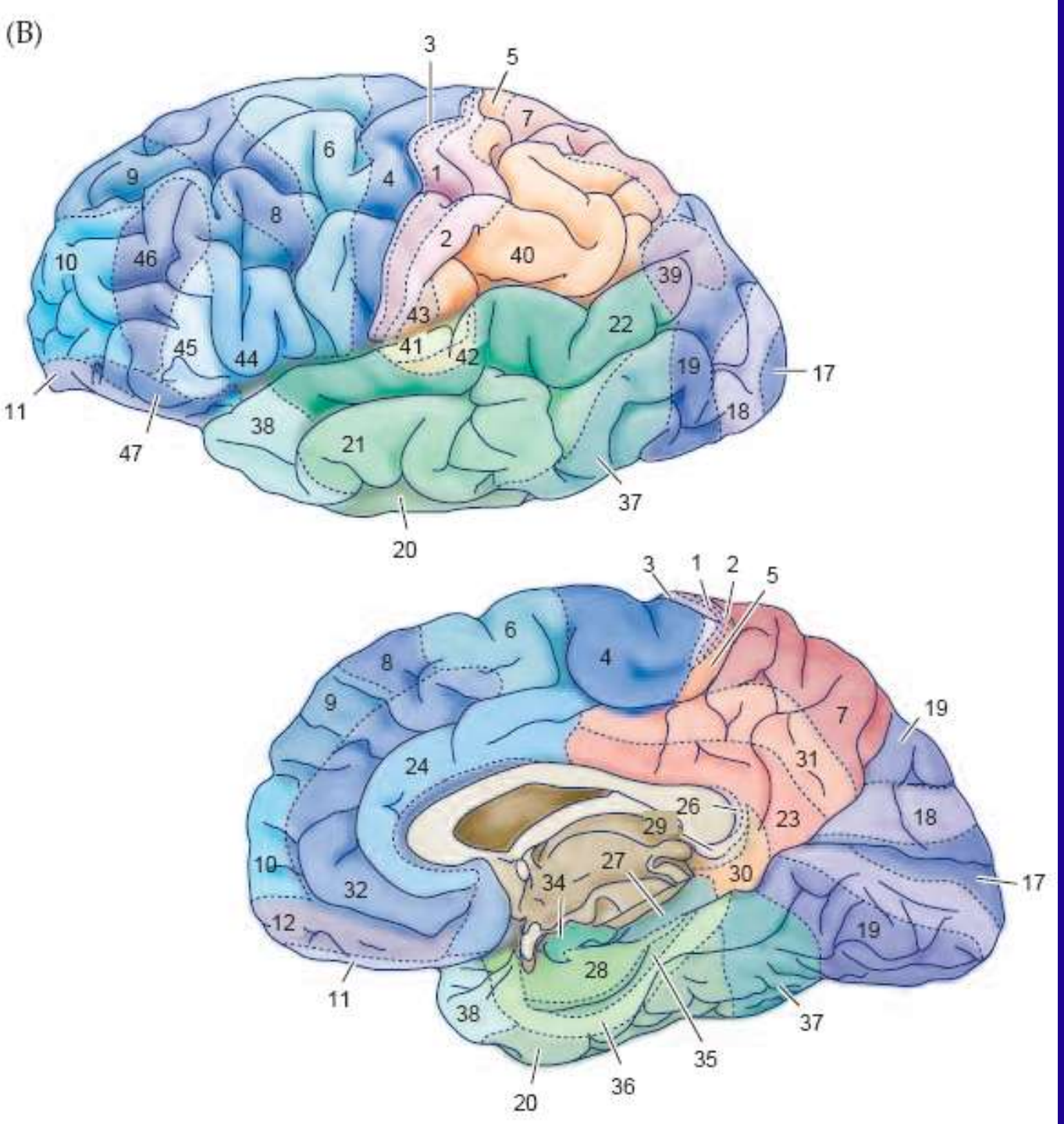

PARACENTRAL LOBULE
SUP. FRONTAL GYRUS
PRÆCUNEUS
Cingulate sulcus
CINGULATE GYRUS
CUNEUS
Corpus callosum
Fornix
Calcarine fissure
LINGUAL GYRUS
HIPPOCAMPAL GYRUS
FUSIFORM GYRUS


Paracentral lobule
Superior frontal
Pre-cuneus
Posterior cingulate
Caudal anterior cingulate
Isthmus
Cuneus
Frontal pole
Medial orbito-frontal
Rostral anterior cingulate
Lingual
Fusiform
Peri-calcarine
Temporal pole
Entorhinal
Parahippocampal

