Attentional Capture by Sound Disappearance

Nicholaus P. Brosowsky & Todd A. Mondor

Department of Psychology, University of Manitoba

University of Manitoba

NSERC CRSNG

INTRODUCTION

Does the sudden disappearance of a sound automatically capture attention?

Previous research has shown that the sudden onset of either a sound or a visual event may act to capture attention. Similarly, some evidence has accumulated indicating that the abrupt disappearance of a visual object can capture attention.

The possibility that the disappearance of a sound similarly captures attention has, however, not previously been rigorously examined. The current study was designed to address this unresolved issue.

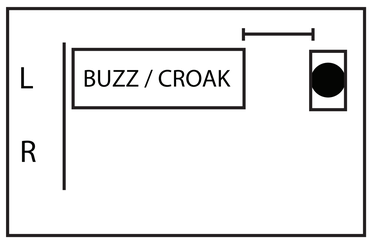
METHODS

In all experiments, participants were presented with extended context sounds from one or two spatially-separated channels (these were the 'buzz' and 'croak' sounds created by Mondor, Leboe & Leboe, 2005 – see the original article for details).

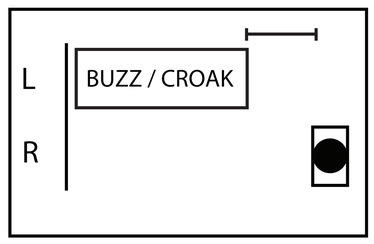
A brief target sound was presented immediately after the abrupt termination of one of these context sounds and the speed and accuracy of the listeners' identification of target pitch (low or high) was measured.

