

Blindsight and Neglect

Attention II Meds 470

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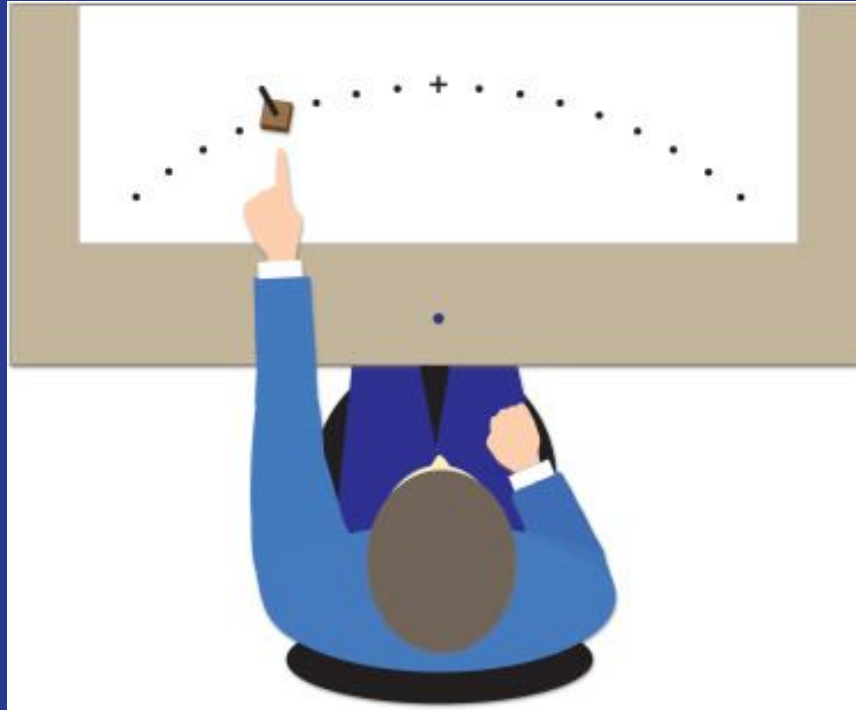
Topics

What is blindsight?

What is neglect?

Review Quiz Questions

Blindsight



Pöppel, Held, and Frost, (1973)
Task- stimulus in the patients blind areas, asked to
look/point to area they “thought” stimulus was
=Performances better than chance

Two Major Principles of Blindsight

1. There is more than one kind of “Blind”

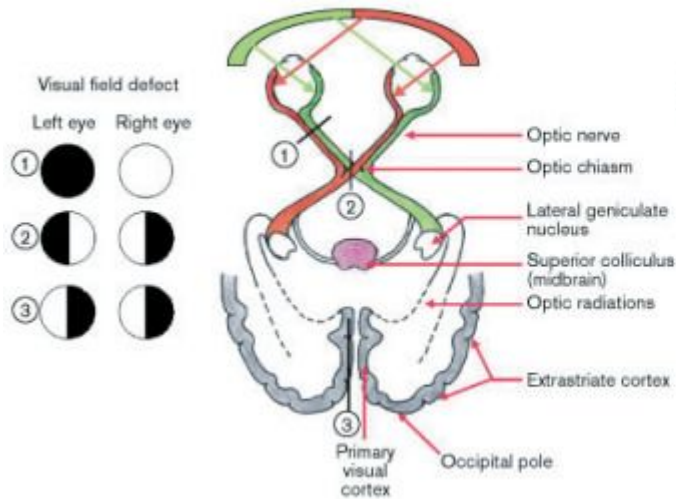
Blindness can occur from damage anywhere along the visual pathway, from the sensory structures to the upper level processing centers in the brain (think prosopagnosia, face blindness)

Cortical blindness refers the loss of vision where there are no ophthalmological causes. This means the blindness is not due to damage to the sensory structures of vision, but often to damage in V1.

