**Within- and cross-modal attention modulate unattended visual information as revealed by the strength of visual motion aftereffects across visual contrast**

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**BACKGROUND**

Often information across our sensory modalities is not correlated and it might be necessary to suppress the processing of information in one modality to process information in another modality. Does the response to an ignored visual stimulus differ when attention is directed away to the same modality versus a different modality?

**METHODS**

**ATTENTION TASK**

- Central Fixation cues stimulus to attend: (visual left / visual right / auditory)
- Do 2IFC task at attended stimulus: (V: Visual; A: Auditory)
- Auditory Frequency Task (Which interval has higher pitch?)

**EXAMPLE ATTENTION COMPARISON**

**RESULTS: fMRI Experiment 1**

- **BACKGROUND**

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- **RESULTS: MAE Experiment 2**

  - Contrast of adapting stimulus varied between blocks (1.25, 5, 10, 20, 40, 80%).
  - Test stimulus contrast was constant (40%).

- **RESULTS: MAE Experiment 3**

  - When the test stimulus had the same contrast as the adapting stimulus, the MAE is stronger for Vl vs Vo, for Vl vs A, and for Vo vs A, consistent with results from IMRI experiment 1 and MAE experiment 1.

**CONCLUSIONS**

(1) Our MAE results with visual & auditory attention are most consistent with our fMRI results in V1, not MT+.

(2) Across all experiments, the MAE is stronger for an attended versus an ignored visual stimulus, confirming previous findings within the domain of visual spatial attention (e.g., Rezez et al., 2004).

(3) The MAE for an ignored visual stimulus is stronger when attending away to an auditory versus attending away to another visual stimulus (but see Berman & Colby, 2002; Rees et al., 2001). Thus, motion perception is more strongly suppressed when attending within the same modality, rather than across modalities.

(4) As visual contrast increases, MAE strength increases gradually, in accord with the slower saturation of neuronal contrast response functions in V1, as opposed to MT+.

(5) The magnitude of the change in MAE in different attention comparisons did not vary significantly as a function of contrast.

**REFERENCES**


**RESULTS: fMRI Experiment 1**

- Contrast of adapting stimulus was constant at 80%. No test stimulus presented.

- Neuronal Response

- MAE responses to ignored visual stimuli are stronger in V1 when attending an auditory stimulus, but stronger in MT+ when attending a visual stimulus.

- MAE is stronger for Vl vs Vo, for Vl vs A, and for Vo vs A, consistent with results from IMRI experiment 1 and MAE experiment 1.

**RESULTS: MAE Experiment 2**

- Contrast of adapting stimulus varied between blocks (1.25, 5, 10, 20, 40, 80%).

- Test stimulus contrast was constant (40%).

- MAE strength across contrasts

<table>
<thead>
<tr>
<th>Contrast of adapting stimulus</th>
<th>MAE strength</th>
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<tbody>
<tr>
<td>1.25</td>
<td>-0.02</td>
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<tr>
<td>5</td>
<td>-0.03</td>
</tr>
<tr>
<td>10</td>
<td>-0.04</td>
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<tr>
<td>20</td>
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<tr>
<td>40</td>
<td>-0.06</td>
</tr>
<tr>
<td>80</td>
<td>-0.07</td>
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</tbody>
</table>

**RESULTS: MAE Experiment 3**

- When the test stimulus had the same contrast as the adapting stimulus, the MAE is stronger for Vl vs Vo, for Vl vs A, and for Vo vs A, consistent with results from IMRI experiment 1 and MAE experiment 1.

**METHODS**

**VISUAL PERCEPTION**

Visual processing is probed by measuring MAE (post 1 sec adaptation) using a “Nulling paradigm”, where observers judge the direction of a slowly moving grating (upstim), presented unpredictably at one of the two possible locations.

**EXAMPLE ATTENTION COMPARISON**

**MAE Test**

visual processing is probed by measuring MAE (post 1 sec adaptation) using a "nulling paradigm", where observers judge the direction of a slowly moving grating (Upstim), presented unpredictably at one of the two possible locations.