

Effects of Awareness on the Control of Attention: An Auditory Behavioral Paradigm

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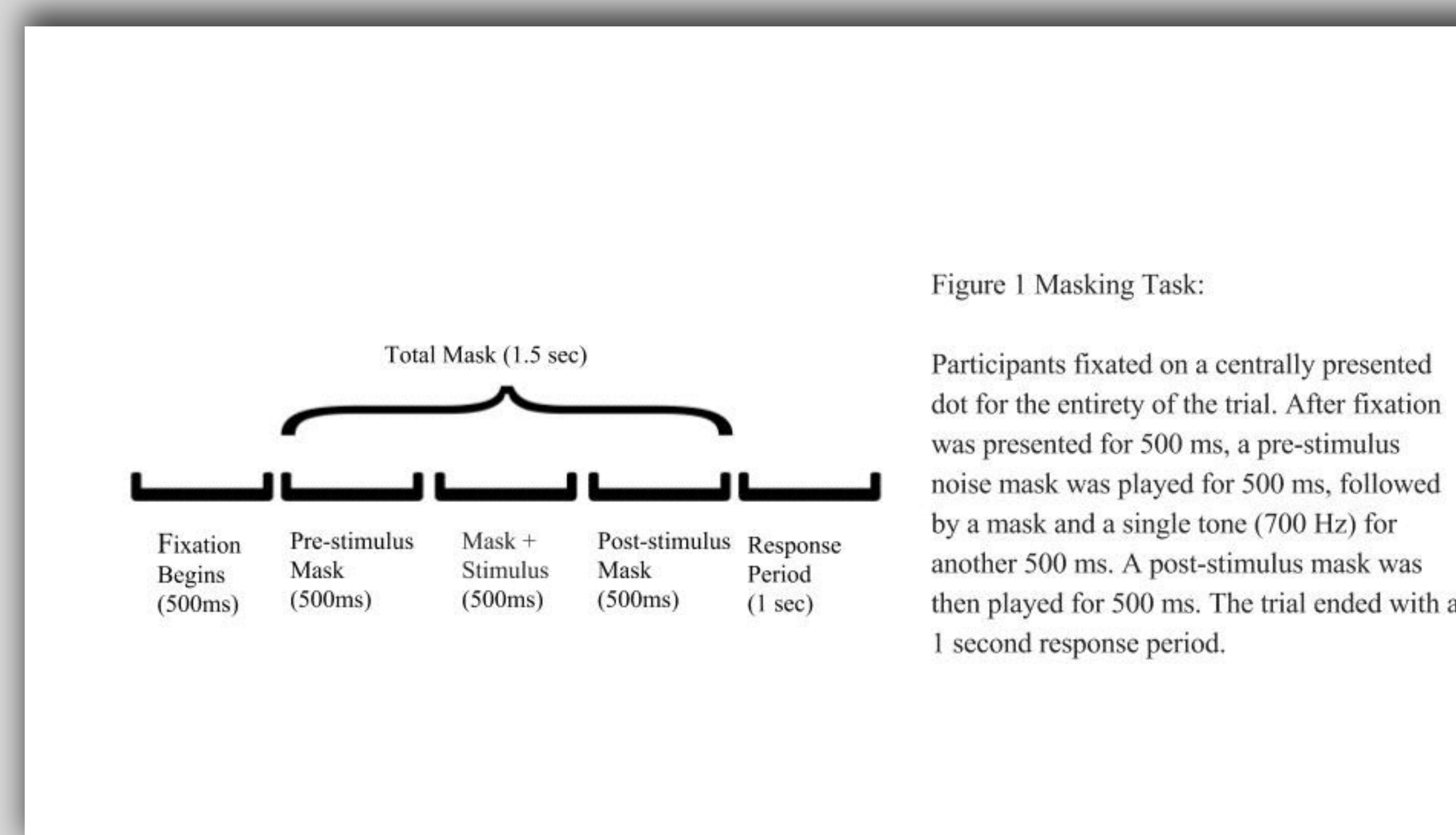


ABSTRACT

Previous studies have shown that it is possible to attend to a visual stimulus without being aware of the visual stimulus. However, it is not known whether this dissociation extends to other sensory modalities.

We developed a paradigm for testing auditory spatial stimuli at different levels of awareness. The spatial location of auditory stimuli was simulated using interaural time differences and interaural level differences. Awareness for those stimuli was controlled by masking them with bandpass filtered white noise. Spatial attention was measured using an auditory variant of the Posner attention paradigm.