Two Major Principles of Blindsight:

2. There is more than one vision pathway in the brain

(a)



(b)

2. Visual form agnosia: occipitotemporal lesion



Patient can accurately grasp objects they can not identify



1. Blindsight: primary visual cortex lesion



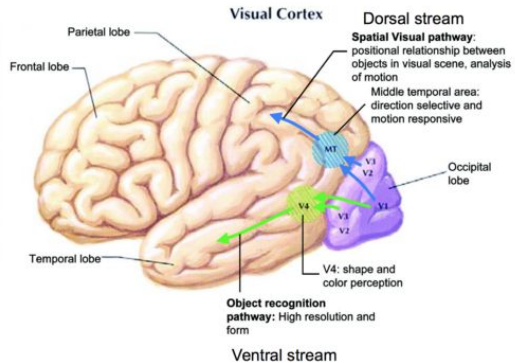
Patient can accurately localise stimuli in the blind field

3. Achromatopsia ventromedial occipital lesion



Patient can distinguish between forms despite being unable to identify colours

Revisiting DF and the Dorsal Stream



Consider: DF though not consciously aware of the size or shape of the mail slot, (could not describe it) is able to “see” where the mail slot is when asked to mail the letter.

There may be other visual pathways that are not yet well understood

The retina projects directly to the superior colliculus, pulvinar and LGN, as well as the thalamus, hypothalamus and midbrain – and these structures project to the cerebral cortex.

There could be unconscious processing of visual stimuli in all or some of these pathways, offering an explanation for the various visually guided behaviours termed blindsight.

What we know so far,

Imaging studies strongly suggest that the SC and pulvinar (in addition to LGN/MT) are highly involved in pathways that result in blindsight phenomenon, particularly through connections to the parietal cortex and amygdala.

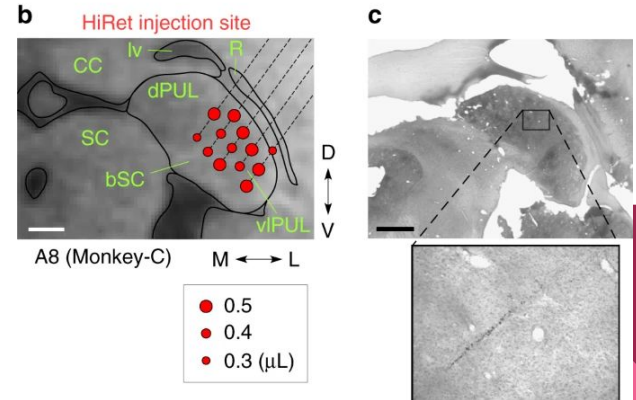
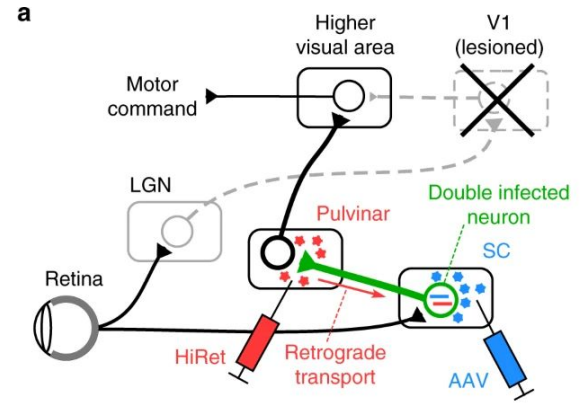
= There is likely a relationship between blindsight and attention systems.



