INTRODUCTION

Background:
ERPs as a tool for evaluating cognitive ability of children with develop. disorder:
• seeking out the appropriate paradigm
• A kind of simulation for interpreting the result pattern
just difficult for them or they show specific characteristics

Distraction effect:
• deteriorating performance caused by orienting attention to unexpected deviation in task-irrelevant stimulus property
• tonal frequency change in duration discrimination task
size change in shape discrimination task
• Enhancement of the P300 amplitude

Purpose:
To examine the effect of task difficulty on the visual distraction

METHODS

Participants:
13 students (m/f = 6/7, 20 – 28 (mean = 24.2) yrs.)

Stimuli:
Table 1. The stimuli used in this experiment

<table>
<thead>
<tr>
<th></th>
<th>Easy</th>
<th>Difficult</th>
</tr>
</thead>
<tbody>
<tr>
<td>Go (50%)</td>
<td>Freq. (42%) Dev. (8%)</td>
<td>Freq. (42%) Dev. (8%)</td>
</tr>
<tr>
<td>No-go (50%)</td>
<td>Freq. (42%) Dev. (8%)</td>
<td>Freq. (42%) Dev. (8%)</td>
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</table>

Go: r = 1.00 cm (3.14 cm²) No-go Easy: r = 1.50 cm (7.07 cm²)
No-go Diff.: r = 1.15 cm (4.15 cm²)
viewing distance: 1 m
2 conds. X 3 blocks X 200 stimuli
SOA: 1200 ms, dur.: 120 ms
random order; on white background

Task:
to make a quick button press by the right thumb to the Go stimuli,
regardless of the color

ERP recording:
EEG: 30 electrodes, referred to the nose tip
bandpass: 0.05 - 100 Hz, A/D: 500 Hz, 30 Hz offline low-pass filter
low-pass filtering (8 Hz, FIR zero-phase, -24 dB) after averaging
P300 peak: max. pos. pts. 300 - 700 ms at CPz (Go) or FCz (No-go)

RESULTS & DISCUSSION

Behavioral Data:

Table 2. Performance data for each condition (mean ± SD)

<table>
<thead>
<tr>
<th></th>
<th>Easy Dev.</th>
<th>Difficult Dev.</th>
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<tbody>
<tr>
<td>RT (ms)</td>
<td>317(77)</td>
<td>340(83)</td>
</tr>
<tr>
<td>Hit (%)</td>
<td>98.0(3.6)</td>
<td>97.6(4.2)</td>
</tr>
<tr>
<td>FP (%)</td>
<td>6.3(5.9)</td>
<td>5.6(7.0)</td>
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2 diff. X 2 stim. ANOVAs
• RT: Easy < Diff., Freq. < Dev.
• Hit rate: Easy > Diff., n.s.
• Difficulty manipulation was successful
Distraction effect in RT
No effect of task difficulty on RT distraction

Distraction effect in RT
• Difficulty manipulation was successful
• Distraction effect in RT
• Enhancement of the P300 amplitude

ERPs:

Fig. 1. Grand averaged and difference ERPs (N = 13).

Go stimulus elicited centro-parietal P300,
whereas No-go stimulus elicited fronto-central P300 in both conds.
The amplitude of these P300s were smaller in the Difficult condition.
These P300s were enlarged to the deviant stimulus.

Fig. 2. Schematic illustration for size discrimination task.

• Go stimulus stimulated centro-parietal P300,
whereas No-go stimulus stimulated fronto-central P300 in both conds.
The amplitude of these P300s were smaller in the Difficult condition.
The P300s were enlarged to the deviant stimulus.

2 Difficulty X 2 Go/No-go X 2 Stim. ANOVA
• Main effects of Diff, Go/No-go, and Stim
• 3-way interaction
  • Go: both Easy & Diff.: Dev. > Freq.
  • No-go: both Easy & Diff.: Dev. > Freq.
  but the effect was small in Easy condition

Fig. 3. P300 amplitude for each condition.

P300 distraction effect was smaller in No-go of Easy condition.

Fig. 4. Scalp distribution of P300s.

CONCLUSION

• No-go stimulus in the easy condition showed the small distraction effect on P300.
• This stimulus required shorter processing time for the task.

P300 distraction effect is related to the later part of the processing.

Further Processing

Contact Info.

Jun'ichi KATAYAMA, Ph.D.
Graduate School of Education
Hokkaido University
Sapporo 060-0811, JAPAN
E-mail: jk@edu.hokudai.ac.jp

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