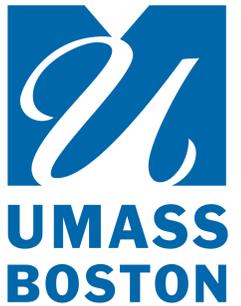




Matching a Shape with a Sound: Does sound-shape correspondence modulate a neuronal signature of visual shape processing?



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QUESTION: Can a sound influence the processing of visual information?

Matching a Shape with a Sound

Cross-modal integration is an essential process that enables the formation of a unified percept of the world. Previous studies have shown that a sound can influence visual attention [1]. It has also been shown that certain sounds (e.g. /kiki/) are associated with certain abstract shapes (e.g. spikey shape) [2, 3]. Here we examine if crossmodal correspondence between non-sense words and abstract shapes modulates the effect of sound on neuronal visual processing.

Method:

Survey: Stimuli were presented using powerpoint presentation software displayed on a Tobii T120 eye tracker monitor. Subjects' judgements were recorded through written response.

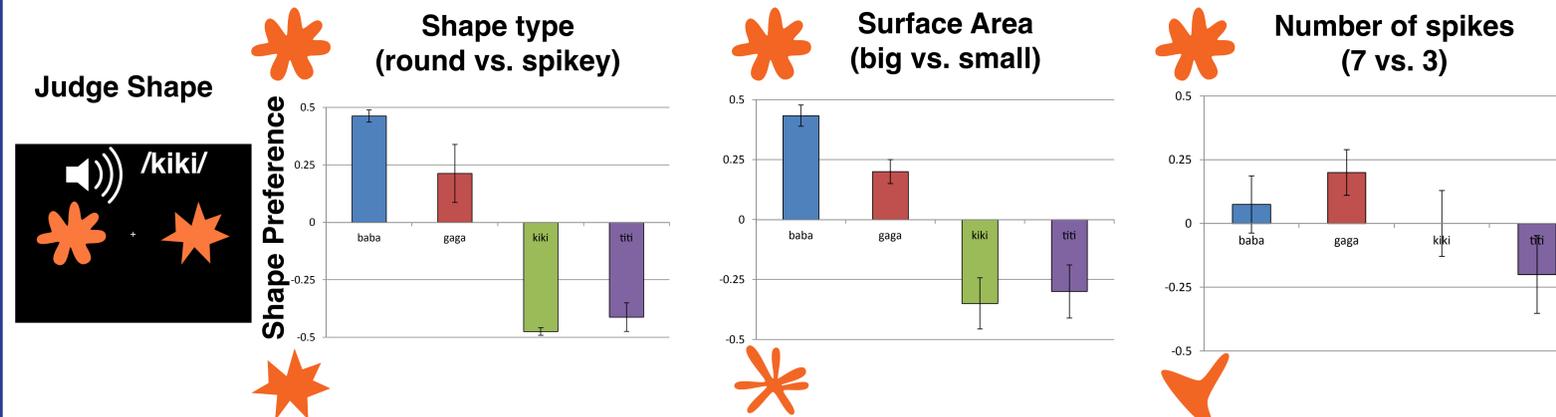
EEG: We recorded 32 channels of EEG data (Biosemi with ActiView). Stimuli were presented using the Presentation software and displayed on a Tobii TX300 eye tracker monitor. Participants completed four blocks (one block per sound condition) with either the round-bouba or spikey-kiki shape. Visual and/or auditory stimuli were passively viewed while subjects maintained fixation at the center of the screen.

Demographics

	Subject (N)	Mean Age (years)	Females (N)
Survey	10	24.2 (5.1)	7
EEG	10	25.8 (4.5)	7

