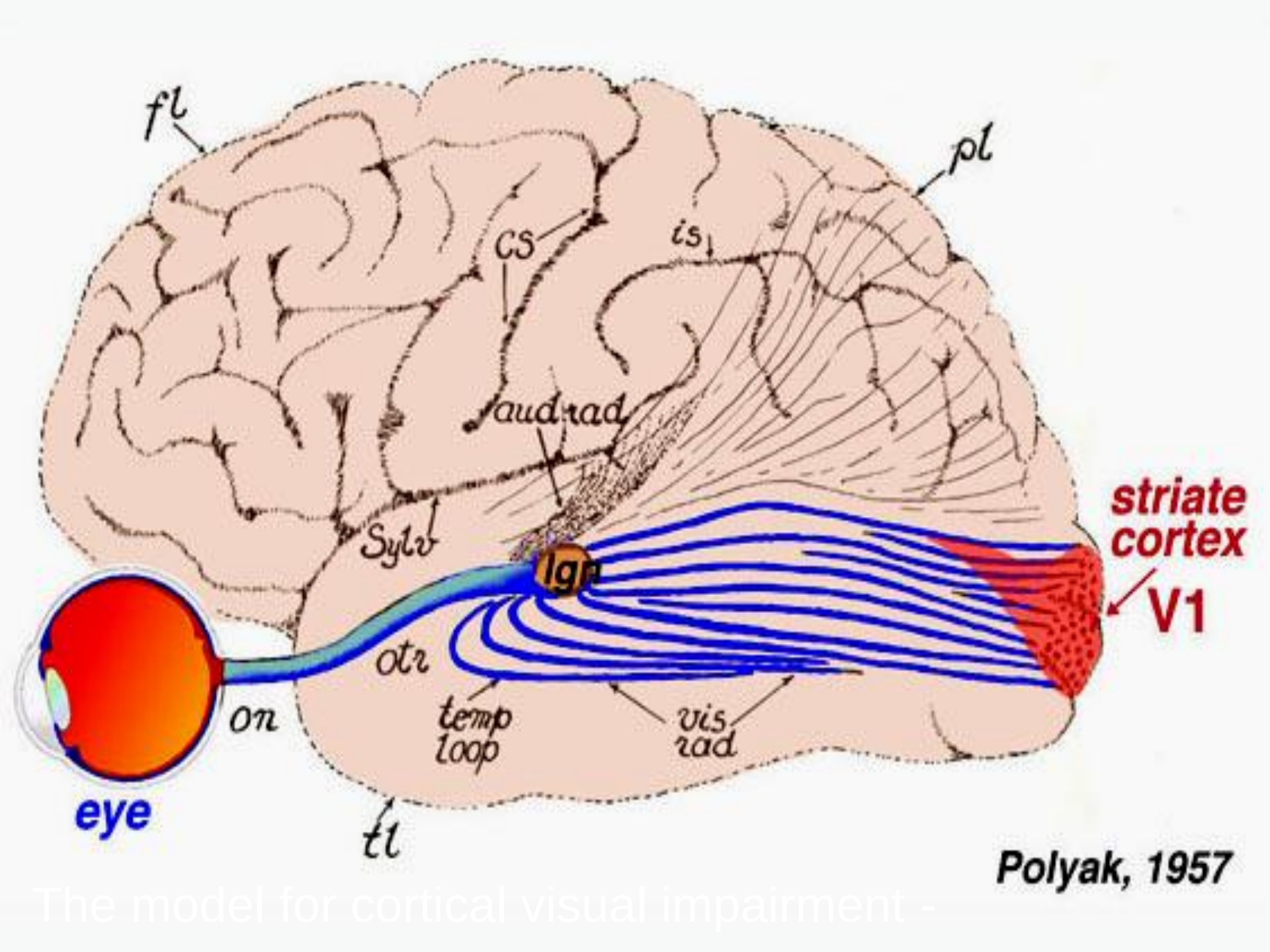
Conditions with cognitive and perceptual visual problems

- Hydrocephalus (>50% of cases)*
- Occipital encephalocele
- After meningitis and encephalitis
- After head injury
- Vascular events
- Neonatal hypoglycemia
- Children with cerebral palsy
- Part of ‘cortical’ visual impairment

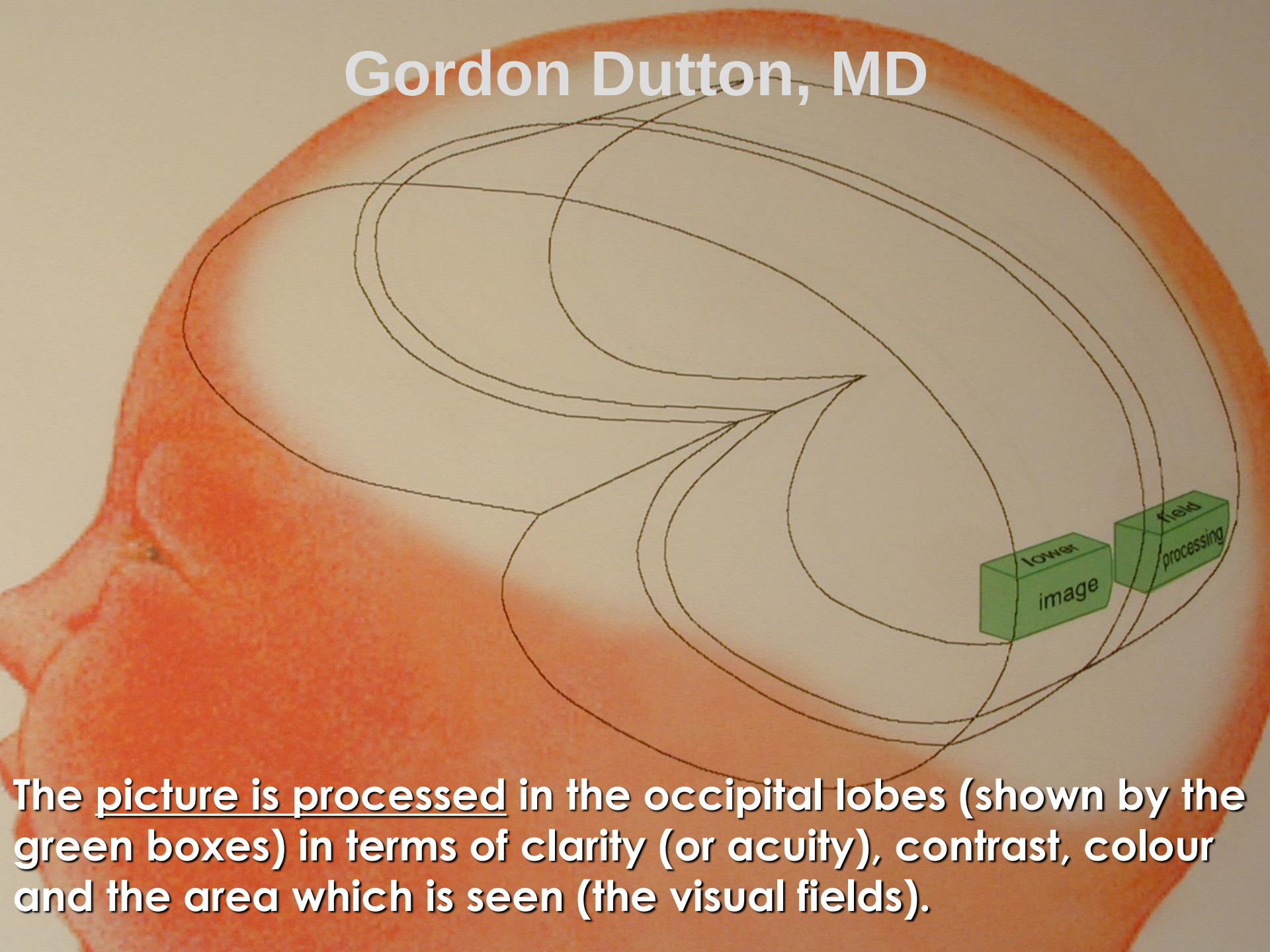
*Andersson S, Persson EK, Aring E, Lindquist B, Dutton GN, Hellstrom A. Vision in children with hydrocephalus. Dev Med Child Neurol. 2006; **48:** 836-41.

