Hallucinations are generally defined as an awake, percept-like experience in the absence of the appropriate causative stimulus. One hypothesis is that differential processing in high-level attentional networks produces hallucinations [1, 2], accordingly attentional deployment should alter hallucination processing. To test this we utilized luminance flicker to induce visual hallucinations [3].

**Methods**

**Flicker-induced hallucination (FIH)**

A white annulus flickering on a black background induces reliable hallucinated content (blobs) that rotated around the annulus and report their directions, during which participants reported their hallucinated motion directions.

**Participants**

12 participants (6 females, 6 males)

**Procedures**

Each condition consisted of three phases (perceptual adaptation, attention manipulation and post-manipulation) [4].

**Stimulus conditions**

- **Attention condition**: The flickering annulus was presented with physical blobs to induce visual hallucinations.
- **Inattention condition**: The flickering annulus was presented without any physical content, while participants were asked to pay attention to the foveal center.
- **No stimulus condition**: The annulus was presented. Participants were instructed to fixate their eyes.

**Analyses**

- **Main analysis**: we analyzed proportion of expected hallucinated direction, if adaptation-effect exists, for each condition and compared them in terms of final stimulus after attention modulated.

**Reflushing analysis**: trials from each physical direction was randomly selected (N=1000). With the resuffling procedure based on bootstrapping method, 95% confidence intervals of distribution of reshuffled data was extracted.

**Results**

**Screening**

<table>
<thead>
<tr>
<th>Stimulus</th>
<th>Perceived direction</th>
<th>Proportion of trials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attention</td>
<td>CW</td>
<td>0.5</td>
</tr>
<tr>
<td>Inattention</td>
<td>CCW</td>
<td>0.5</td>
</tr>
<tr>
<td>No stimulus</td>
<td>CCW</td>
<td>0.5</td>
</tr>
</tbody>
</table>

These data suggest that disregarding a flicker induced hallucination is equivalent to having it removed from view.

**Main results**

**Attention**

Phase 1

- **Initial adaptation**: 0.5
- **Attention**: 0.891

**Inattention**

Phase 2

- **Initial adaptation**: 0.5
- **Inattention**: 0.012

**No stimulus**

Phase 3

- **Initial adaptation**: 0.5
- **No stimulus**: 0.001

Dark color lines on the curve indicate data points significantly different from 0.5 (one sample t-test, p<.05, done only for phase 3). Initially adapted direction gained dominance again only in the “Attention” condition, whereas in the other conditions either direction tended to be perceived equally. These data suggest that disregarding a flicker induced hallucination is equivalent to having it removed from view.

**Conclusion**

Inattention abolishes flicker induced hallucination, supporting the role of top-down attention in hallucination formation.

**References**


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