RESULT



DISCUSSION

In this experiment, the 'quiet' trials resulted in 58% detection rate, 91% on the 'medium' trials and 96% on the 'loud' trials. The results established this as a viable method for auditory masking of spatially localized tones.

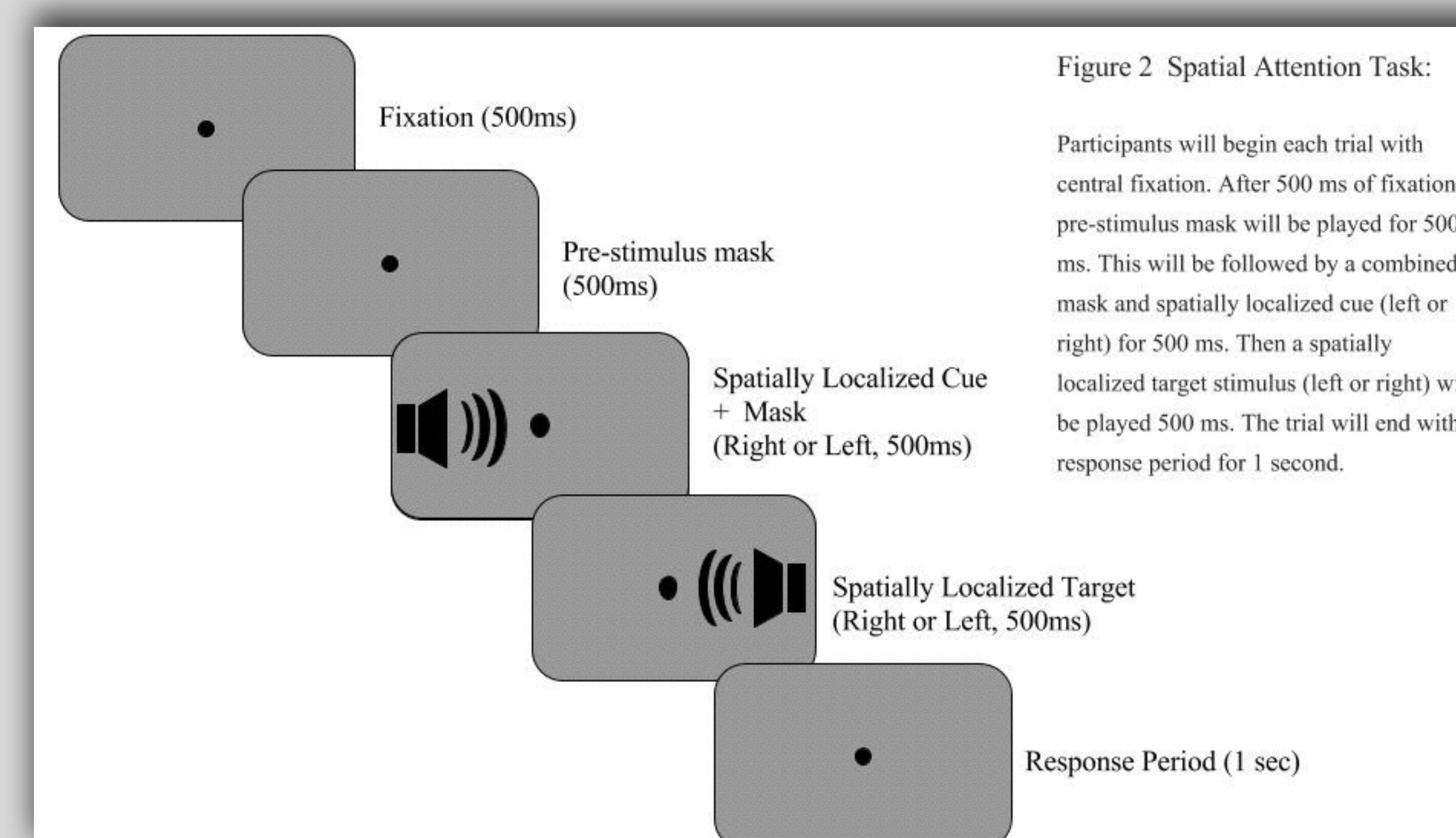
Questions for further research:

One important question is whether the masked stimuli in this experiment will affect attention. In future tasks, we plan to use these stimuli as cues in an auditory version of the Posner attention paradigm. Previous work has explored differences between attention with and without awareness (Webb, Kean, & Graziano, 2016), but this work has been in the visual domain. An important step will be to determine whether these differences generalize to the auditory domain. The present experiment is a first step toward testing this question.