腦部變化與中樞神經傷害時機的關係

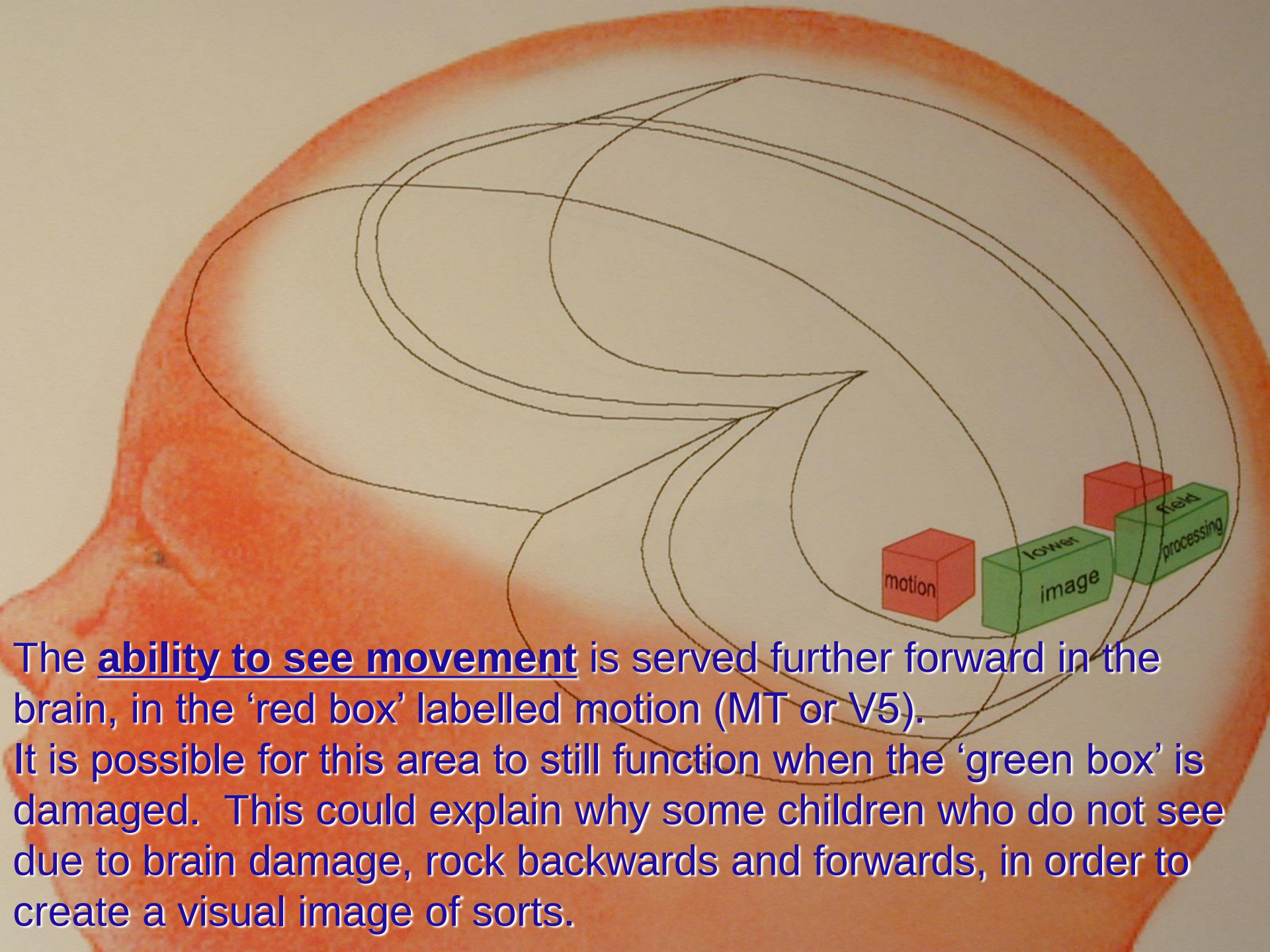
- 1st trimester: Liquifaction necrosis, tissue resoption, no gliosis→ Congenital malformation
- Late 2nd to 3rd trimester: Hypoxia-ischemia to subcortical white matter with gliosis→ periventricular leukomalacia
- Term: Hypoxia-ischemia to parasagittal watershed zones with gliosis→ Encephalomalacia (cortical+subcortical)



