Parietal laterality effects in visual information processing during object individuation and identification

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**Background**

The inferior IPS (IIPS) : individuates objects
The superior IPS (SIPS) : encodes features (identification)

Other studies:
- ERP studies : contralateral delay activity (CDA) tracks items stored in visual short-term memory (VSTM)
- Neglect patients : stronger laterality in the left than right hemisphere (hemispheric bias)
- fMRI studies : laterality in the parietal regions and hemispheric bias

**Questions**

1) What is the extent of laterality effect in the IIPS and SIPS?
   - Which regions contribute to ERP signal (CDA) during VSTM task?
2) Is there hemispheric bias?
3) How do top-down and bottom-up attention contribute to laterality effect and hemispheric bias?

**Experiment 1** (n=11)

VSTM task without top-down attention
- Probe present? 1.8s
- Delay 1s
- Sample 0.2s

Conditions
- 2 targets
- 4 targets

- Event-related design
- Conditions were randomly intermixed within a block

Laterality index
- No laterality
- Complete laterality

- Laterality in both IIPS and SIPS
- Greater laterality in IIPS
- No hemispheric bias

Further question
- No hemispheric bias, why? Due to lack of top-down attention?

Experiment 2A (n=10)

VSTM task with top-down attention
- Probe present? 1.8s
- Delay 1s
- Sample 0.2s

Conditions
- Unilateral
- Bilateral

- Event-related design
- Conditions were randomly intermixed within a block

- Blocked design, within a given block cued to attend to one visual field

- Presence of distractors weakened laterality

Experiment 2B (n=10)

Perceptual task with top-down attention
- Stimuli 0.5s + blank 0.3s
- Delay 1s

Conditions
- Unilateral
- Bilateral

- Event-related design
- Blocks are randomly intermixed within a block

- Fast trial presentation
- Task : respond when 2 out of 3 attended shapes are identical

**Summary and Discussion**

1) IIPS and SIPS have different amount of laterality (IIPS > SIPS),
   - Consistent with location based encoding in IIPS and feature based encoding in SIPS
   - Suggesting that ERP signal (CDA) might originate from more inferior regions.

2) Hemispheric bias in the parietal cortex is not fixed:
   - Bias emerges when task requires more top-down attentional control

**References**


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