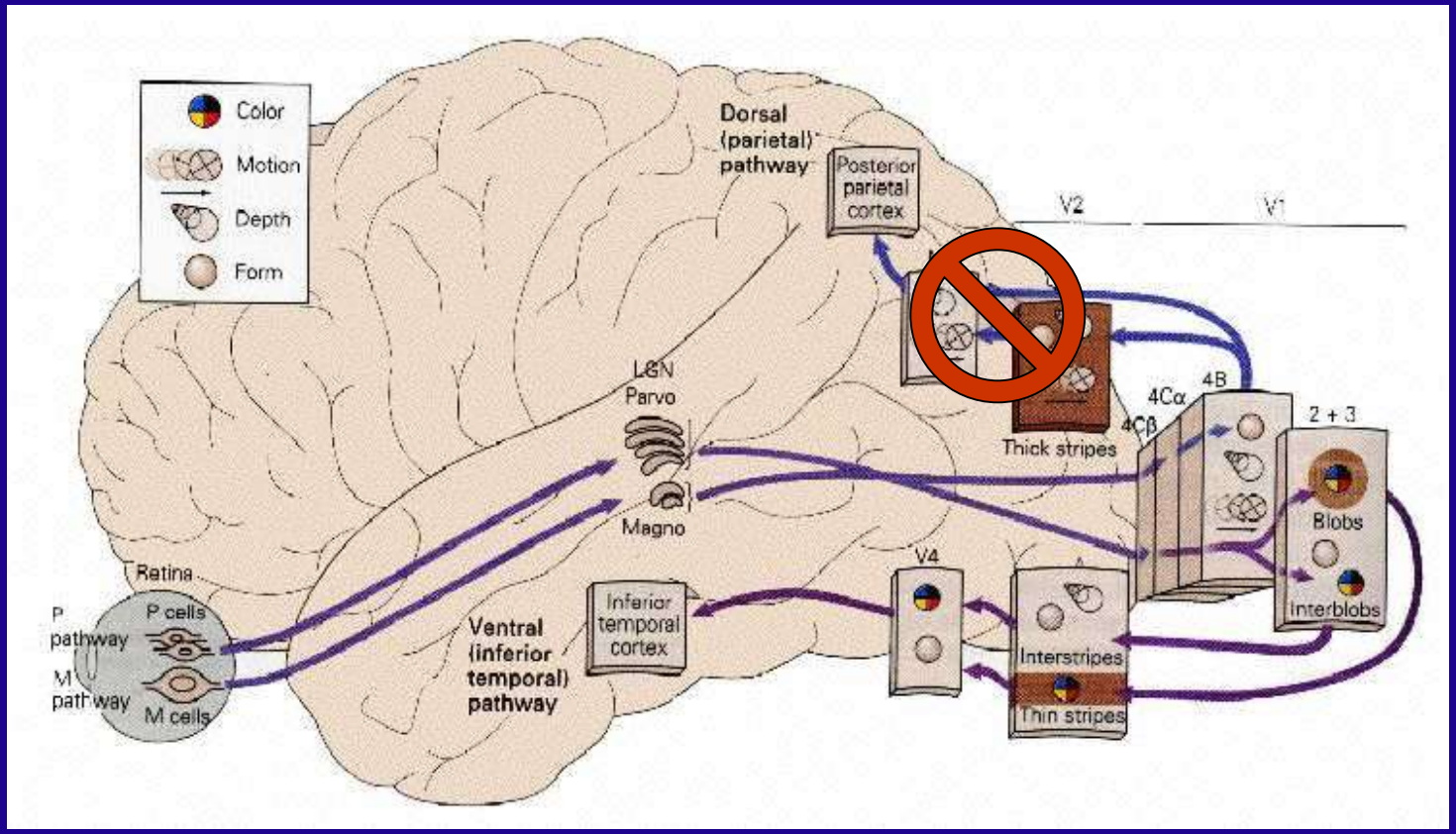



(A) Lateral
MT
VP
V3a
(B) Medial
V3
V3a
V2
V2
V1
VP
V4

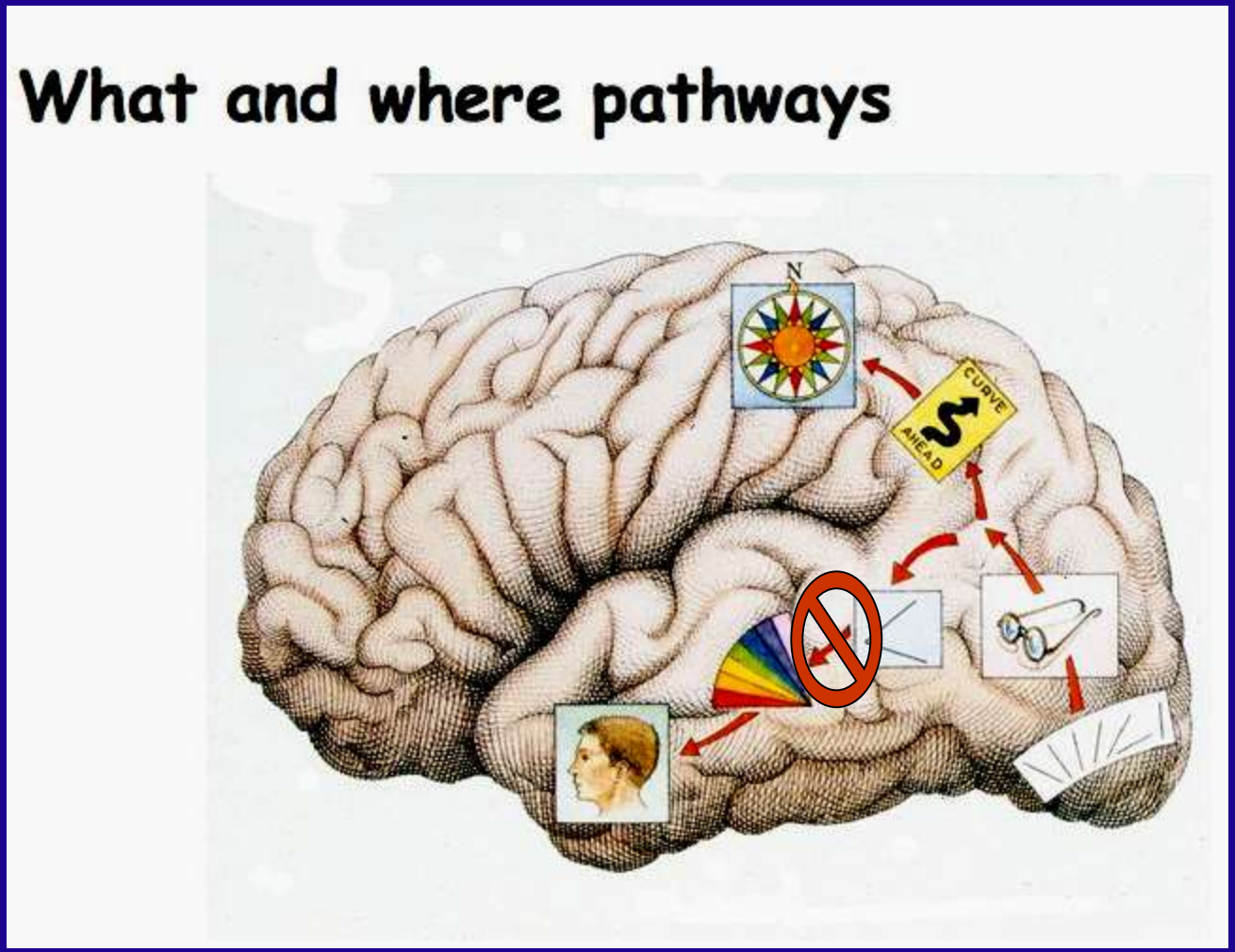

(C)
Brain "inflated" to reveal buried cortex
Flattened occipital lobe
V1
V2
V3a
V3
Calcarine sulcus
MST
MT
Sulci
V4
VP
V1
V2
Gyri


(B)
3
5
7
6
9
4
1
8
2
40
10
46
39
43
22
45
41
42
44
19
17
11
18
38
21
47
37
20
3
1
2
5
6
8
4
9
7
19
24
31
26
23
18
29
10
27
30
34
17
32
12
19
28
11
38
37
35
36
20

Visual processing of information

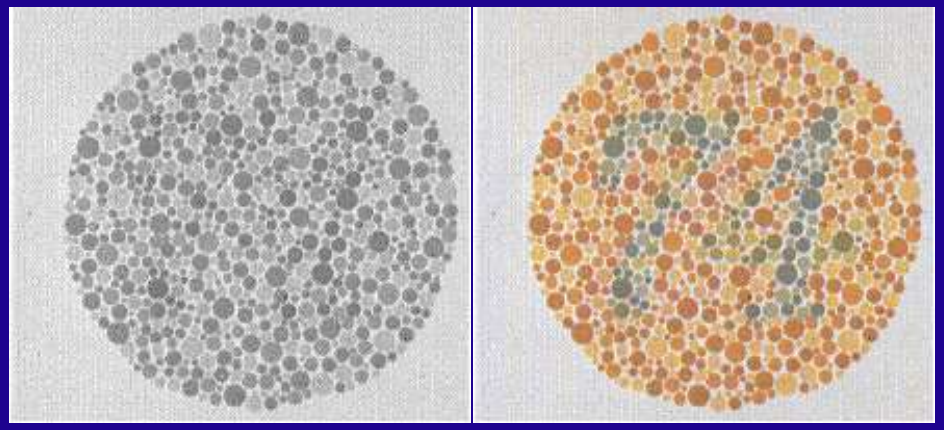

Color
Motion
Depth
Form
Dorsal (parietal) pathway
Posterior parietal cortex
V2
V1
L&N
Parvo
Magno
Thick stripes
4Cα
4Cβ
4B
2 + 3
Blobs
Interblobs
Interstripes
Thin stripes
V4
Inferior temporal cortex
Ventral (inferior temporal) pathway
Retina
P cells
M cells
P pathway
M pathway

Damage to “What” pathway



Achromatopsia, agnosia

Achromatopsia



- **Complete achromatopsia-** BL area V4: Lingual/fusiform gyri/occipitotemporal junction

Color agnosia

- **Color agnosia**: loss the ability to retrieve color knowledge
- cannot name colors for objects but can sort
- Cant /Remembering the color of object “even by none verbal way” , like painting pumpkin orange or apple red
- Cant /Color composition

Left or bilateral occipitotemporal region Inferior temporal , fusiform and right lingual