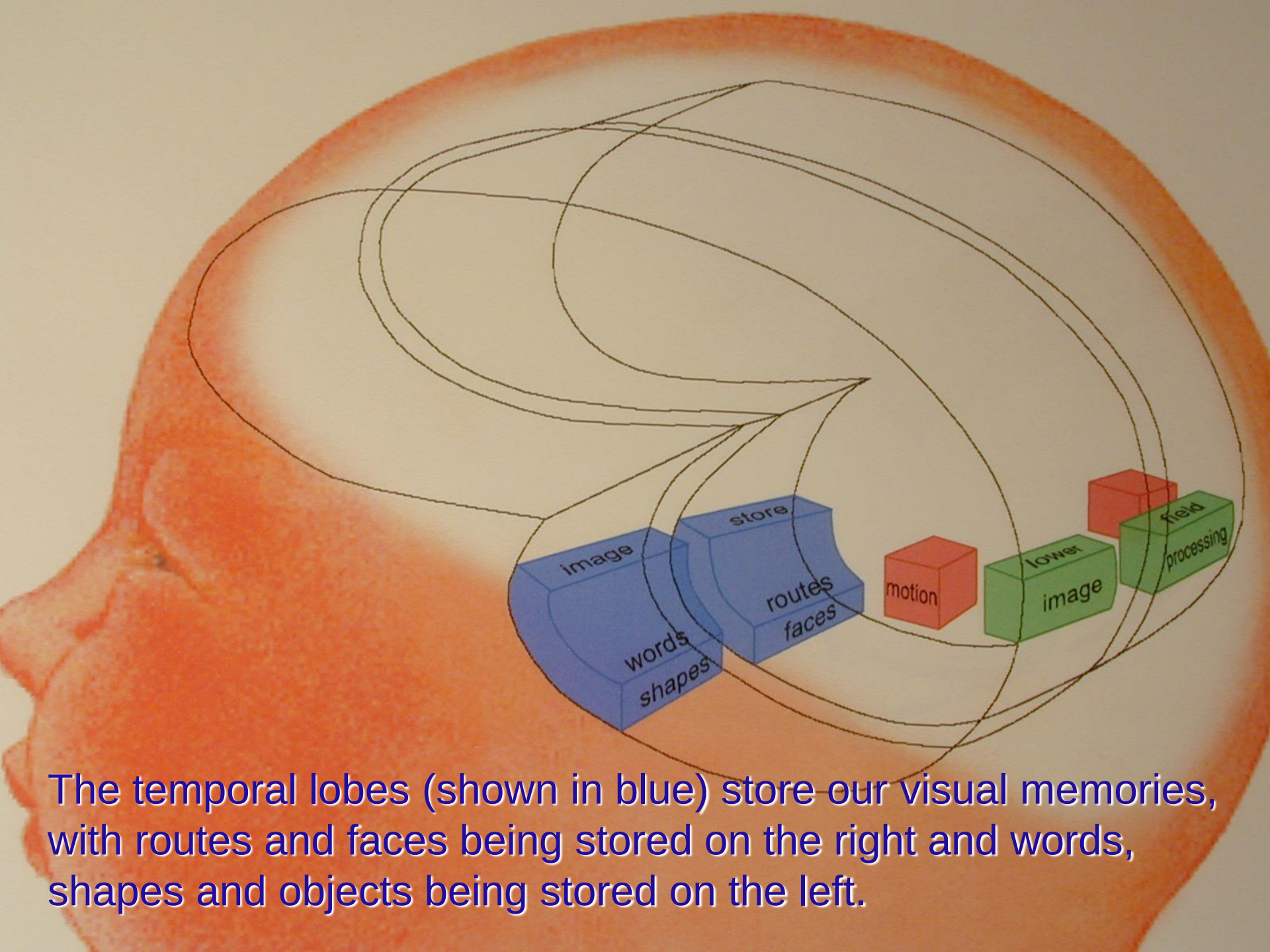
Gordon Dutton, MD



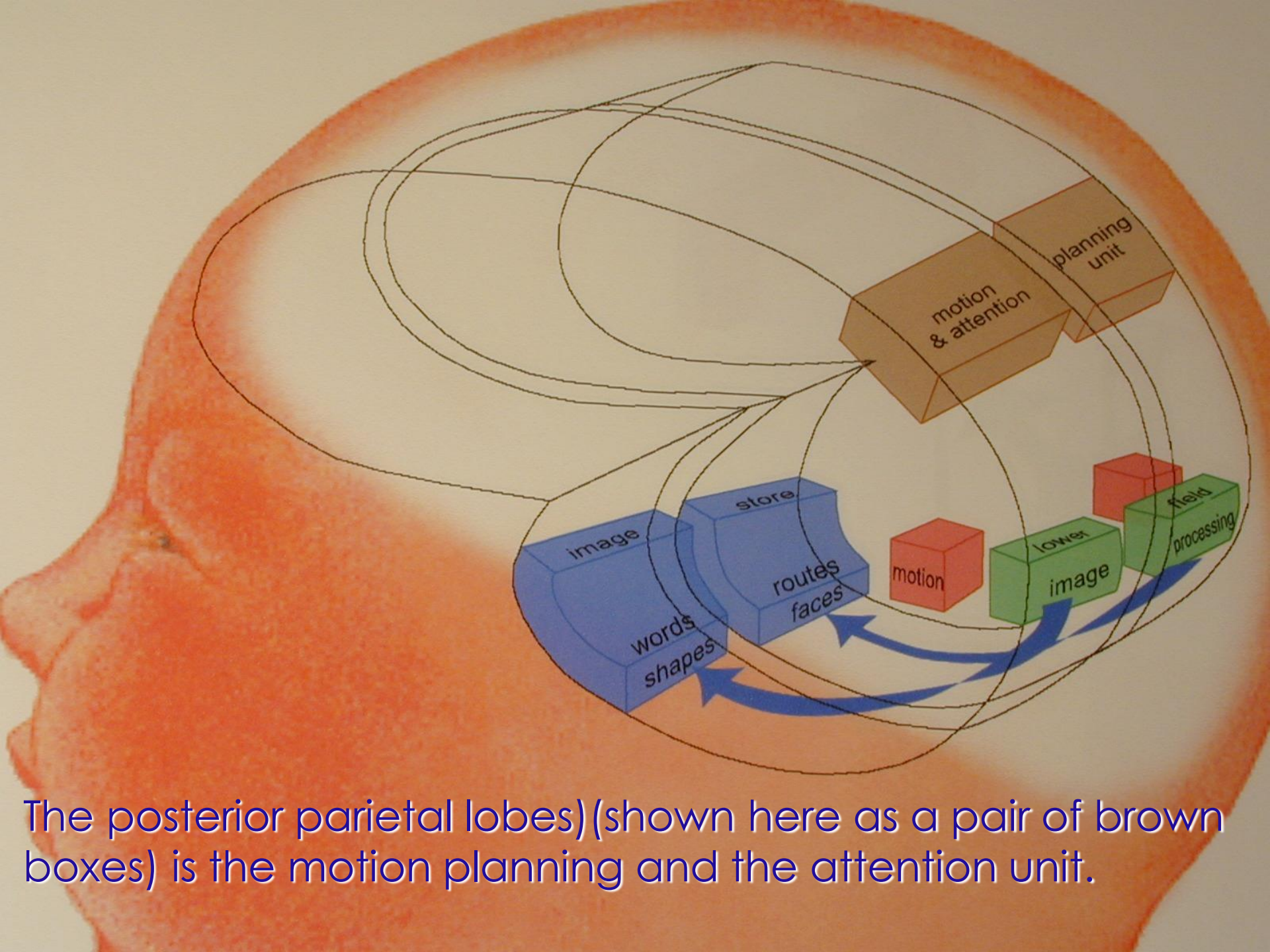
The picture is processed in the occipital lobes (shown by the green boxes) in terms of clarity (or acuity), contrast, colour and the area which is seen (the visual fields).