Dissecting the circuit for blindsight to reveal the critical role of pulvinar and superior colliculus

Masaharu Kinoshita, Rikako Kato, Kaoru Isa, Kenta Kobayashi, Kazuto Kobayashi, Hiroataka Onoe & Tadashi Isa (2019)

Pharmacological intervention to block pulvinar activity reduce blindsight related abilities



Simulated blindsight: Video Discussion



Simulated blindsight: Video Discussion

Glasses are used to prevent the eyes from having overlapping visual fields. Computer generates blocks with the lines pointing in the opposite grain, during later stage processing and integration, the brain superimposes these to remove the alternative grain from vision,

Researchers suggest that the initial “pre superimposed” information about the square is transmitted along a separate pathway, and while we cannot consciously assess its location, there is access to its location via other visual pathways in the brain. Possibly a dorsal stream mediated response, opposed to pre V1 pathways



Hemispatial Neglect

Imaginary Hemispatial Neglect?

Neglecting the Left Side of a City Square but Not the Left Side of Its Clock: Prevalence and Characteristics of Representational Neglect

[Cecilia Guariglia](#), ^{1, 2, *} [Liana Palermo](#), ^{1, 2} [Laura Piccardi](#), ^{2, 3} [Giuseppe Iaria](#), ⁴ and [Chiara Incoccia](#) ²



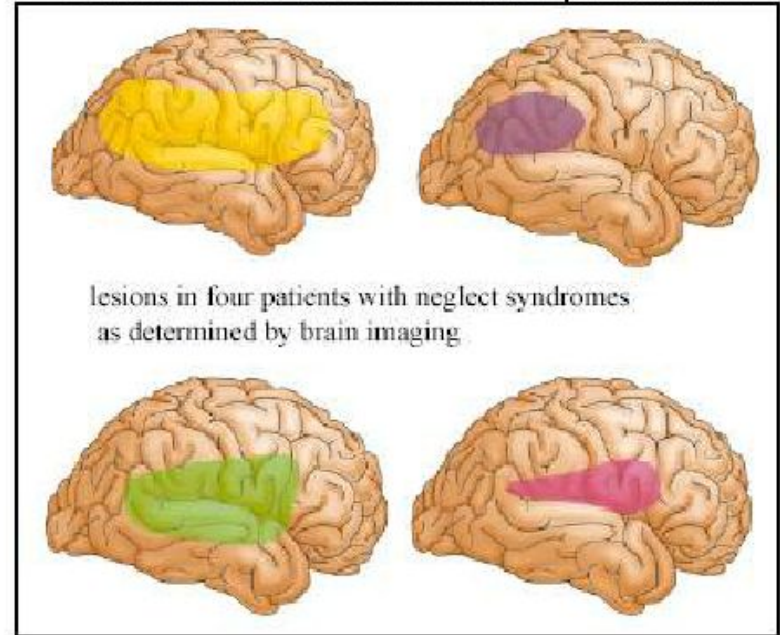
Causes and Severity

Causes- Stroke or other severe brain trauma

Left sided neglect = longer lasting and more severe

Theoretically, this is because of the right parietal has a larger role in attention, and that it attends to both sides of the visual field.

Damage to right side inferior parietal lobe causes the most severe problems



Question 1. What are the visual pathways that project directly from the midbrain to parietal regions associated with attention.

Superior Colliculus - Dorsal Stream connections (FEF's and IPS) for eye movements and perceptual-motor coordination for attention related tasks,

Pulvinar - pathways to V4, SC, and IPS, pathways are used for disengaging from the current focus of attention, and to refocusing and engage on a new target,

LGN - Pathways to and from Parietal Cortex, and MT, role of increasing neural response to stimulus (near threshold activity is enhanced with attention)

Question 2. Explain the difference between specific and general attention.

General attention - Uniformly distributed awareness that is not focused on any particular stimulus. System is prepared to identify any unique or relevant

Specific attention - Spotlight, focus is on specific objects.

- One focal point at a time, processed in order
- Focus on one area can reduce sensitivity to other stimuli

Question 3. How can you explain blindsight and neglect in terms of the three main attention systems outlined in Peterson and Posner?

Blindsight : indicated that a loss of conscious perception does not necessarily interfere with unconscious attention to visual stimuli, if midbrain pathways are left intact.

Neglect: Alerting and Executive systems may continue to function in the absence of regularly functioning Orienting systems