

# Audiovisual Temporal Synchrony Directs Selective Listening in Four-Month-Old Infants

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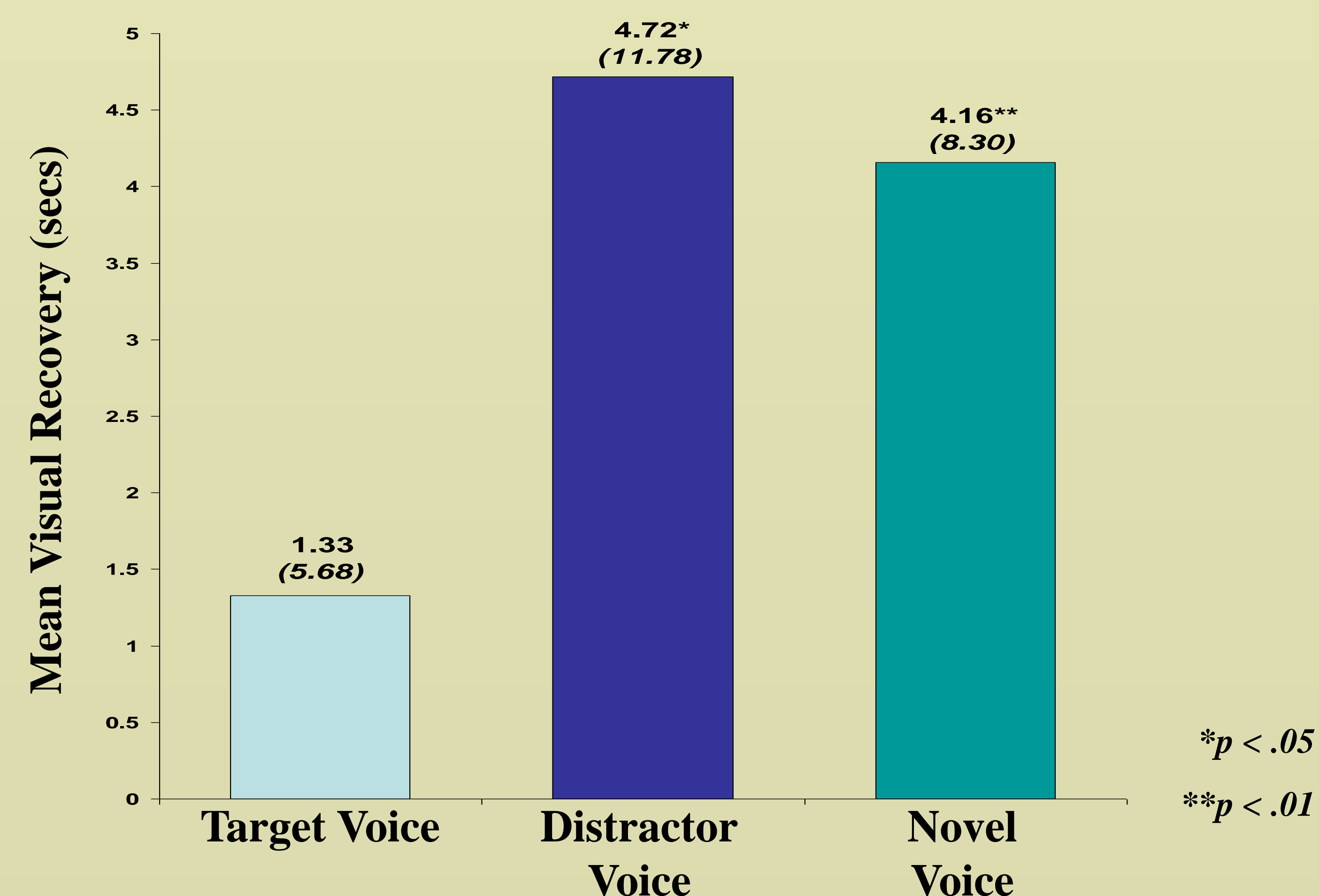
## Abstract

Research has demonstrated that intersensory redundancy such as audiovisual temporal synchrony guides and constrains early selective attention (Bahrick & Lickliter, 2000; 2002; Bahrick, Walker, & Neisser, 1981). Audiovisual temporal synchrony can guide auditory selective attention even in the context of competing background noise. Research indicates that 7-month-olds can attend to a female voice synchronized with a face while ignoring a nonsynchronous male voice of the same amplitude (Hollich, Newman, & Jusczyk, 2005). The present study assessed auditory selective attention in younger infants under more difficult conditions: two identical nursery rhymes were spoken concurrently, at the same amplitude, and out of phase with one another, by two females. Results suggest that infants selectively attended to the voice synchronized with the face during habituation and ignored the concurrent asynchronous distractor voice, even under these difficult conditions.

## Introduction

Adults routinely attend to one speech stream while ignoring concurrent speech nearby, as illustrated by the “cocktail party phenomenon”. What guides this selective attention and how does it develop? Infant research has demonstrated that detection of amodal information (intersensory redundancy) such as audiovisual temporal synchrony guides and constrains early visual and auditory selective attention (Bahrick & Lickliter, 2000; 2002; Bahrick, Walker, & Neisser, 1981). Hollich, Newman, & Jusczyk (2005) recently extended this to selective listening in the context of background noise: 7-month-old infants attended to a female voice synchronized with a face while ignoring a concurrent but nonsynchronous male voice of the same amplitude. The present study assessed whether face-voice synchrony was sufficient for guiding selective listening in younger infants under more difficult conditions: two identical nursery rhymes were spoken concurrently, at the same amplitude, by two females, using infant-directed-speech.

**Figure 1.** Visual recovery to the face during test trials when it was synchronized with the target voice (synchronous during habituation), the distractor voice (asynchronous during habituation), and a novel voice (not presented during habituation).



## Methods

Four-month-old infants (N=36) were habituated to two female voices each speaking the same rhyme, while only one voice (target) was synchronized with a speaking face and the other (distractor) was asynchronous. Each infant received 3 types of test trials (order counterbalanced) each depicting the habituated face synchronized with a different female voice (target, distractor, and novel voice). Visual recovery to each voice synchronized with the familiar face was assessed. We reasoned that if audiovisual synchrony guides selective attention, infants would attend to the target voice during habituation and should thus treat the target voice test trials as familiar (no visual recovery) and the distractor and novel voice test trials as novel (visual recovery). Since the same face was played on all habituation and test trials, visual recovery could only be based on discrimination of voices.

## Results

Consistent with our predictions, infants showed significant visual recovery to the novel ( $t(35) = 3.01, p = .005$ ) and distractor voice test trials ( $t(35) = 2.40, p = .022$ ) but not to the familiar voice test trials ( $t(35) = 1.41, p > .1$ ). These results suggest that infants selectively attended to the voice synchronized with the face during habituation and ignored the asynchronous distractor voice, allowing them to discriminate the target voice from the novel and distractor voices during test trials.

## Conclusions

These findings indicate that intersensory redundancy provided by audiovisual synchrony can guide selective listening and promote processing of synchronous auditory information at the expense of concurrent, but nonsynchronous information in infants by 4-months of age. These findings suggest that audiovisual synchrony is sufficient to direct auditory selectivity and provide a basis for separating concurrent speech streams even when other cues such as differences in gender, tempo, amplitude and prosody are minimized.

## References

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