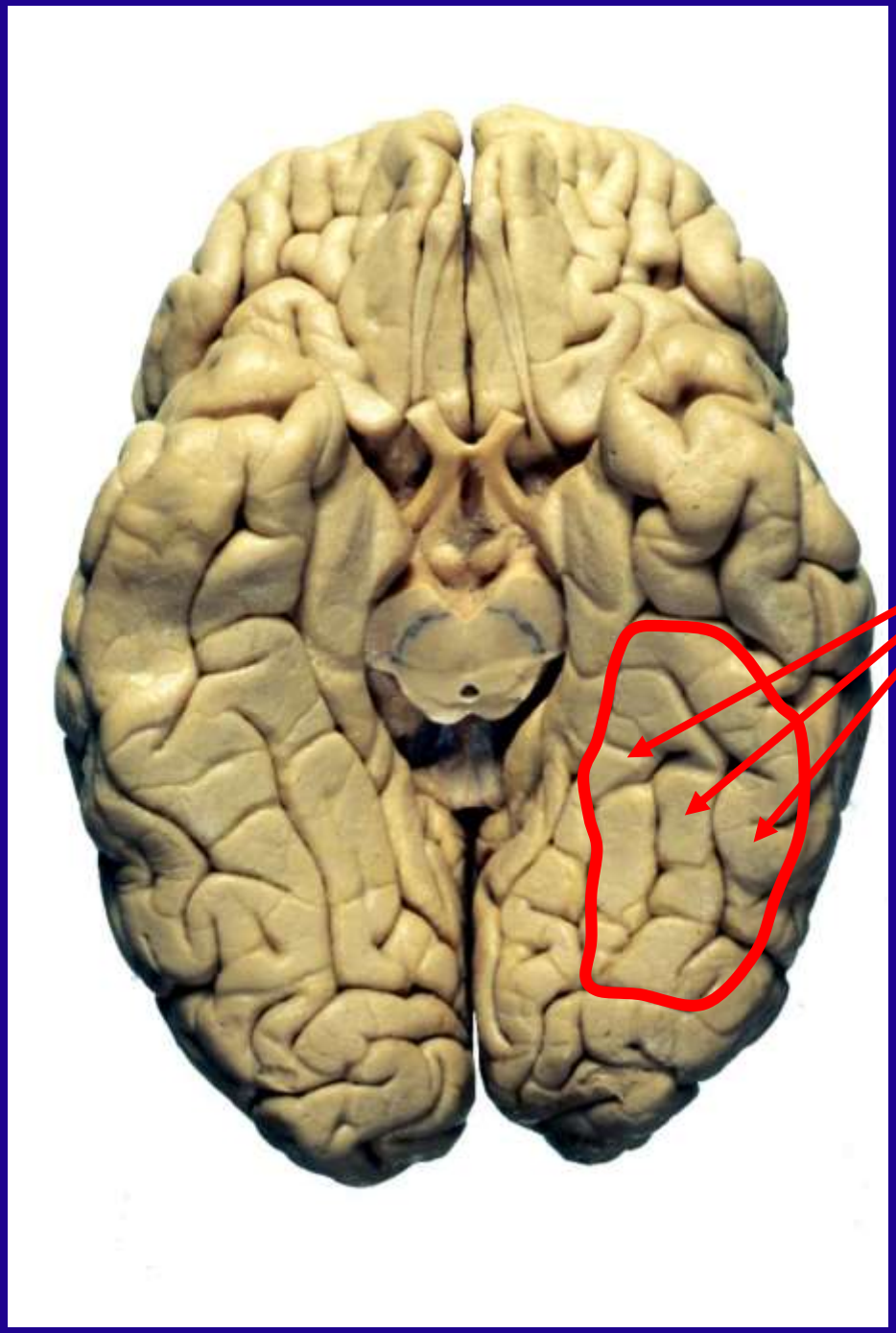
Color anomia

- Inability to name colors or to point to colors given their names, which is not due to aphasia or due to defective color perception

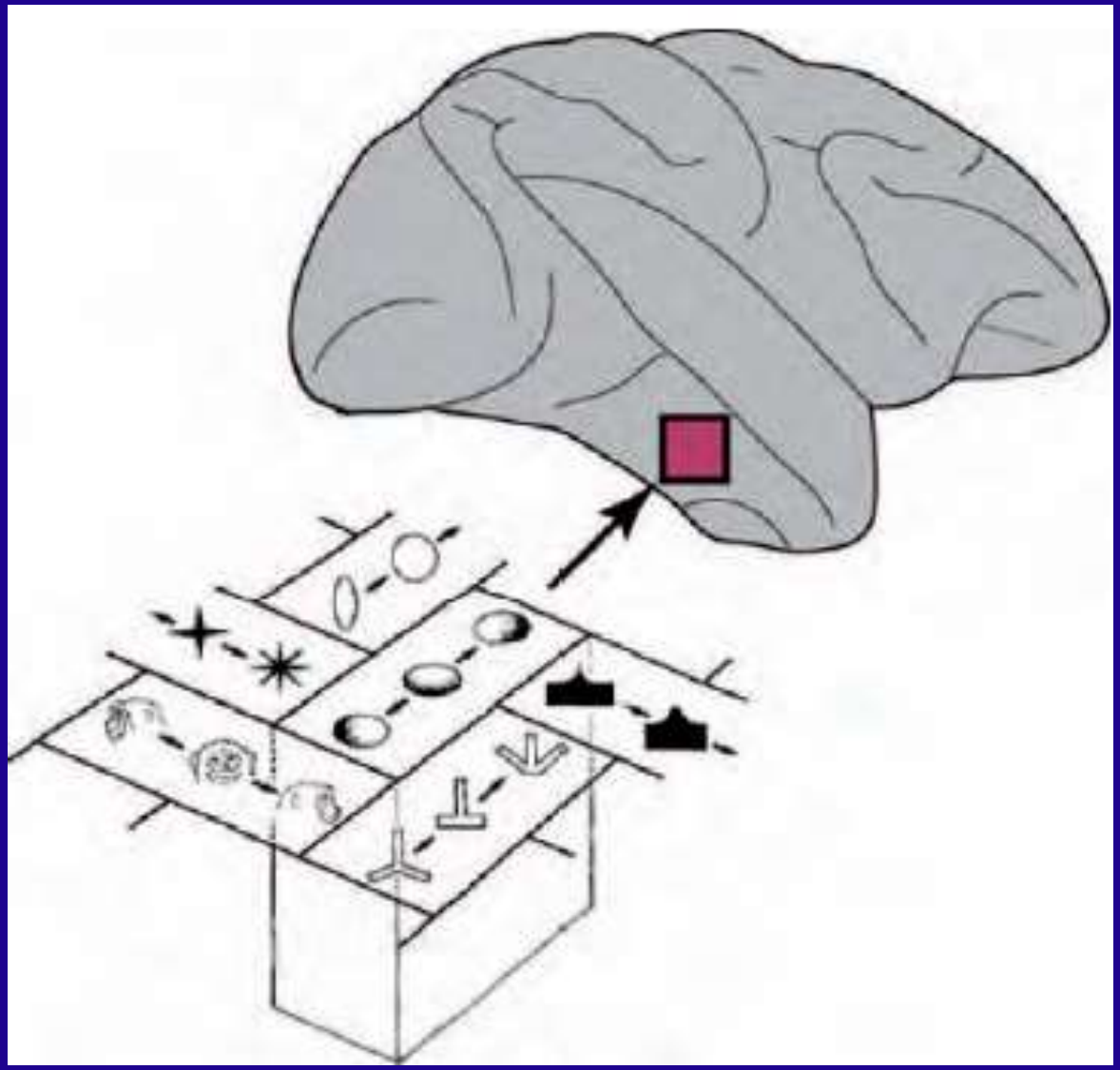
- Usually associated with *left mesial occipitotempora*l region
- hence usually affect the visual cortex or optic rediation leading to right hemianopia , and also associated with alexia