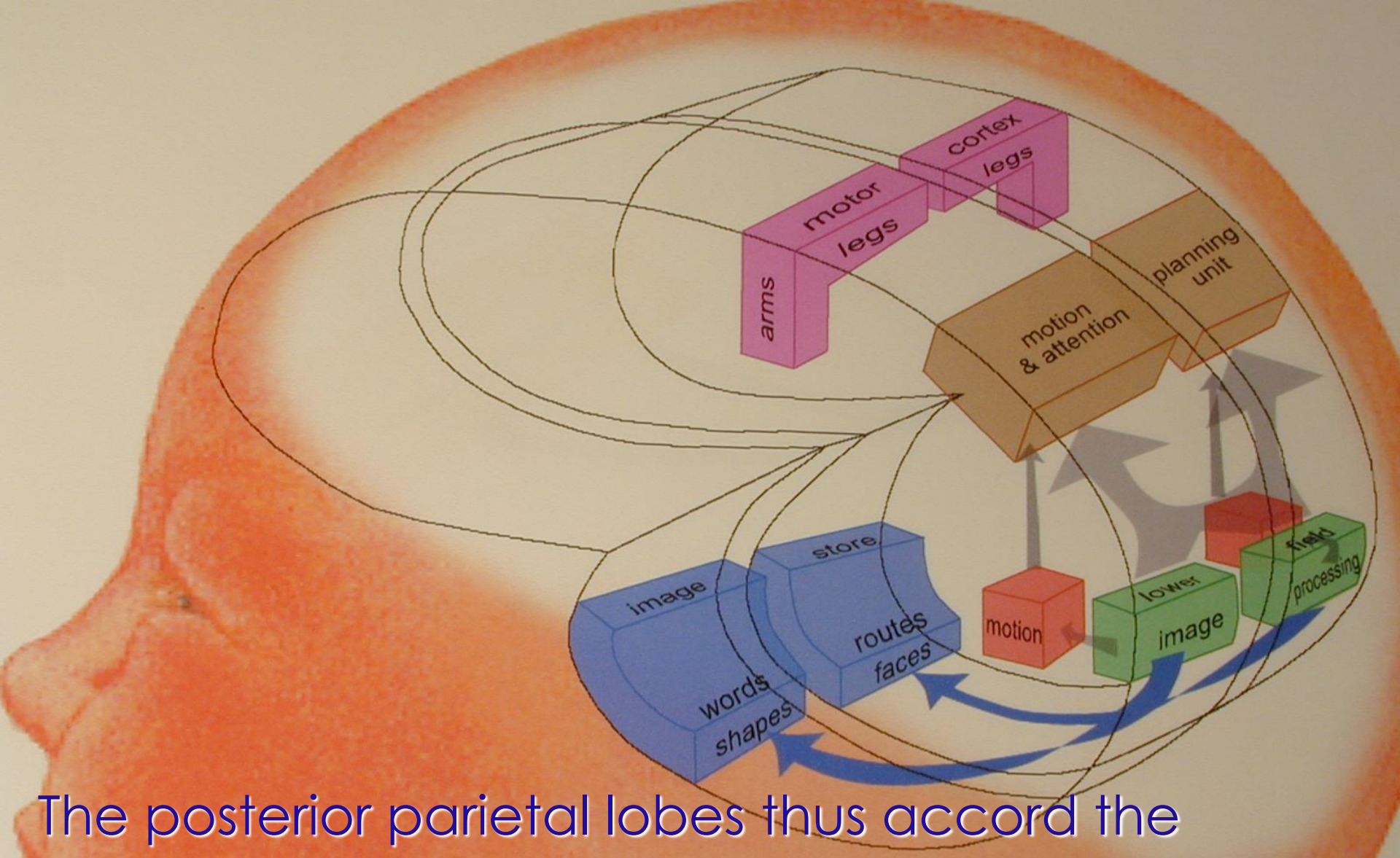
The **ability to see movement** is served further forward in the brain, in the ‘red box’ labelled motion (MT or V5).
It is possible for this area to still function when the ‘green box’ is damaged. This could explain why some children who do not see due to brain damage, rock backwards and forwards, in order to create a visual image of sorts.



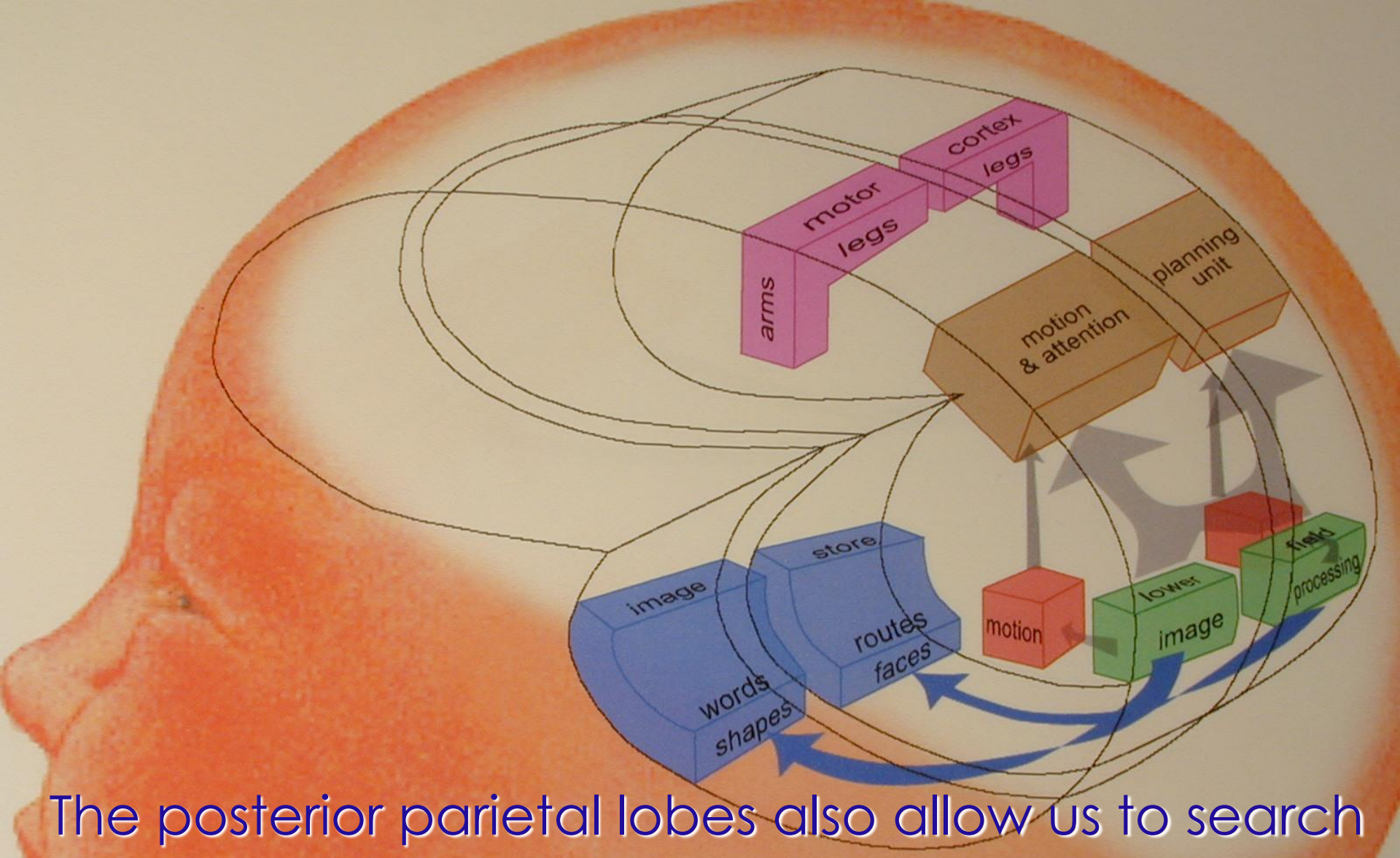
The temporal lobes (shown in blue) store our visual memories, with routes and faces being stored on the right and words, shapes and objects being stored on the left.