METHOD

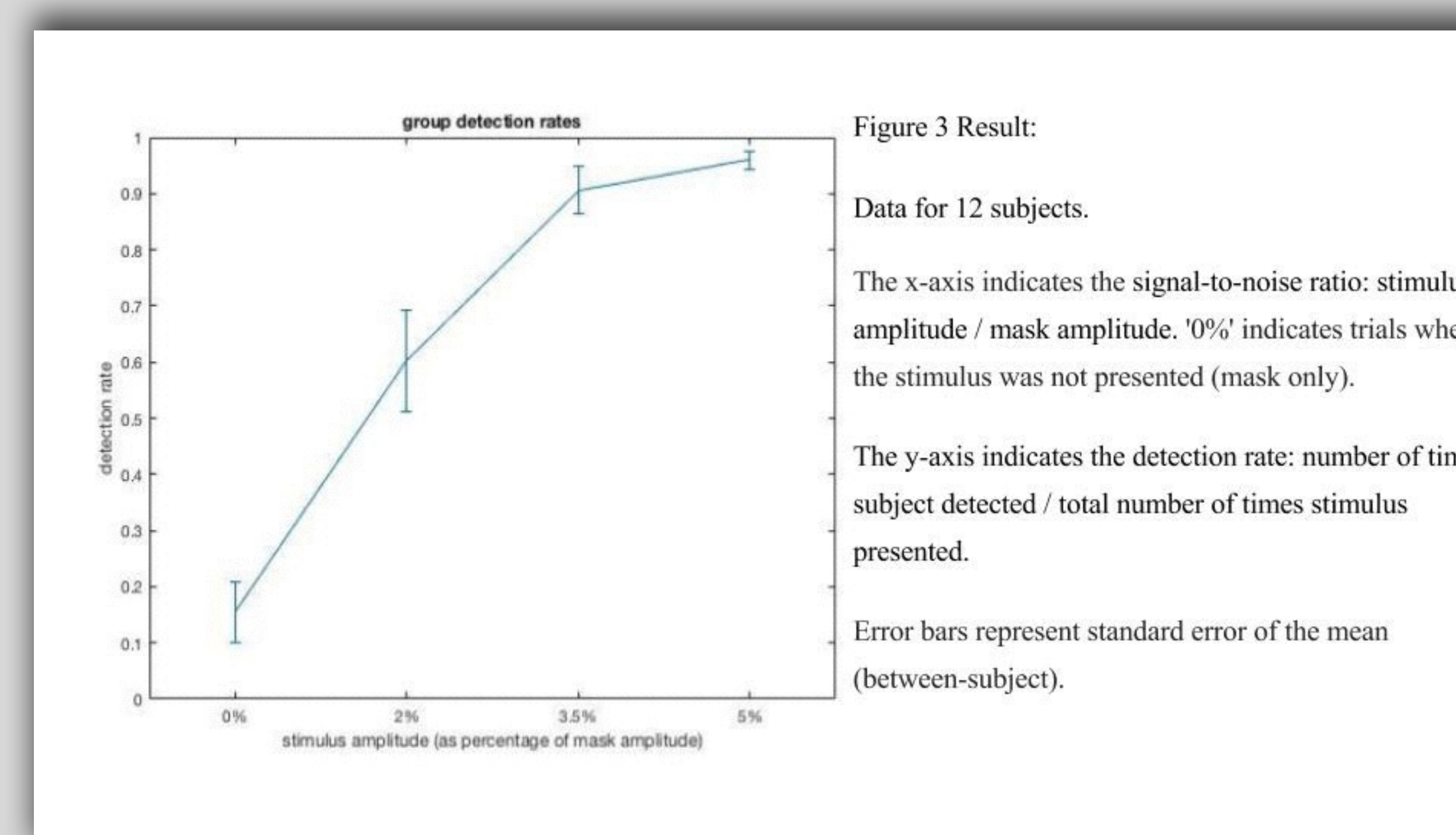
Method: Participants performed a task in which they attempted to detect a 700Hz sinusoidal tone. This tone was masked using white noise bandpass filtered between 600 Hz and 800 Hz. Participants began each trial by fixating on a centrally presented dot for 500 milliseconds (ms), and continued to fixate on this dot throughout the trial. This was followed by the bandpass filtered mask alone for 500 ms. This was followed by the tone and mask combined for 500 ms. This was followed by the mask alone again for 500 ms. Finally, participants had 1 second to make a response.