Stimulus Optimization: Survey

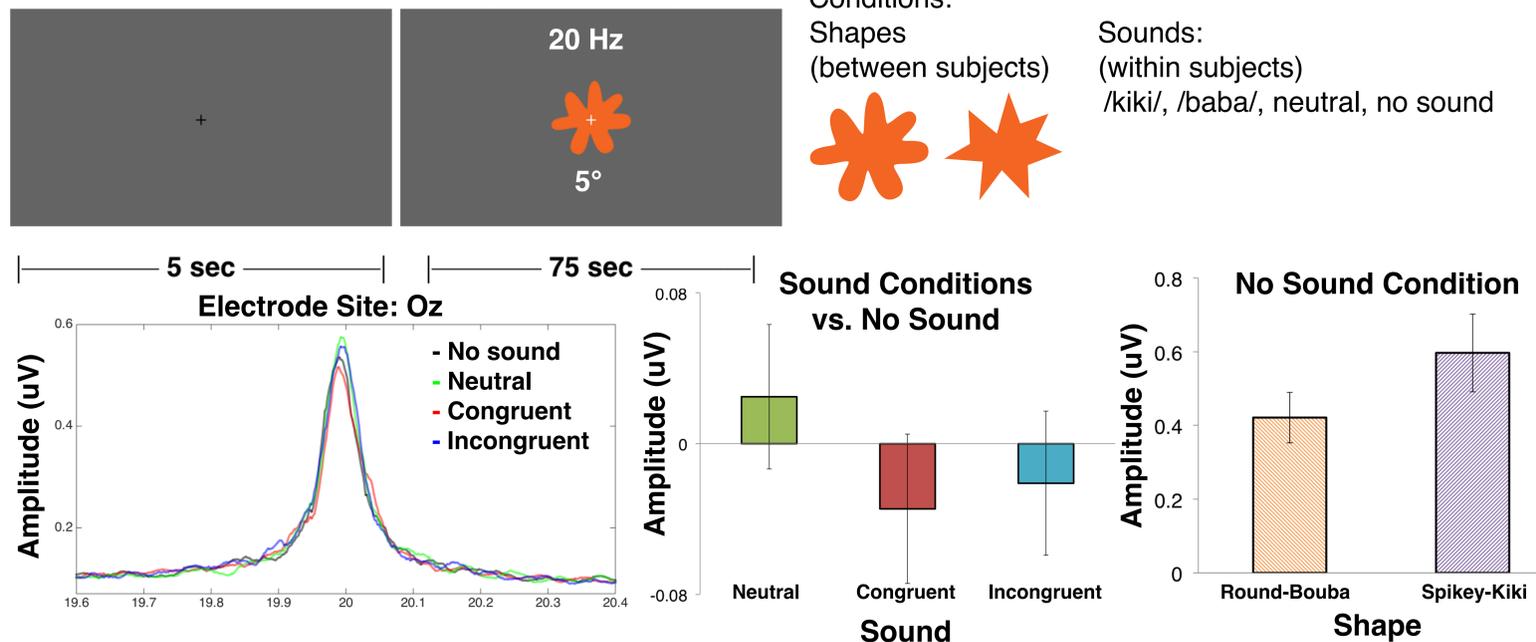
Sound: /baba/ /gaga/ /kiki/ /titi/



Participants completed 2 conditions, judging shapes and judging sounds. In the judge shape condition, 2 visual objects were presented simultaneously with a sound. Participants were asked to select which of the 2 shapes best corresponded with the sound. Consistent with previous results, the /baba/ and /gaga/ sounds were associated with the rounder shapes and the /kiki/, /titi/ sounds with the spikey shapes [4,5].

Influence of Congruent and Incongruent Sounds

Schematic illustration of sample trial (9 trials in total).



The Presence of a Sound

The addition of either a congruent, incongruent, or neutral sound showed no significant differences in the neural signature representing the processing of the visual information. One possible reason could be that the effects of the sound on visual processing would be better measured with the intermodulation frequency, a frequency generated from the combination of auditory and visual frequencies when neurons are responding to both stimuli.

Congruent vs. incongruent auditory information

We expected that when the sound and shape are congruent there would be a facilitation of visual processing that results in a measurable increase in the neural signature of the visual stimulus. Surprisingly, there were no differences in the processing of a visual stimulus when the sound was congruent compared to incongruent.

Influence of the Visual Stimuli

To investigate whether there was a shape bias in processing the visual stimuli that has been noted in the literature [6], we compared the group that saw the round-bouba shape with the group that viewed the spikey-kiki shape. Though on average the spikey-kiki shape showed a trend of greater visual processing compared to the round-bouba shape.

The processing of visual information was unaffected by the simultaneous presentation of a sound.

References:

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