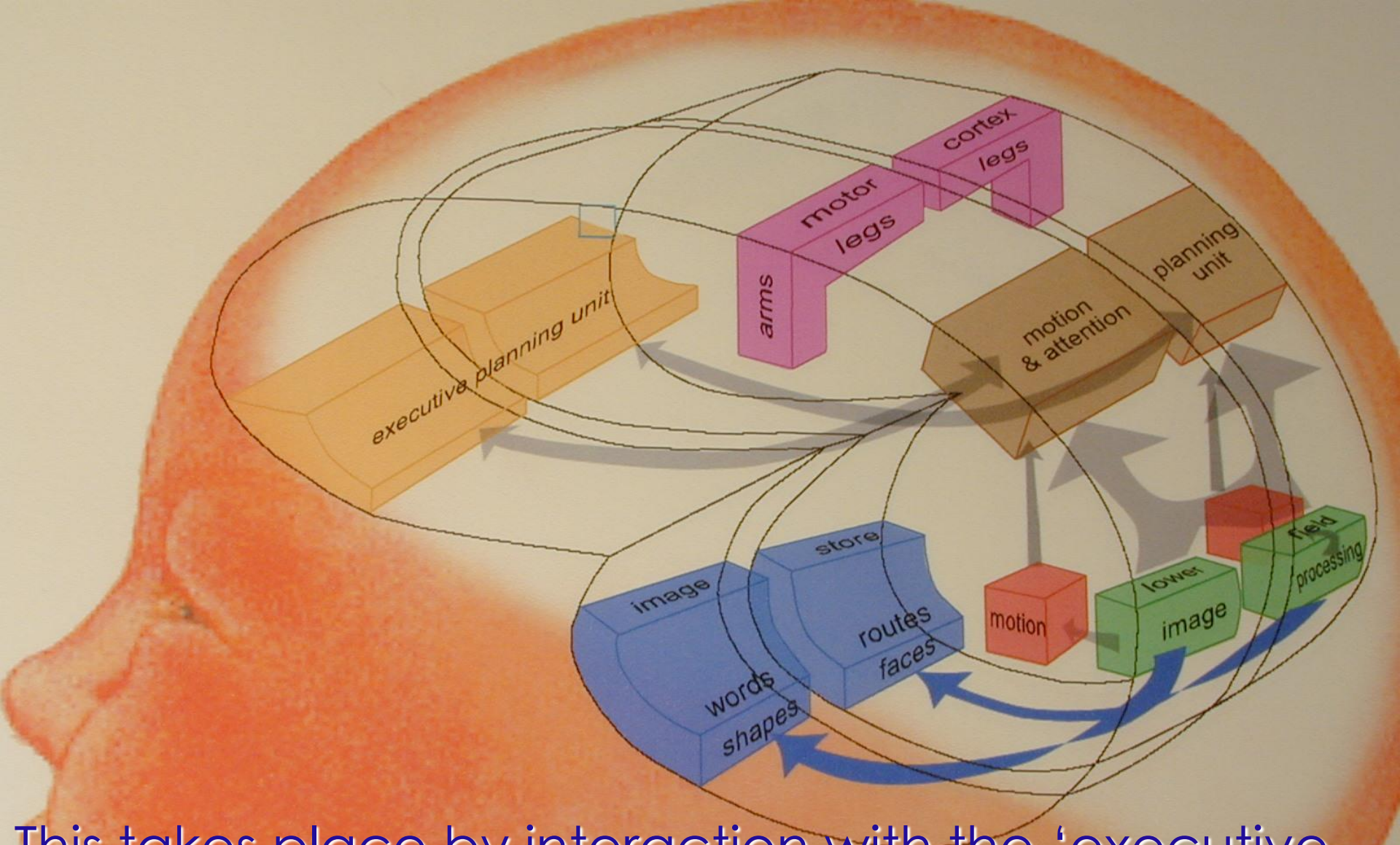
The posterior parietal lobes)(shown here as a pair of brown boxes) is the motion planning and the attention unit.



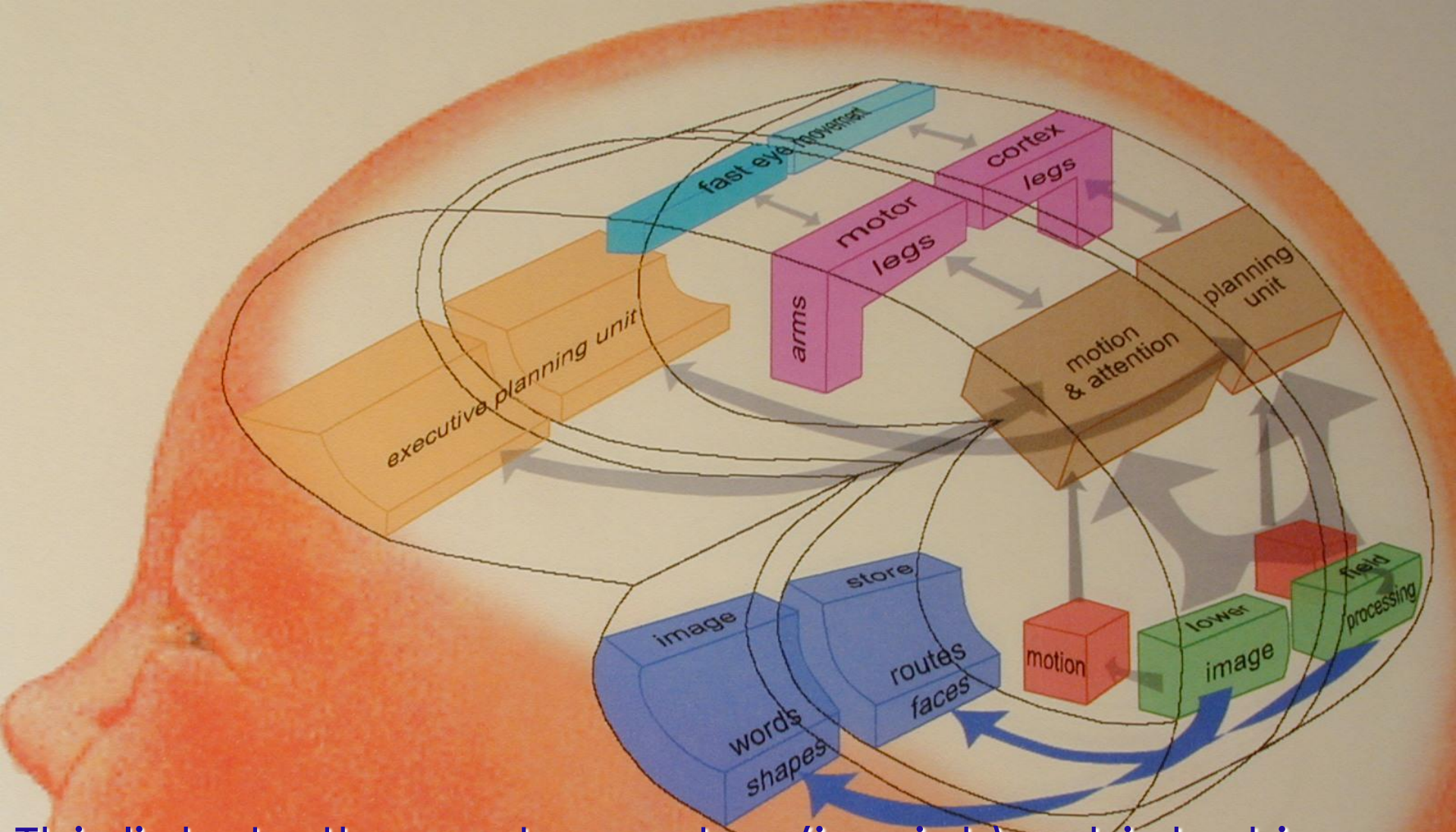
The posterior parietal lobes thus accord the calculations, to bring about visually guided movement. Damage causes optic ataxia which is probably a significant contributor to 'dyspraxia'.