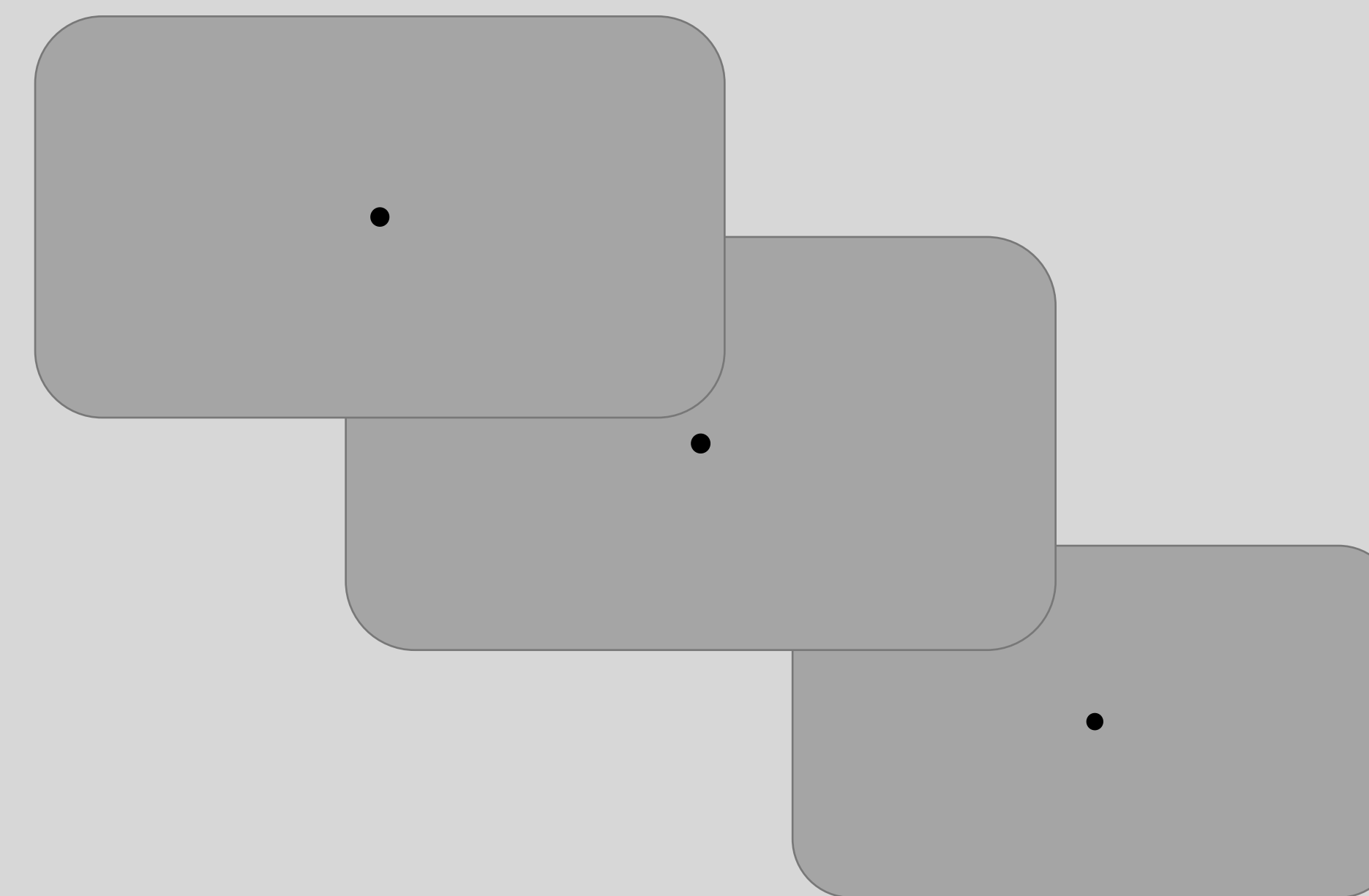
Participants pressed the F key if they detected a tone, and the J key if they did not detect a tone. Tones were spatially localized either to the right or the left, using a combination of interaural time differences and interaural level differences. Participants were presented with a left-localized tone on 1/3 of trials, a right localized tone on 1/3 of trials, and no tone on 1/3 of trials. The trials with no tone served as catch trials to ensure that participants were not guessing about the presence of the tone. Additionally, tones were presented at three different amplitudes: 2%, 3.5% and 5% signal-to-noise ratios.



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Spatially localized
cue

