# Auditory alerts caused by changes in unattended sounds


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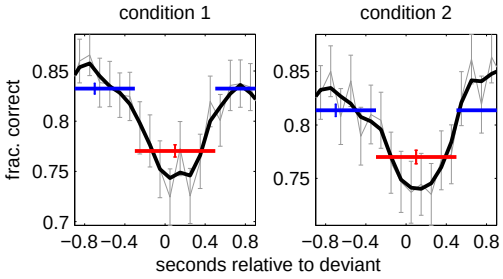
An important function of the auditory system is to alert animals to changes in their environment. Phenomena such as mismatch negativity (MMN), changes in detection threshold and changes in reaction time are associated with rare deviant sounds amongst common standard sounds [1]. Here, we focus on the range and impact of certain changes in unattended sounds on the perception of other, attended sounds, interpreting such changes as potentially containing a distracting, "alerting" quality, related to informational masking [2]. The eventual goal of this research is to find which changes in distributions generating stochastic sounds do and do not cause auditory alerts.

We tested the distracting quality of changes in an unattended sound by asking subjects to discriminate between two frequencies of regularly presented tone pips, while simultaneously presenting the sound of interest as a spectrally well-separated, task-irrelevant auditory stream. The impact of changes in the task-irrelevant stream on the performance in the discrimination task could then be studied. This design is related to a previously proposed distraction paradigm in which there is no unattended sound and the task-irrelevant changes (such as a change in volume) occur in the tone pips of the discrimination task themselves [3].

We present psychophysical results showing the time-varying extent of the distracting quality of a change in the unattended sound (see figure below). In some cases, this works symmetrically: a rare instance of sound A within commond sound B is distracting, whereas a rare instance of sound B within common sound A is also distracting. Thus change, rather than identity, of the unattended stimulus is responsible for the distraction.




Grand average results on pilot data from six subjects (two of whom were not naive). *Blue:* average performance away from deviants. *Red:* average performance near deviants. *Black and gray:* temporal variation of performance near deviants. The standard sound in one condition was the deviant in the other condition. These sounds were harmonic stacks differing in distribution of power in each harmonic.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**References**


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[2] Some comments on informational masking. C. S. Watson, *Acta Acustica with Acustica* 91:502-512, 2005.

[3] Behavioral and electrophysiological effects of task-irrelevant sound change: a new distraction paradigm. E. Schroeger and C. Wolff, *Cognitive Brain Research* 7(1): 71-87, 1998.