Instructions for use

Title

An ERP study of visual change detection: Effects of the feature and spatial attention on the change-related posterior positivity

Author(s)

KIMURA, Motohiro; KATAYAMA, Jun'ichi; MUROHASHI, Harumitsu

Citation

The 46th Annual Meeting of the Society for Psychophysiological Research

Issue Date

2006-10

Doc URL

http://hdl.handle.net/2115/15864

Type

conference presentation

Note

10/25-29, 2006. The Hyatt Regency Hotel, Vancouver, BC, CANADA.

Poster Session 2・Friday, October 27, 2006 : 86

File Information

06SPR_Kimura.pdf

Hokkaido University Collection of Scholarly and Academic Papers: HUSCAP
An ERP study of visual change detection: Effects of the feature and spatial attention on the change-related posterior positivity

Motohiro KIMURA, Jun’ichi KATAYAMA, and Harumitsu MUROHASHI
Graduate School of Education, Hokkaido University, Sapporo, Japan
m-kimura@edu.hokudai.ac.jp

INTRODUCTION

Change-related positivity (CRP): A posterior positive ERP component at around 100-200 ms elicited by the visual change stimulus in the S1-S2 matching paradigm (Kimura et al., 2005, Psychophysiology). The pre-attentive nature of CRP: Significant elicitation of CRP in response to changes in unattended feature (i.e., spatial frequency) at attended location (Kimura et al., 2005, Nature), and to changes in attended feature (color) at unattended location (Kimura et al., 2005, Neuroscience). Purpose of the present study: To make a comprehensive assessment of the feature and spatial attention effects on the color and spatial frequency CRPs in the S1-S2 matching paradigm. We tested the elicitation of CRP in response to (1) changes in unattended feature at attended location, (2) changes in attended feature at unattended location, and (3) changes in unattended feature at unattended location.

RESULTS

Table 2. Behavioral performance (mean & SD)

<table>
<thead>
<tr>
<th>Change type</th>
<th>RT (ms)</th>
<th>Hit (%)</th>
<th>FA (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Color</td>
<td>435 (68)</td>
<td>89.3 (8.1)</td>
<td>0.8 (0.9)</td>
</tr>
<tr>
<td>Frequency</td>
<td>435 (68)</td>
<td>94.3 (5.0)</td>
<td>0.1 (0.2)</td>
</tr>
</tbody>
</table>

- RT: n.s. - Hit: Color < Frequency

Table 1. Four categories defined by the change type and the target change type

<table>
<thead>
<tr>
<th>Change type</th>
<th>Target change type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left color</td>
<td>S−F−, S−F+, S+F−, S+F+</td>
</tr>
<tr>
<td>Right color</td>
<td>S−F−, S−F+, S+F−, S+F+</td>
</tr>
<tr>
<td>Left frequency</td>
<td>S−F−, S−F+, S+F−, S+F+</td>
</tr>
<tr>
<td>Right frequency</td>
<td>S−F−, S−F+, S+F−, S+F+</td>
</tr>
</tbody>
</table>

- S: Spatial, F: Feature, −: Attended, +: Unattended
- # Since there were no systematic hemispheric differences, the left and right conditions were pooled.

DISCUSSION

CRPs to the changes in unattended feature at unattended location: The elicitation of the CRPs in response to changes in unattended feature at unattended location for both dimensions suggests the attention-independence of CRP. Thus, these results provide further support for the pre-attentive nature of CRP.

?? No CRP to the changes in attended feature (i.e., frequency) at unattended location ??: Although the reason why CRP was not observed in response to changes in attended feature at unattended location for the spatial frequency dimension is unclear, this might be consistent with the “competition hypothesis” for the auditory change detection (Sussman et al., 2003, Psychophysiology), proposing that the pre-attentive processing of the competing changes at unattended location is strongly inhibited.

CONCLUSION

Change-related positivity (CRP) reflects the pre-attentive detection of visual stimulus changes.