Same Stimulus – Different Constellation: The visual mismatch mismatch investigated with Garner’s patterns

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Introduction

How early is the brain able to categorize different conceptual categories based on perceptual information?

The vMMN and categorization

- The vMMN is an ERP componend that is elicited by an infrequent deviant in a series of frequent standards.
- The underlying system of the vMMN can automatically detect changes in complex regularities [3].

Hypothesis

Does automatic perceptual encoding of stimulus category affect early sensory processing steps?

- (1) vMMN is elicited if two patterns belong to different sets - two different perceptual categories.
- (2) vMMN is elicited if two patterns belong to the same set - two different cognitive categories.
- (3) Difference between vMMN (1) and vMMN (2) - two different category types.

Experiment 1

Procedure

Experimental blocks
Deviant-8 block (12.5%) Target (12.5%) Standard (75%)
Deviant-4 block
Equiprobable control block

Task
Count the targets and report orally per block

Participants
24 healthy, right-handed students (10 females, mean age 25.8 years)

Results

Accuracy

Accuracy was steady with a mean of 94.9%. (F (2, 46) = 0.23, p = .72)

ERPs

vMMN

vMMN can be observed. (t (23) = -6.52, p < .001)

No difference between both. (t (23) = 0.66, p = .52)

Discussion

Summary

(1) Hypothesis: vMMN was elicited with a deviant belonging to a different perceptual category than the controls. Detecting changes on mere perceptual differences without changing physical energy.

(2) Hypothesis: vMMN was elicited with a deviant belonging to a different cognitive category than the controls.

(3) Hypothesis: No difference between a vMMN elicited by a deviant that was within the same or a different set. Hence, the underlying system of the vMMN does not differentiate between or within categorical changes but can mirror initial cognitive categorization processes.

Further results and investigation

Replication of results in a second experiment with a different block order. The order could still influence the vMMN. Thus the block order should be changed again in future experiments.

References