

# The behavioral impact of auditory and visual oddball distracters in visual and auditory categorization tasks

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## Introduction

Numerous studies have established that one's attention can be involuntarily captured by sudden changes (oddball, novel, or deviant stimulus) in a train of otherwise repeated sounds (standard). Of importance, brain responses observed in auditory oddball tasks are also observed in the so-called cross-modal oddball task in which participants process visually presented material in the face of irrelevant auditory distracters (e.g. Escera, Ahlo, Winkler, & Näätänen, 1998). Furthermore, such responses are also observed for deviant tactile stimuli (e.g., Knight, 1996) as well as in purely visual paradigms (e.g., Berti & Schröger, 2004). Behaviorally, responses in a primary task are delayed following the presentation of a task-irrelevant deviant stimulus.

Performance in a visual discrimination task is also affected by auditory deviants or novels (two-channel paradigm), as demonstrated in studies using the cross-modal oddball task (e.g., Andrés, Parmentier & Escera, 2006; Barceló, Escera, Corral, & Periañez, 2006; Escera et al., 1998).

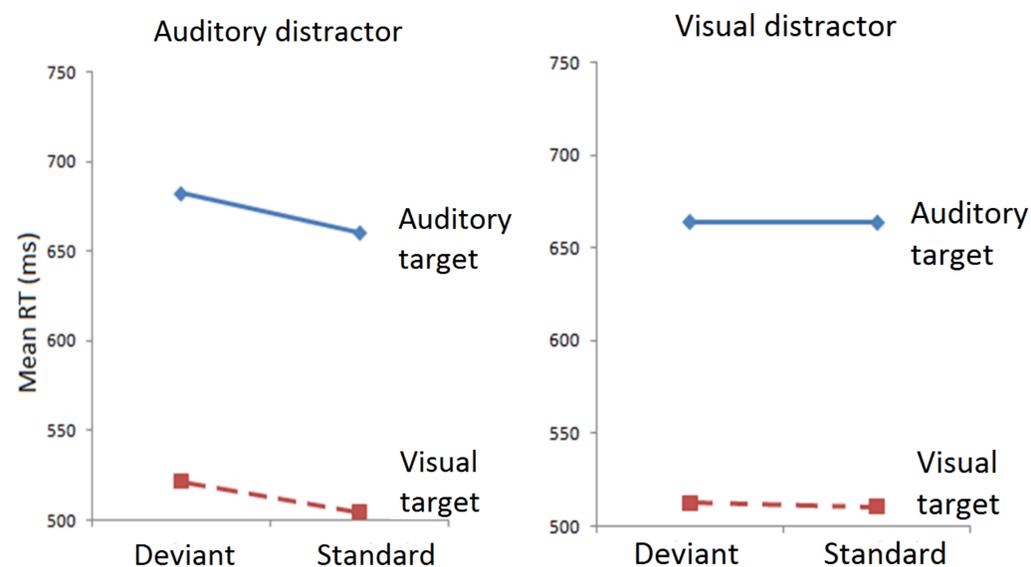
Behavioral distraction consists in the lengthening of response latencies in the visual task, following deviant or novel sounds compared to standards. Importantly, such behavioral distraction is not limited to deviant sounds but is also observed for visual (e.g., Berti & Schröger, 2004) and tactile (Parmentier, Ljungberg, Elsley & Lindkvist, in press) deviants, suggesting that the behavioral impact of deviant stimuli, just as their electrophysiological signature, may be underpinned by functionally similar mechanisms.

The present study is the first to examine systematically the impact of auditory and visual deviant stimuli on performance in auditory and visual categorization tasks.

We used the uni-modal and cross-modal oddball tasks illustrated on the left and in which participants categorized the parity of visual or auditory digits while ignoring auditory or visual distracters. The study aimed to explore whether novelty distraction is mediated by the sensory modality in which distracter and target are presented.

Sample: 24 university students (21 females) reporting normal hearing and normal or corrected-to-normal visual acuity (mean age = 21.5, SD = 4.43).

## Key finding



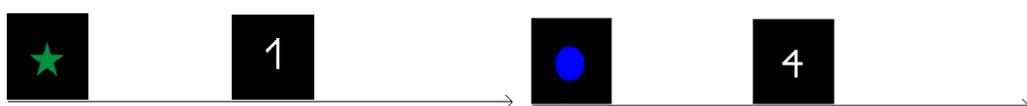
- [1] The analysis of RTs revealed an interaction between distracter modality and sound condition,
- [2] no difference between deviant and standard conditions when the distracter was visual,
- [3] but significantly slower RTs in the deviant condition than in the standard one when the distracter was auditory (effect of same size for auditory and visual targets).

## Method

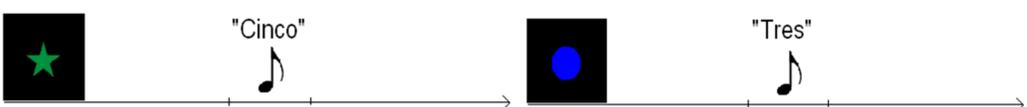
Deviant trials (20%)

Standard trials (80%)

Visual distractor-Visual target



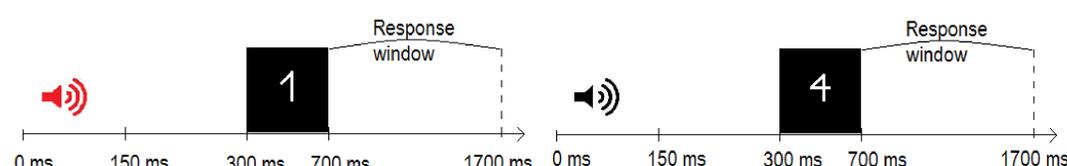
Visual distractor-Auditory target



Auditory distractor-Auditory target



Auditory distractor-Visual target



(conditions administered within-participant with order counter-balanced using a Latin Square method)

## Conclusion

Distraction was observed in the presence of auditory deviants, irrespective of whether the targets were visual or auditory. Visual oddball distracters, in contrast, yielded no distraction, whether targets were visual or auditory. Behavioral oddball distraction is not mediated by the sensory modality of the target stimuli but by that of the distracters.

Our results differ from past demonstrations of distraction by visual deviants (e.g., Berti & Schröger, 2004). However, it is worth pointing out that the latter used tasks in which distracter and target information were presented as part of the same perceptual object. Future research is needed to establish the extent to which distraction by visual deviants is contingent upon the participant attending the distracter information. Our results show that when distracter and target are perceptually and temporally decoupled, visual deviants do not yield behavioral distraction, in contrast to auditory deviants.

### References

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