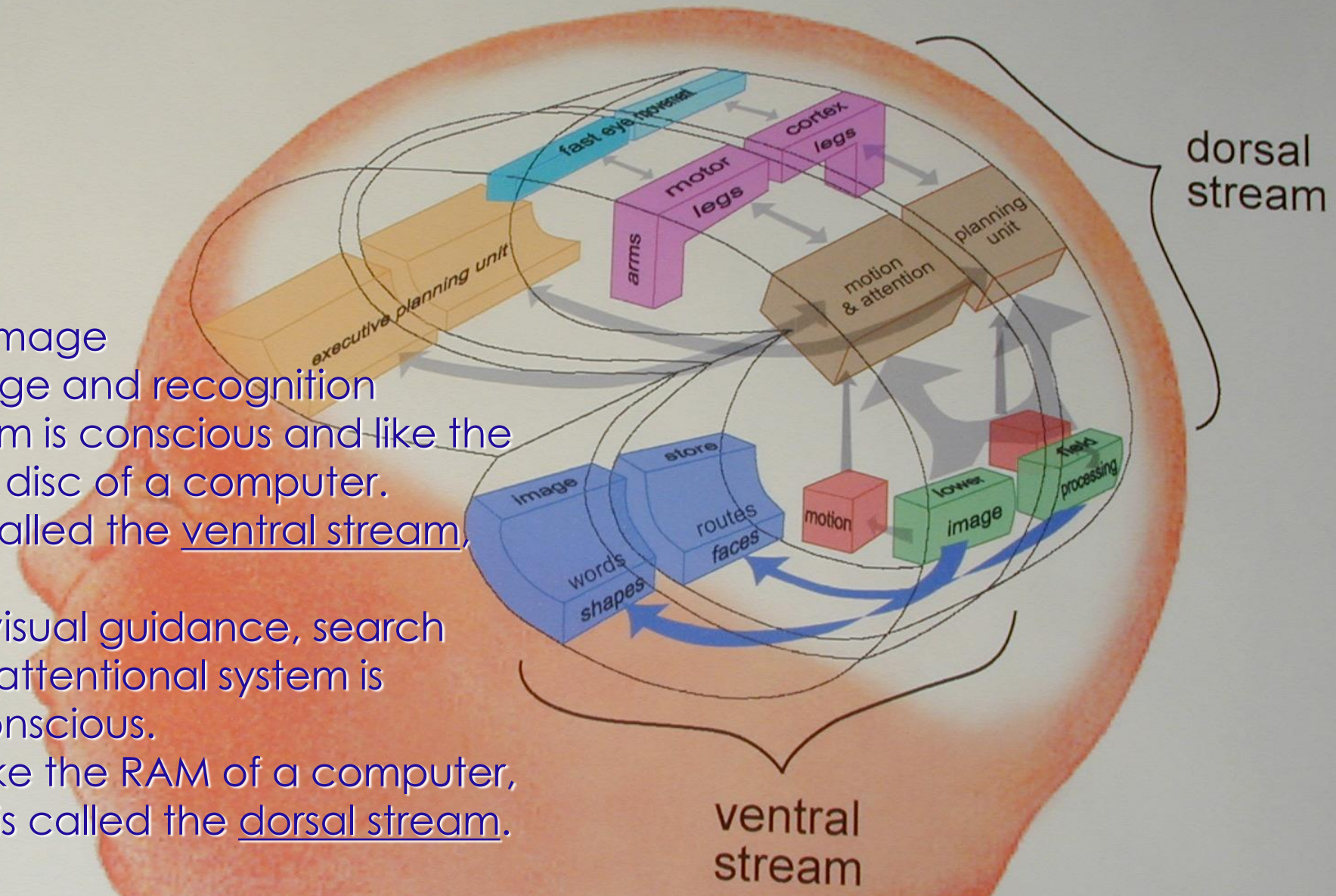
The posterior parietal lobes also allow us to search the visual world, to find what we are looking for, and give attention to it…
and to passively ignore the rest of the picture.



This takes place by interaction with the 'executive planning unit' at the bottom of the frontal lobes which are responsible for making the choices.



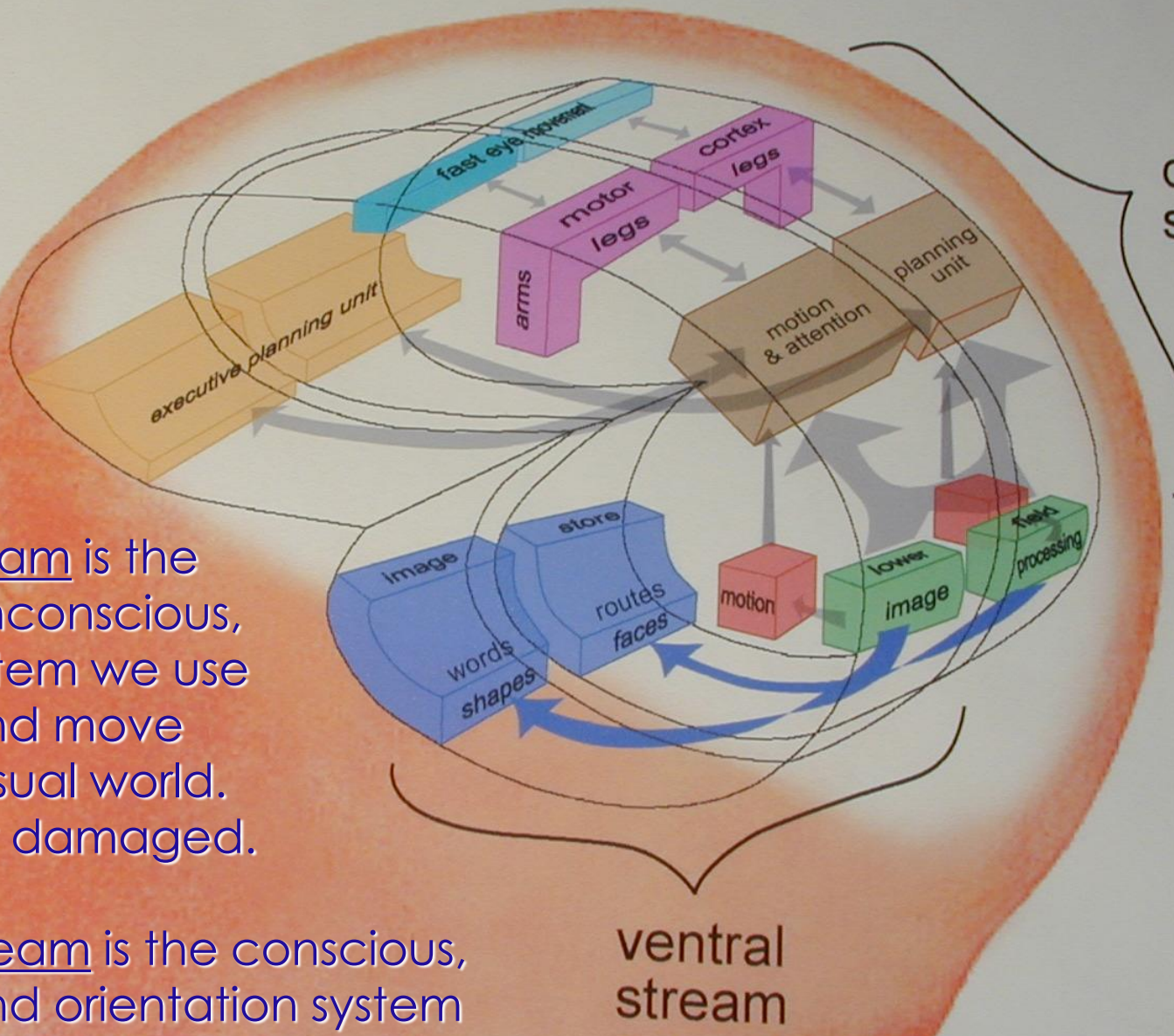
This links to the motor cortex (in pink), which drives movement of the body, and the frontal areas (in light blue) which drive fast movement of the head and eyes to look at a chosen object.



