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Involvement of memory-based change detection in visual distraction

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INTRODUCTION

■ Distraction effect

Distorted behavioral performance by sudden stimulus deviants

■ Visual distraction effect

Distraction by location deviants (Berti & Schröger, 2001, 2004)

■ Purpose

- ?? Involvement of memory-based change detection in visual distraction ??

- ?? An ERP correlate of memory-based change detection ??

> We examined the effects of sudden energetic decrements

METHODS

■ Participants

12 students (m/f = 5/7, mean = 25.4 yrs.)

■ Stimuli (Table 1)

Central stimuli: Square & Triangle (11.5 cd/m², 2.0° x 2.0°)

Peripheral stimuli: Light & Dark (79.5 & 2.5 cd/m², 2.5° x 2.5°)

■ Task

Forced-choice task for central stimuli

■ EEG recordings

EEG: 25 electrodes, referred to the nose tip

Bandpass: 0.03-30 Hz, A/D: 250 Hz

■ Data analysis

Deviance effects: Deviant-minus-standard differences

■ Procedure

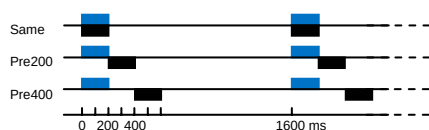


Figure 1. Three time-interval conditions.

Table 1. The stimuli and two probability conditions

	Peripheral stimuli	Central stimuli	
	(Light)	(Dark)	(Square) (Triangle)
Light deviant condition	15	85	50 50
Dark deviant condition	85	15	50 50 (%)

RESULTS

■ Deviant-minus-standard difference ERPs

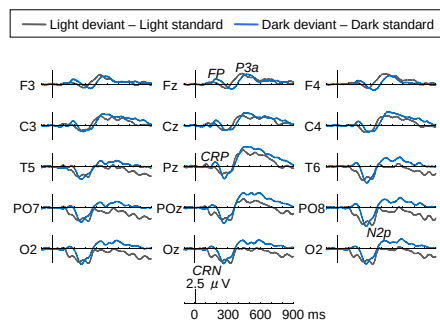


Figure 2. Deviant-minus-standard difference waves (time-interval conditions were pooled). CRN: change-related negativity; CRP: change-related positivity; FP: frontal positivity; N2p: posterior N2.

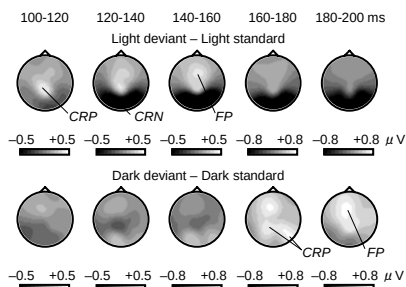


Figure 3. Topographical maps of the difference waves (time-interval conditions were pooled). CRN: change-related negativity; CRP: change-related positivity; FP: frontal positivity.

- Light deviant effects: CRN, CRP, FP, N2p, & P3a

- Dark deviant effects: CRP, FP, N2p, & P3a (No CRN)

■ Behavioral distraction effects

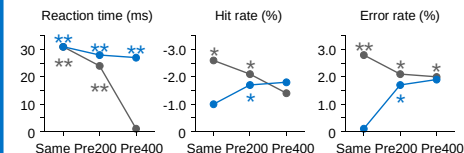


Figure 4. Behavioral distraction effects (i.e., deviant-minus-standard differences) in the three time interval conditions. **: $p < .01$, *: $p < .05$ by one-tailed t -tests.

Behavioral distraction by both Light & Dark deviant stimuli

DISCUSSION

■ Involvement of memory-based change detection in distraction

< Behavioral distraction and elicitation of N2p & P3a even in response to Dark deviants

■ CRP: Memory-based change detection

< CRP in response to both Light & Dark deviants (e.g., Fonteneau & Davidoff, 2007; Kimura et al., 2006)

■ CRN: Refractoriness-based rareness detection

< CRN in response to Light deviants only (e.g., Berti & Schröger, 2006; Kenemans et al., 2003)

CONCLUSION

- Involvement of memory-based change detection in visual distraction

- CRP as an ERP correlate of memory-based change detection

CONTACT INFO.

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