Experiment 1

Valid / 100 or 200 ms ISI

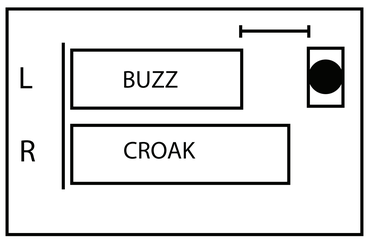


Invalid / 100 or 200 ms ISI

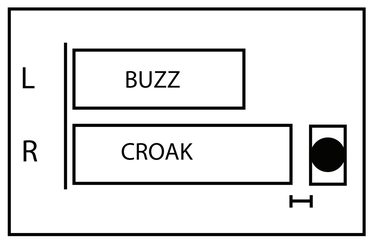


Experiment 2

Target following small context / 100 or 200 ms ISI

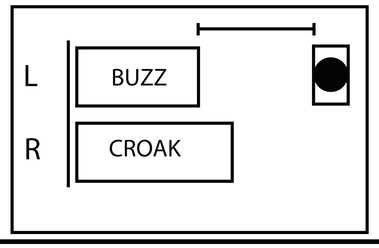


Target following large context / 25 ms ISI

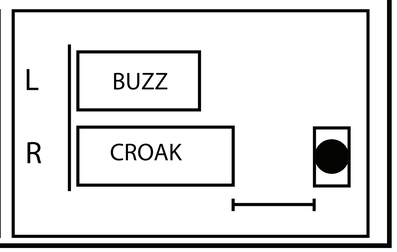


Experiment 3

Target following small context / 500 or 600 ms ISI



Target following large context / 425 ms ISI

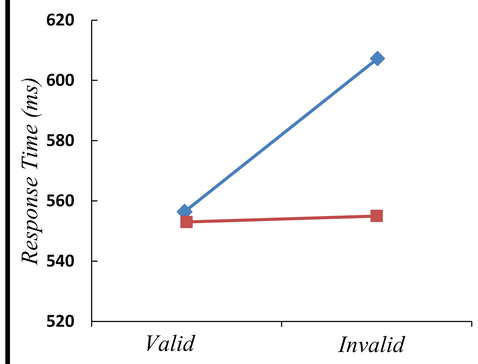


RESULTS

◆ *100 ms ISI* ▲ *500 ms ISI*

■ *200 ms ISI* ✕ *600 ms ISI*

Experiment 1

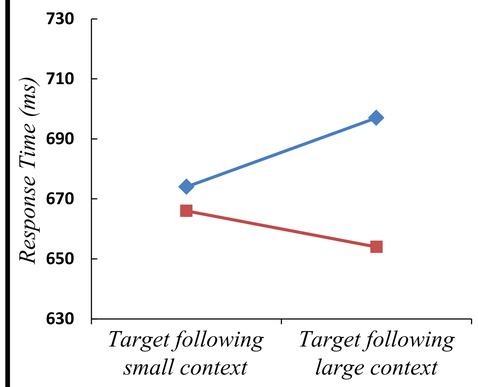


◆ At 100 ms ISI, participants responded significantly more quickly on the Valid trials (M = 577 ms) than the Invalid trials (M = 607 ms), $F(1,11) = 10.19$, $p < .01$.

■ There was no significant differences in response times at 200 ms ISI, $p > .05$.

✻ There was no significant difference in error rates across conditions with an average error rate of 5.99%.

Experiment 2

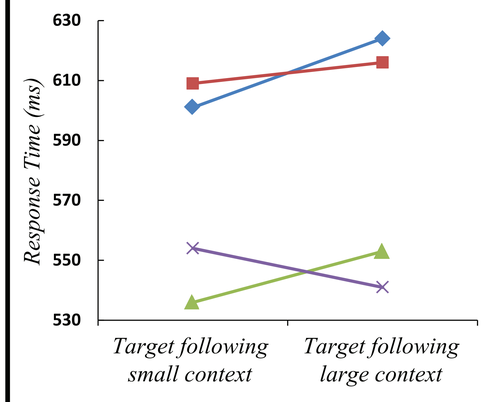


◆ At 100 ms ISI, participants responded significantly more quickly when the target followed the short context sound (M = 674 ms) rather than the longer context sound (M = 697 ms), $F(1,29) = 5.05$, $p < .05$

■ There was no significant difference in response times at 200 ms ISI, $p > .05$.

✻ There was no significant differences in error rates across conditions with an average error rate of 6.76%.

Experiment 3



◆ At 100 ms ISI, participants responded significantly more quickly when the target followed the short context sound (M = 601 ms) rather than the longer context sound (M = 624 ms), $F(1, 15) = 6.35$, $p < .05$.

■ There was no significant difference in response times at 200 ms ISI, $p > .05$.

▲ Similarly, at 500 ms ISI, participants responded significantly more quickly when the target followed the short context sound (M = 536 ms) rather than the longer context sound (M = 553 ms), $F(1,15) = 5.28$, $p < .05$

✕ There was no significant difference in response times at 600 ms ISI, $p > .05$.

✻ There was no significant differences in error rates across conditions with an average error rate of 3.89%.

CONCLUSIONS

Taken together the results of these three experiments suggest both that sound offset does indeed capture attention and that approximately 100 ms is required to orient attention to this abrupt change in the auditory scene.

In Experiment 1, participants were presented with a single context sound in either the left or right channel that abruptly terminated 100 or 200 ms (ISI) before the presentation of a target which could also be presented in either the left or right channel. Under these conditions, participants responded more quickly when the target was presented in the same channel as that in which the context sound terminated at 100 ms ISI but not at 200 ms ISI.

The second experiment was similar to the first except that different context sounds were presented concurrently from different locations. In addition, whereas one of the context sounds terminated either 100 or 200 ms prior to the onset of a target, the other terminated 25 ms before the target. The target sound was presented either in the same location as the longer context sound (so ISI here would be 25 ms) or in the location of the shorter context sound (so ISI here would be 100 or 200 ms). Participants were found to respond more quickly and accurately when the target was presented in the same channel as the context sound that terminated 100 ms prior to its onset.

Experiment 3 was similar to Experiment 2, except that a wider range of silent periods between the context sounds were used. Results revealed that listeners responded more quickly when the target was presented in the same channel as the context sound that terminated first even when the target was presented much later.

QUESTIONS?

Please contract:

Nicholaus Brosowsky

University of Manitoba

umbroson@cc.umanitoba.ca