The image storage and recognition system is conscious and like the hard disc of a computer.
It is called the ventral stream.

The visual guidance, search and attentional system is unconscious.
It is like the RAM of a computer, and is called the dorsal stream.

Either can be damaged, the dorsal stream more frequently.



The dorsal stream is the immediate, unconscious, automatic system we use to appraise and move through the visual world. It is commonly damaged.

The ventral stream is the conscious, recognition and orientation system which we are aware of and which processes more slowly. It is damaged less frequently.

Cerebral visual impairment include:

- Those with profound visual impairment
- Those with and without cerebral palsy
- Those with poor acuities +/- visual field impairment
- Those with poor acuities +/- visual field impairment and perceptual problems
- Those with perceptual problems only

4 As of visual loss

- Acuity 視力
- Assimilation 同化
- Attention 專注力
- Apraxia 失用

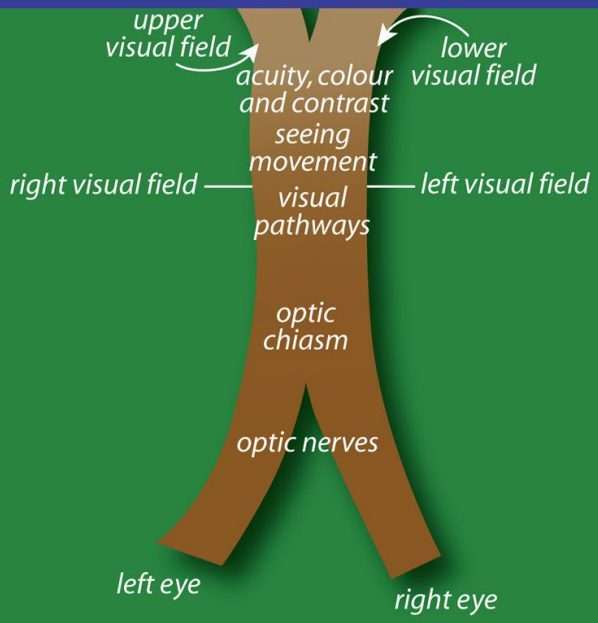
CVI 臨床特徵表現

- 熟悉的環境 單純的背景視覺表現較佳
- 喜歡近距離視物
- 用週邊視覺視物
- 視覺功能疲勞/起伏
- “瑞士乳酪” 視野
- 注視光源/畏光--有些孩童在較暗光照下視覺表現較佳
- 移動的物體 或 靜物辨識較強? --跟腦傷的位置有關
- 對色彩辨識比型體強

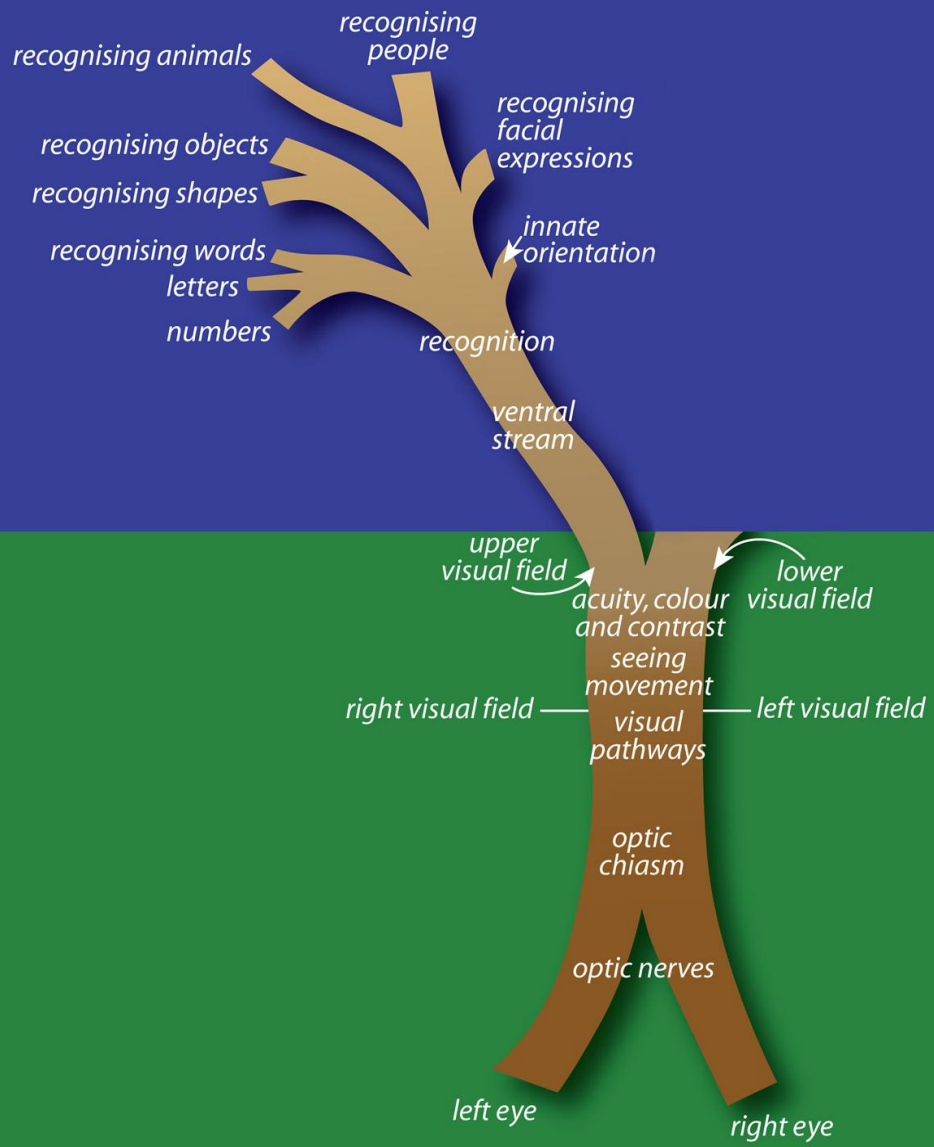
眼神經學表現

Cortical	***Subcortical***
• Horizontal conjugate gaze deviation	Tonic downgaze
• None or intermittent nystagmus	Latent or rarely congenital
• Constant XT	ET>XT
• Normal or mildy atrophic disc	Hypoplastic or large cups