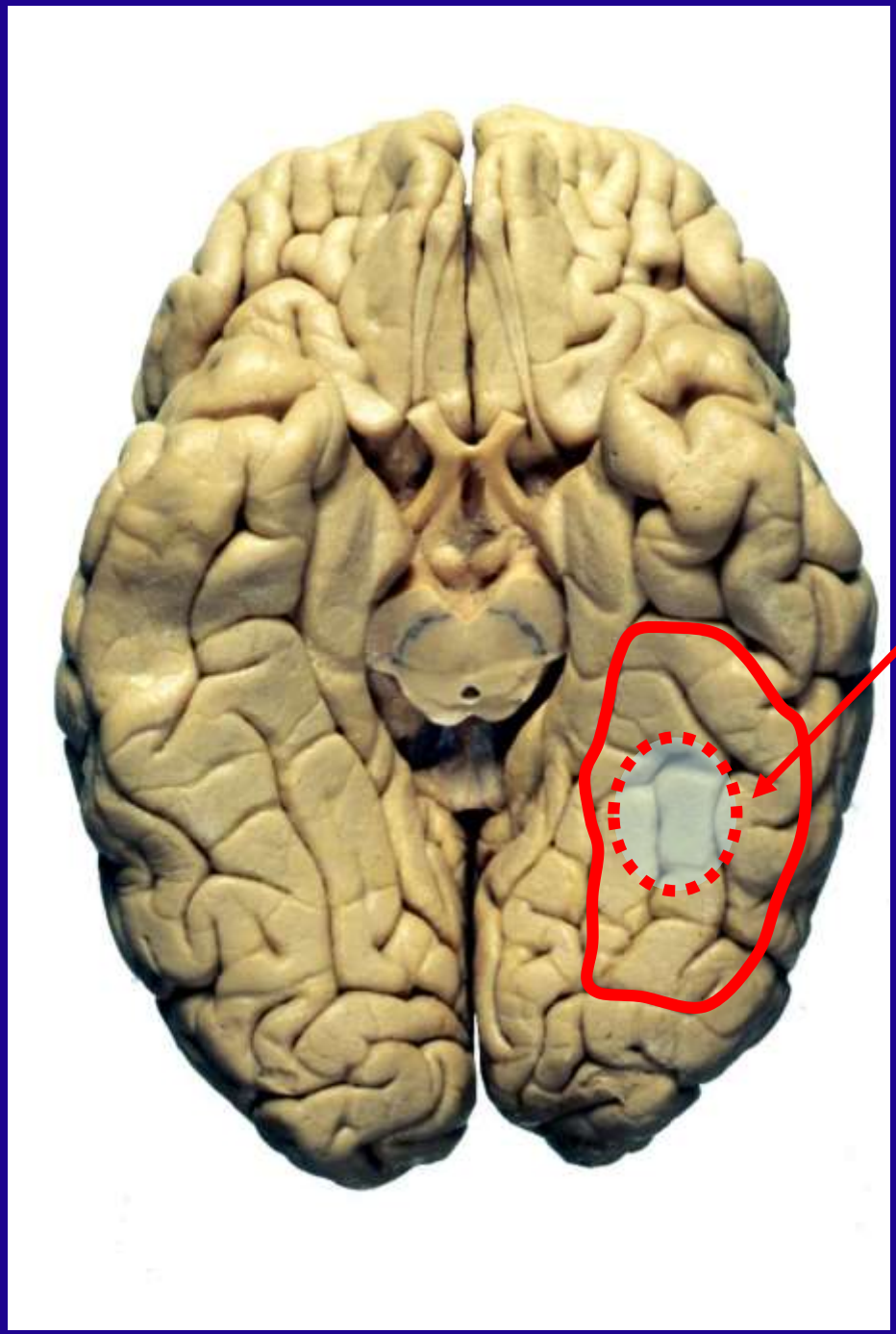
The Neural Basis of Visual Perception

- Visual agnosia is the inability to recognize objects despite satisfactory vision.
  - Caused by damage to the pattern pathway usually in the temporal cortex.
  - For words : Alexia
  - Left (dominant lobe) fusiform/lingual areas

