Disorders of Object and Spatial perception

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Take Home Message 1

Where there are lesions of the posterior cerebrum and posterior temporal lobe, screen for disorders of spatial perception and object agnosia.
The Parietal Lobe presents space in order to move in that space.
Primary Assoc. Auditory Motor Touch Visual Higher Order Association
Visual processing

More than half of the posterior cerebrum is devoted to visual processing.

Visual processing areas are hierarchical and increasingly specialised.
Vision processing and modulation
Two visual processing streams

- A **dorsal** occipito-parietal stream (the “where” stream) for spatial processing.

- A **ventral** occipito-temporal stream (the “what” stream) for object identification
How we perceive space

- We use multiple senses-visual, auditory, Tactile esp proprioception and vestibular.
- The right hemisphere controls spatial perception in both hemispheres.
- The left hemisphere only controls spatial perception in the right hemispace.
- It has been found that patients with right hemisphere lesions may have bilateral impairments of spatial perception and movement while those with left hemispheric lesions may not show any obvious spatial perceptual abnormality.
- Verbal stimuli are responded to better when presented in right hemispace and non-verbal stimuli responded to better when presented in left hemispace.
How we perceive space

- In patients with a left hemispatial perceptual disorder if two stimuli presented side by side in right hemispace, the person will respond slower to the left sided stimulus.
- Carr and Shepherd (2010) report moving cues more compelling in reducing symptoms of UHA indicating an intentional bias to spatial perception.
- Also report action-intention movements into neglect hemi space improves motor recovery.
- In macaque monkey single neurons in the parietal lobe not only sensitive to location in space but also to action that must be directed towards the target e.g reach or saccades.
- Snyder et al concluded therefore that parietal lobe not only codes for spatial attention but spatial intention.
- The parietal lobe might present space in terms of the action to be carried out in that space.
Terminology

- Unilateral hemispatial neglect
- Unilateral hemispatial inattention
- Unilateral hemispatial agnosia
- Disorder of spatial perception
Classification by modality

- **Sensory Neglect**
  - Visual neglect
  - Somatosensory neglect (tactile)
  - Auditory neglect
  - Proprioceptive neglect
  - Vestibular neglect
Classification by modality

- **Motor Neglect**
  - Akinesia
    - Directional akinesia - hypometria
      - hypokinesia
      - bradykinesia

- **Mixed**
  - Buccal hemi neglect
  - Dysphagia neglect
Classification by Spatial representation

- Egocentric neglect
- Allocentric neglect
Classification by range of spatial neglect

- Personal Neglect-of body
- Peripersonal Neglect-on body and within reach of body
- Extrapersonal Neglect- outside reach of body
Agnosias

- “Lack of Knowledge/recognition” viz agnostic

- Ventral occipito-parietal stream
Apperceptive visual agnosia-recognition
Apperceptive visual agnosia: copy
Matching
ASSOCIATIVE VISUAL AGNOSIA

- **associative visual agnosia** patients derive normal visual representation but cannot use this information to recognize things.

- Patient is unable to recognize the object despite an apparent perception.

- Can copy a drawing rather accurately (indicating a coherent percept), match it to another object, use the object correctly, but cannot identify it.

- The problem seems to be situated at the level of association between the visual representation of the object and its semantic links (stored information about the object, category function).

- Bilateral lesion of the anterior inferior temporal lobe.
Associative visual agnosia
Associative VA-copy from memory

- can copy an anchor, can define it, but cannot draw it from memory demonstrating a deficit in accessing a mental image of the object

- failure of object recognition is a memory defect that effects not only past knowledge about the object, but also acquisition of new knowledge
Category specific agnosias
Akinetopsia

- Failure to detect motion and direction of motion.

- Beware of crossing roads. Patient might not have a visual hemispace inattention but might not perceive a car is approaching or the speed.

- Problem in the hMT lobe.
Final comment

- If you suspect a spatial perceptual or visual agnosia difficulty, refer for further neuropsychometric screening and evaluation.