The ‘Tree’ of Visual Perception and Cognition



The ‘Tree’ of Visual Perception and Cognition



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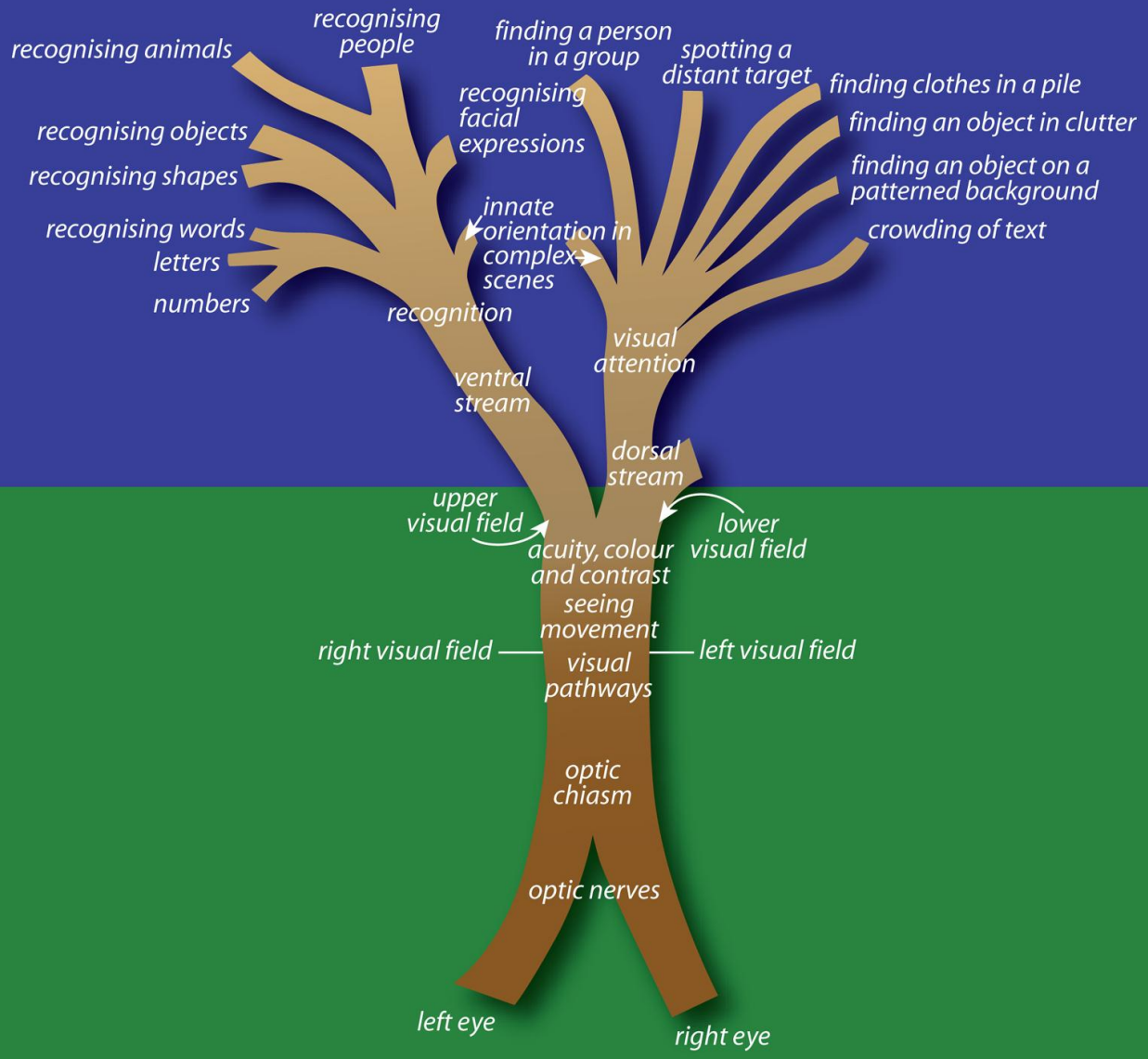
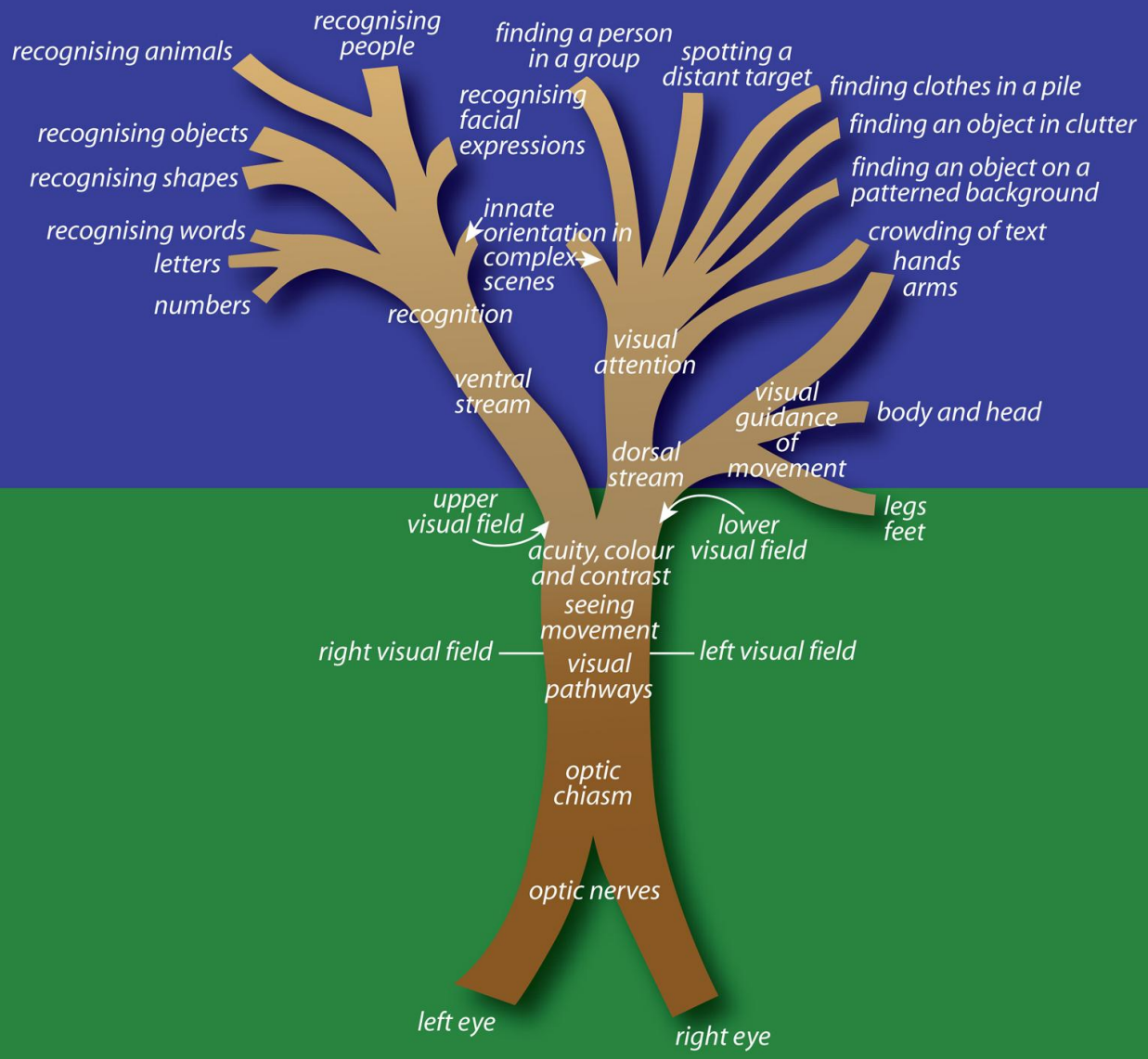


The ‘Tree’ of Visual Perception and Cognition



結論

- 傳統視力檢查對評估嚴重的 CVI 孩童功用不大
- 視野的評估非常困難，可以玩具分左右側分別測試
- 和照顧者取得詳細的視覺病史、花時間陪伴觀察孩子，才能得到珍貴有用的資訊
- **對CVI孩子視覺的發育，父母和您扮演最重要的角色!!**

台大兒童醫院的小兒眼科設備

謝謝！