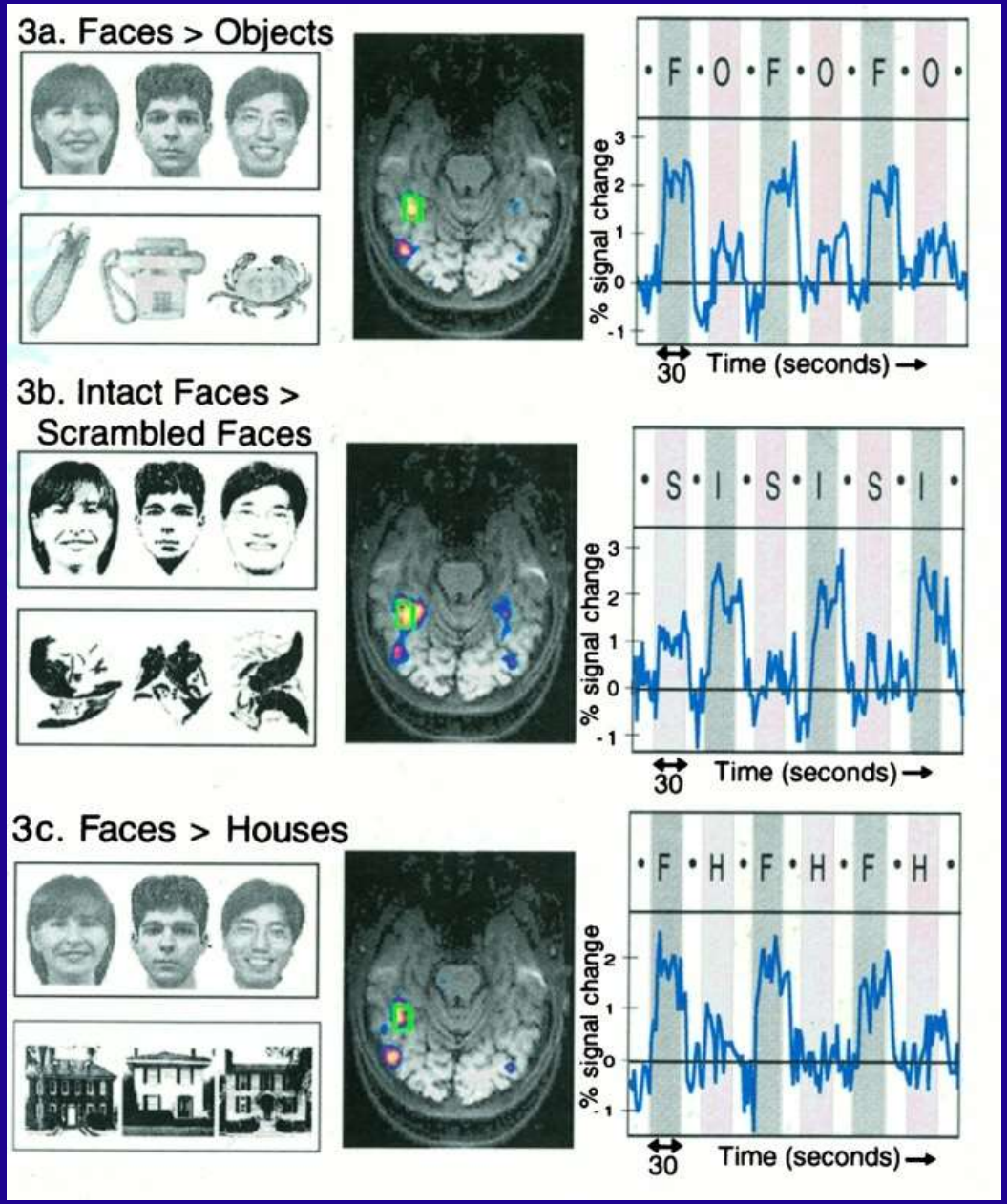


Occipitotemporal gyri

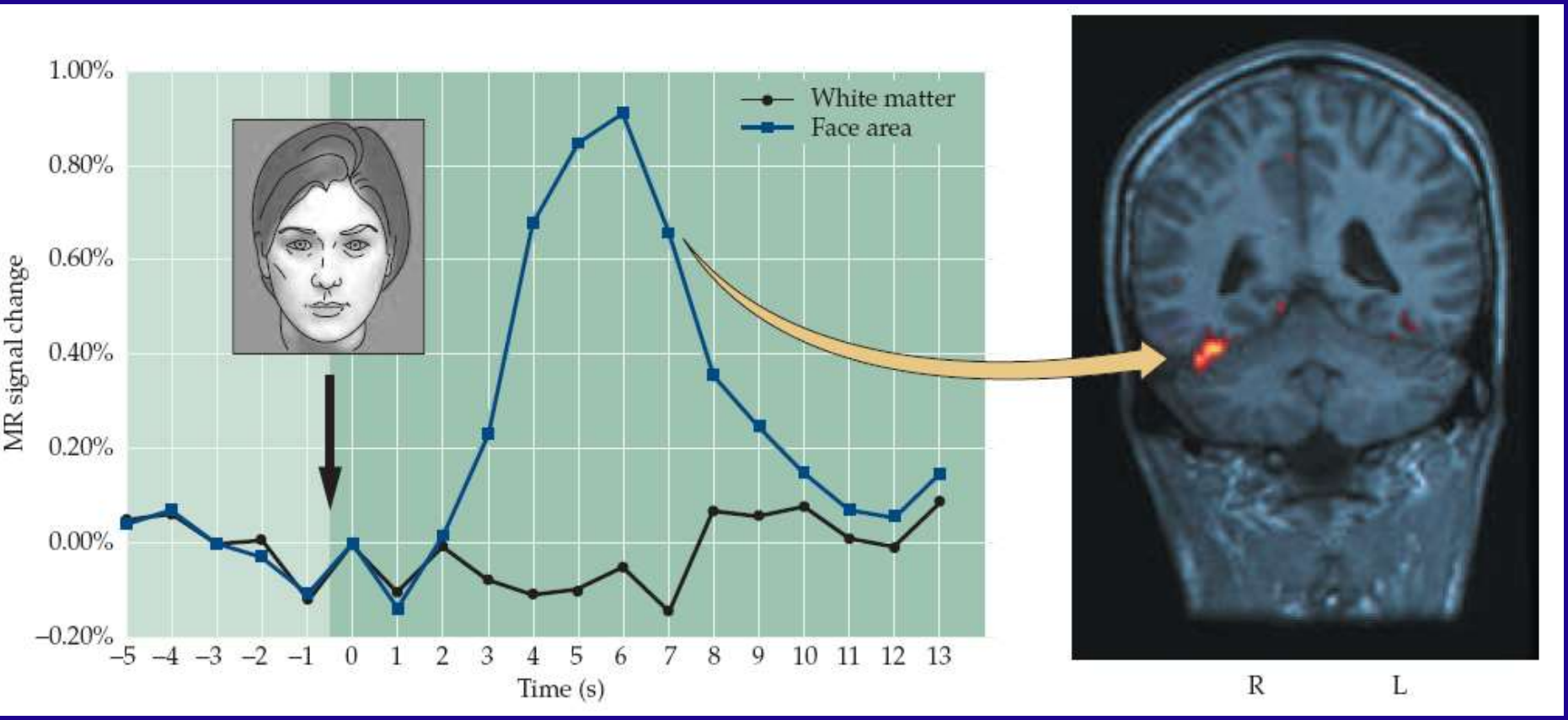




Occipitotemporal gyri

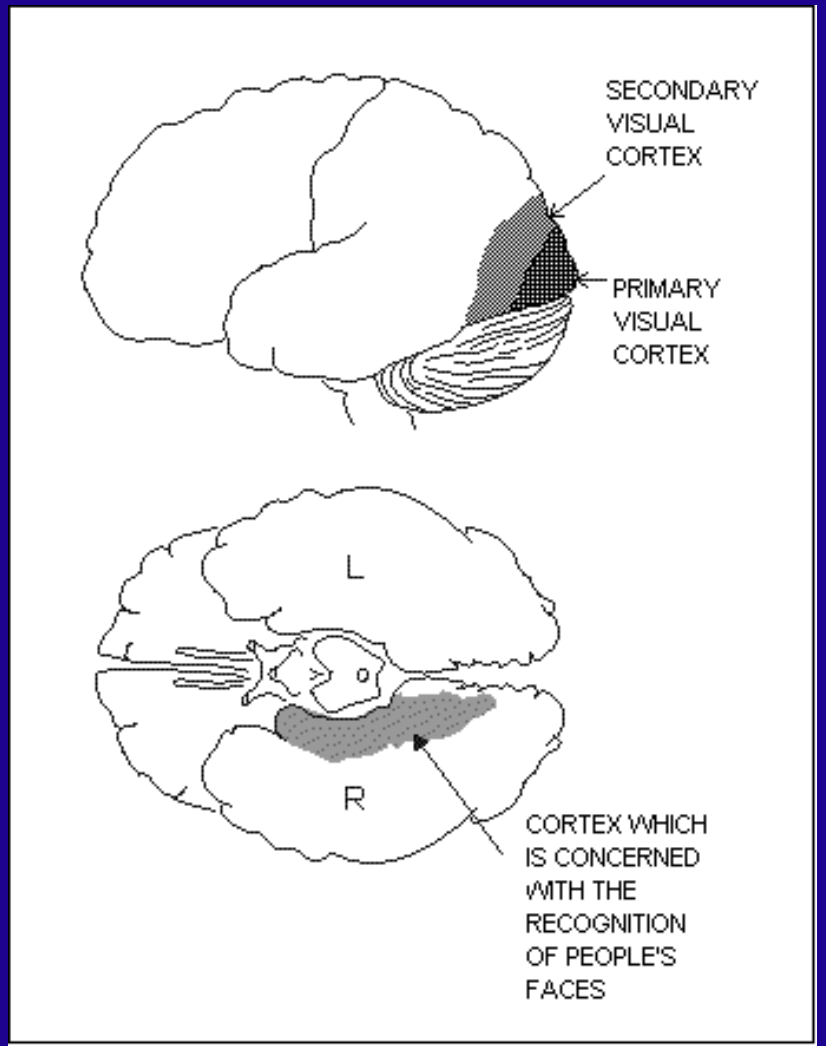


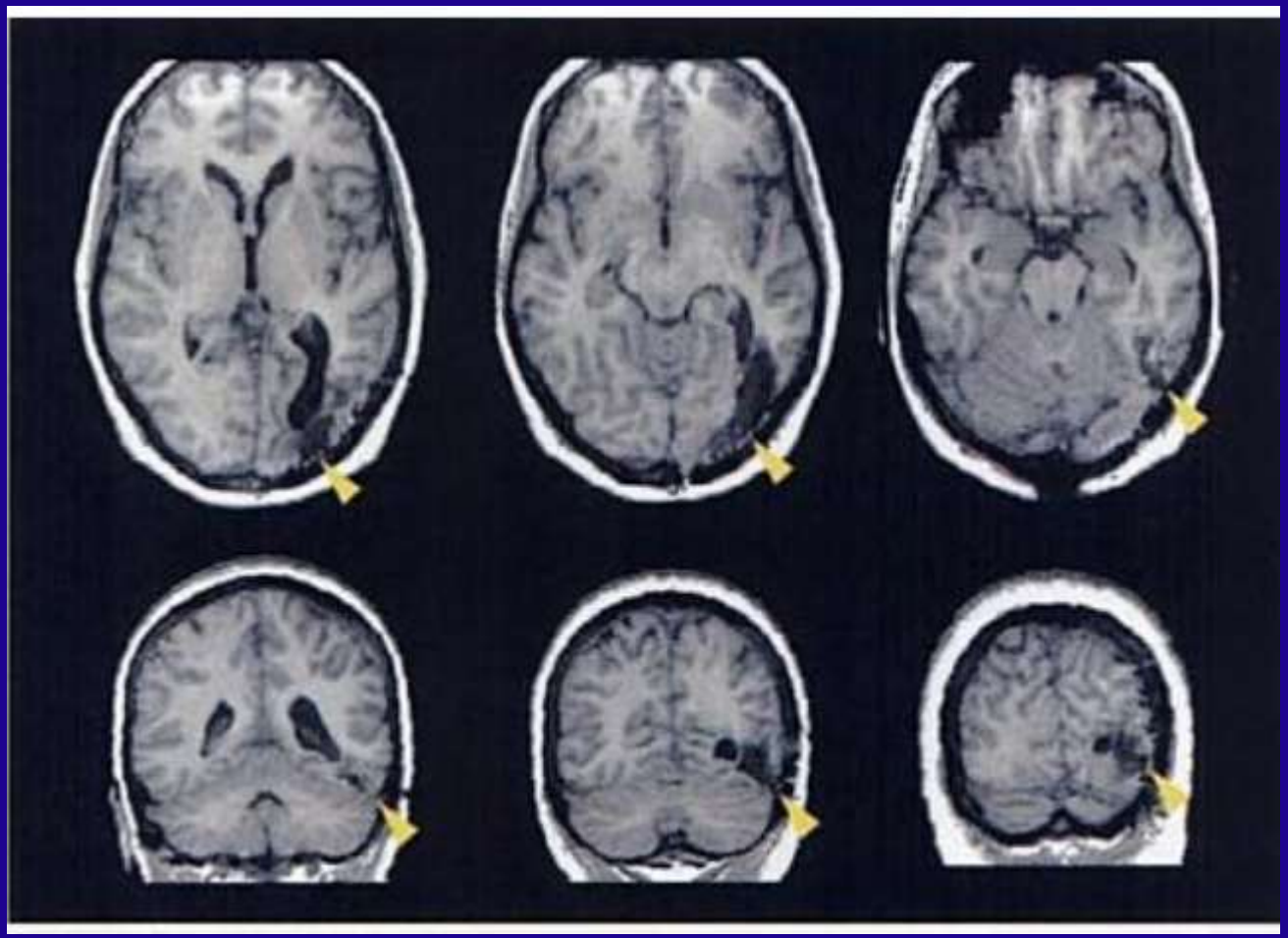
Kanwisher , McDermott, and Chun, 1997


1.00%
0.80%
0.60%
0.40%
0.20%
0.00%
–0.20%
MR signal change
White matter
Face area
