How children and adults become familiar with perceptual item features: Development of ERP and behavioral correlates of familiarity and recollection for identical versus perceptually changed pictures

André Haese & Daniela Czernochowski
Institut für experimentelle Psychologie, Heinrich-Heine-Universität Düsseldorf
andré.haese@hhu.de

Introduction

In event-related potential (ERP) studies, recognition memory can be separated into two components: Recollection or familiarity. Recollection refers to the conscious recognition of an event, whereas familiarity is a more automatic, implicit process. The two components can be distinguished by the differences in their neurophysiological correlates. In particular, the frontal positivity (300–500 ms) and the parietal positivity (500–650 ms) have been associated with recollection and familiarity, respectively. However, the neural mechanisms underlying these components are not fully understood.

Methods

Participants

21 children in 2nd grade (7–9 years, mean = 7.7)
21 children in 4th grade (9–11 years, mean = 10.5)
19 undergraduate students (20–23 years, mean = 21.4)

EEG acquisition

27 active Ag/AgCl electrodes
Reference electrode: right mastoid
Sampling rate: 500 Hz
Band-pass filtered: 0.1 – 30 Hz

Material

We selected 200 pictures from Brogdon and Vandenberg [3] (ordered by Konrad & Gatheral [1]) and created changed counterparts (same, different, or new). We also created identical items—particularly at frontal electrodes.

Procedure

4 Phases:
- Incidental study – incidental test
- Intentional study – intentional test

Analysis

PTC + FST + TDC = Total Correct Rejections + Total False Alarms + Total Hits

Results

Overall, intentional encoding lead to better performance than incidental encoding. However, performance was better when items were presented identically (versus perceptually changed). This effect was most pronounced when encoding was incidental. When comparing incidental with intentional encoding, older children showed higher performance than younger children. This difference, however, was not observed in the older children. These findings suggest the role of perceptual stimulus features in determining familiarity and recollection. In our study, children and adults decided whether objects shown as pictures were more commonly found indoors or outdoors. By contrast, several studies report evidence that early frontal effects is not fully understood.

References