–5 –4 –3 –2 –1 0 1 2 3 4 5 6 7 8 9 10 11 12 13
Time (s)
R
L

Agnosia

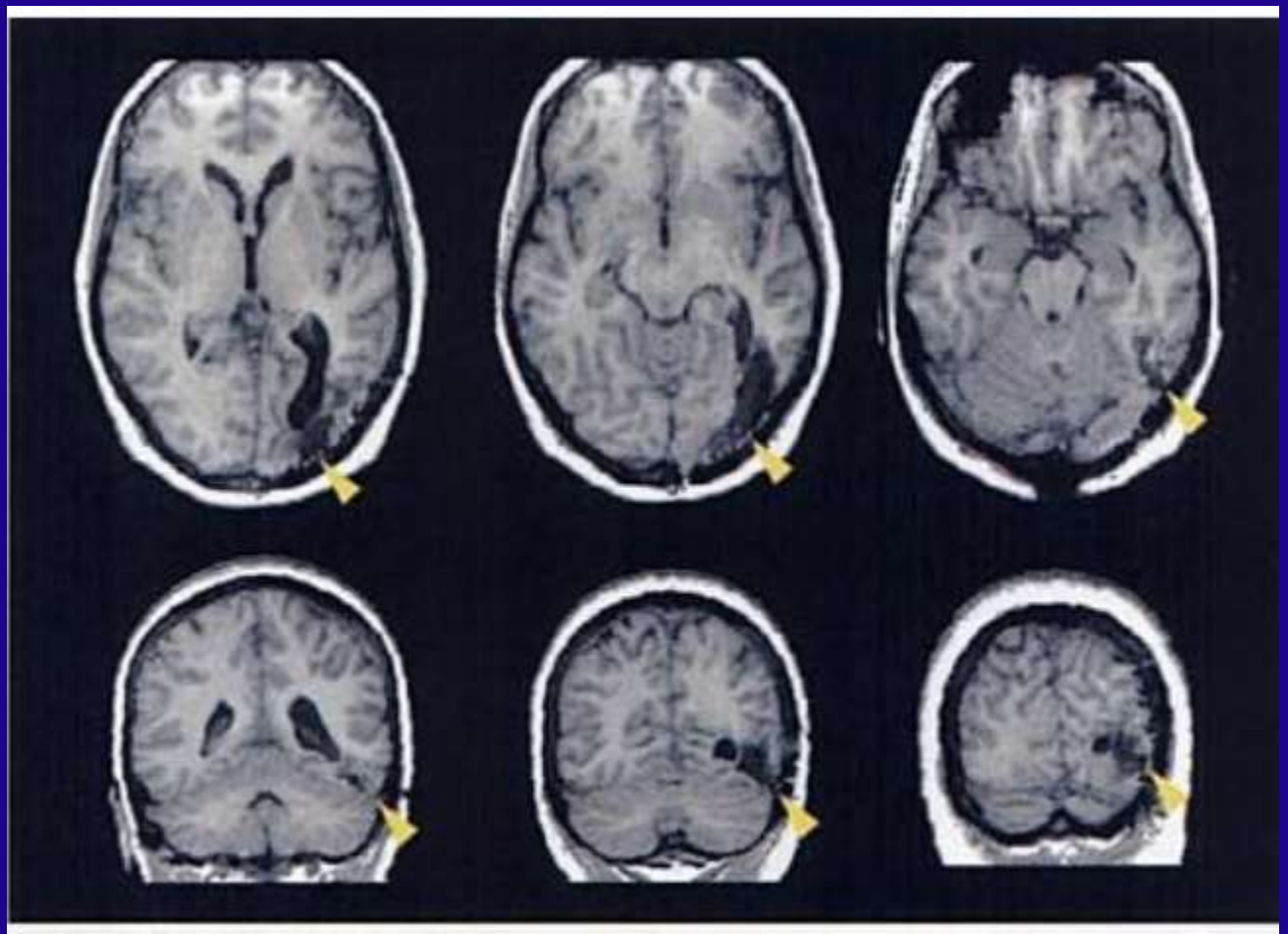
- Prosopagnosia-
  - Inability to recognize or learn faces
  - Identify people by other cues- gait, mannerisms or facial features- spectacles, gait
  - Aware of defect
  - **BL lingual and fusiform gyri of medial occipitotemporal cortex**.



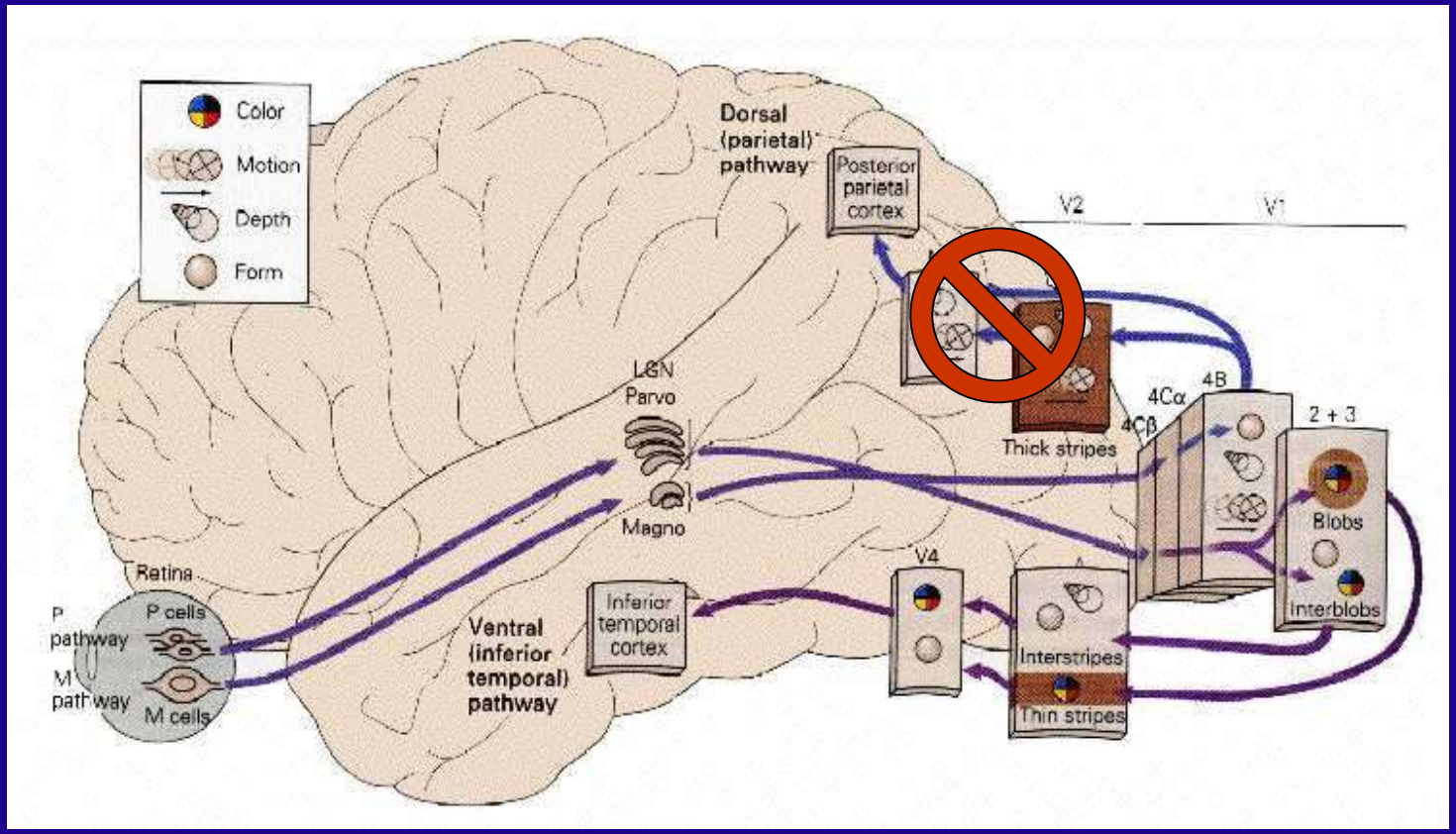


Lesion, left occipitotemporal region and involves parts of the lingual and fusiform gyri.

Hemi-achromatopsia , pure alexia , and category-specific visual object agnosia



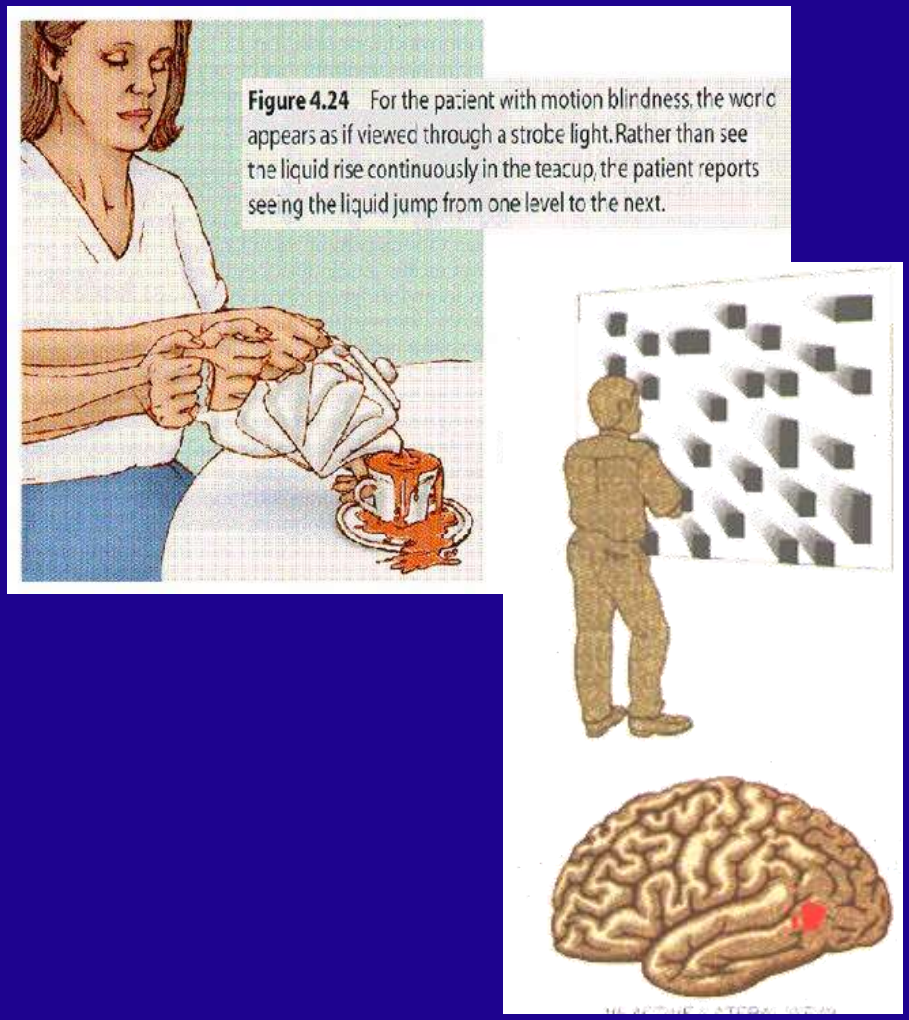
Damage to “where” pathway



Abnormal motion processing & Visuspatial neglect

Akinetopsia

- Clinical features
- Can’t see moving objects (as if under strobe lights); can see still objects
  - People appear suddenly
- Neuropathology
  - **BL lesion** to area MT (V5; T-O-P junction)
  - UL lesions cause subtle defects



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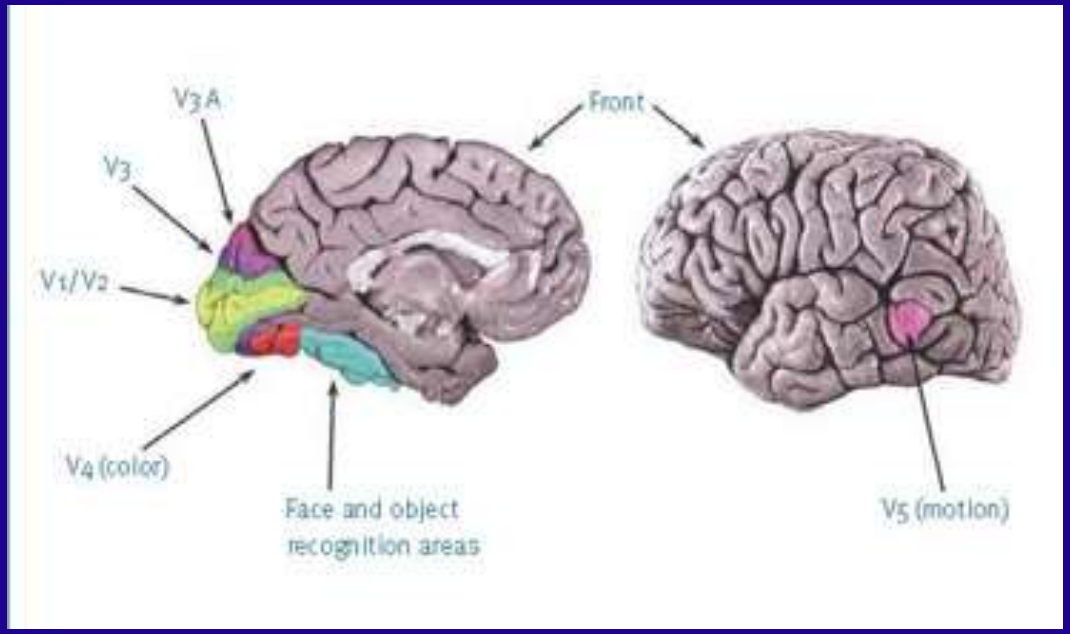
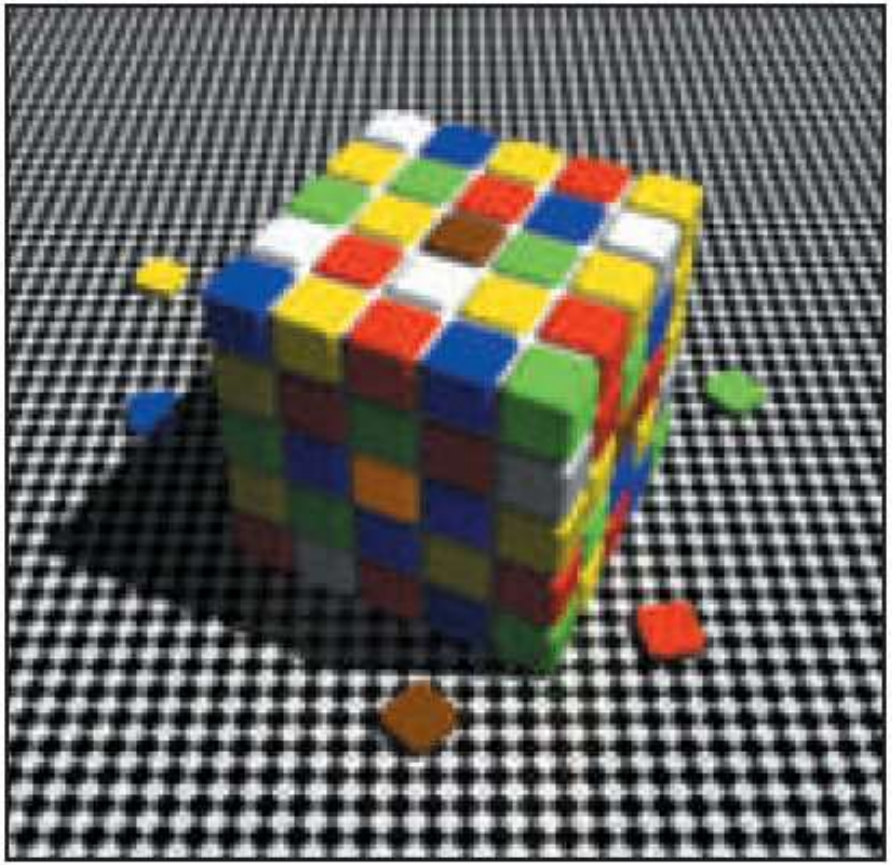
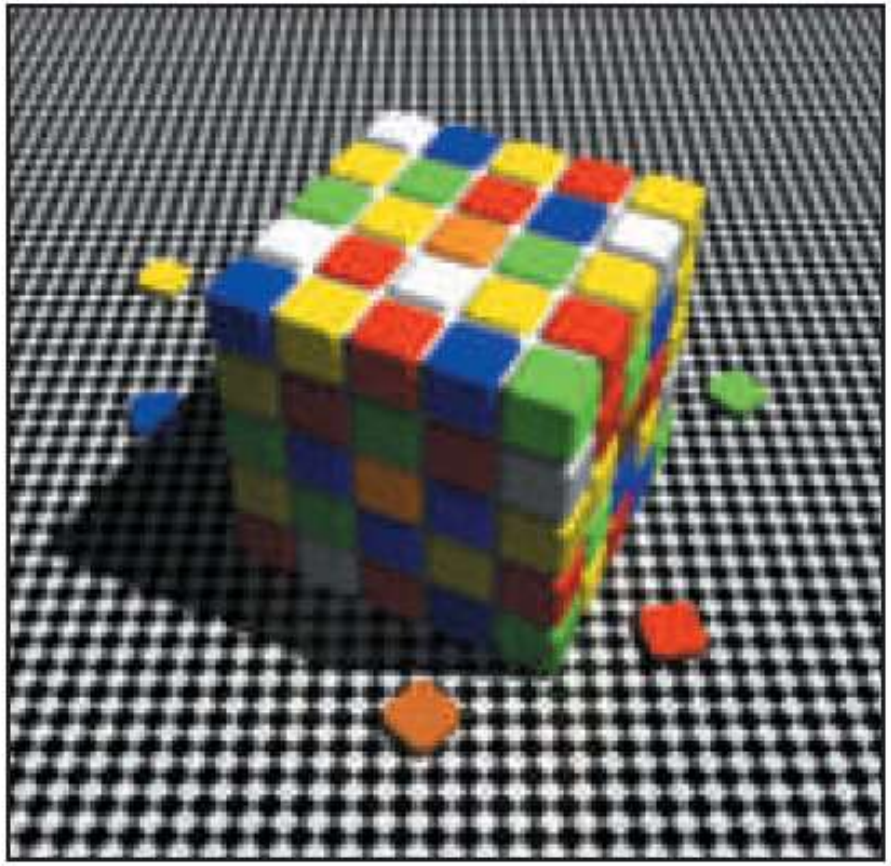
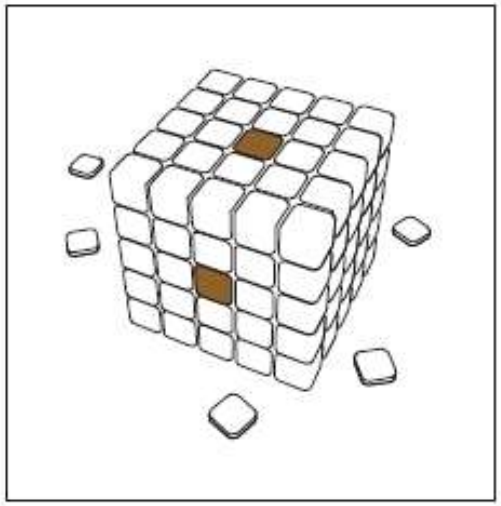


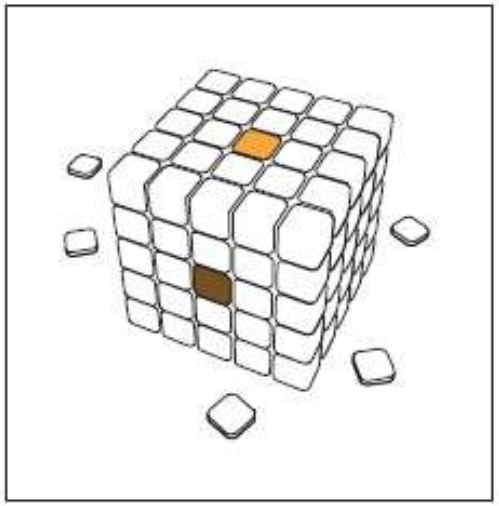
All of these plates are flipped upside down

Except one. Once you see that one, they'll all be right side up









Video

Plans for Action

(prefrontal cortex)

Functions of the prefrontal cortex:

1) Planning

This is the area where volition, thinking ahead, problem solving are located. Before you can have these, and do them flexibly, fluently, adaptively, have to inhibit more primitive, automatic, instinctive behavior patterns; hence

↓

2) Inhibition

3) Selectivity

‘I will do this, I will not do that’

Phineas Gage


Skull of Phineas Gage

Prefrontal Cortex Damage:

- Lack of foresight
- Frequent stubbornness
- Inattentive and moody
- Lack of ambitions, sense of responsibility, sense of propriety (rude)
- Less creative and unable to plan forthe future