

Audiovisual Nature of Language: Do Children Process Audiovisual Information Differently?

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ABSTRACT

Audiovisual processing during speech perception is often studied using a McGurk task, which elicits a perceptual illusion from the interaction of mismatched auditory and visual speech. The available research on the McGurk task shows evidence for perception of the McGurk illusion in adults and infants but does not in school-aged children with typical development. The absence of a McGurk effect in school-aged children has been interpreted as a reduction in the use of visual information during speech perception at this age. However, the failure to McGurk in school-aged children may be due to task demands. Results from adult subjects demonstrate that our task reflects audiovisual processing. Further, results from children 7 to 11 years old demonstrate that our task reflects audiovisual processing in this age group.

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BACKGROUND

- Using *verbal report*, 98% of **adult** responses to McGurk task indicate an illusory percept (McGurk & MacDonald, 1976).
- Using *preferential looking*, **infant** performance on a McGurk task suggests an ability to perceive the McGurk effect (Rosenblum, Schmuckler, & Johnson, 1997).
- Using *verbal report*, **school-aged children** show a significantly weaker McGurk effect compared to adults (McGurk & MacDonald, 1976; Dupont et al., 2005).
- Infants' performance on McGurk-like tasks is assessed by looking time measures. Children perform the same McGurk task as adults and performance is assessed in the same way for both adults and children.
- Children's performance has been attributed to poor lip-reading skills, less experience correctly producing phonemes, learning to read around this age causes reorganization of phonological representational knowledge (Massaro et al., 1986; Dupont et al., 2005; Jerger et al., 2009).

PURPOSE

The purpose of this study was to establish an experimental paradigm that could examine the developmental trajectory of audiovisual processing during speech perception in typical populations.

METHOD

Participants

	CHILDREN (N = 10)			ADULTS (N = 16)		
	Mean	SD	Range	Mean	SD	Range
Age (years; months)	9;9	1;2	8;2-11;11	22;9	2;0	21;0-26;7

Demographics

Children

- 5 Females, 5 Males
- Monolingual typically developing children with no prior history of perceptual or neurological disorders

Adults

- 13 Females, 3 Males
- All participants had a high school education and the majority of participants were in their final year of college education.

STIMULI

Lexical Items

	GOAT	BOAT	OAT
Neighborhood Density	26	32	25
Imageability	585	631	499
Familiarity	496	584	484
Meaningfulness	402	542	357
Concreteness	636	637	553
Phonotactic Probability	Sum = .0066 (Avg. = .0033)	Sum = .0077 (Avg. = .0038)	Sum = .0394 (Avg. = .0197)
Word Frequency	2.79	3.62	2

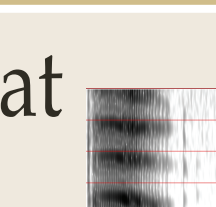
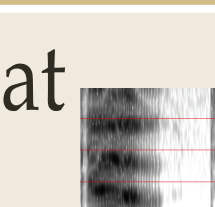
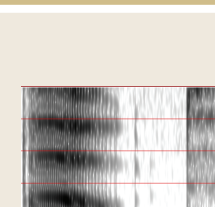
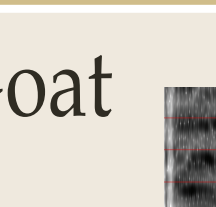
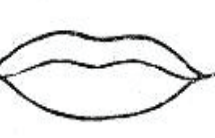
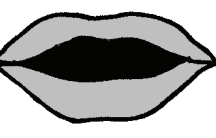
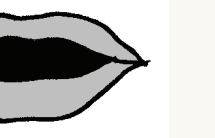

*Stimuli designed to be matched & age appropriate.

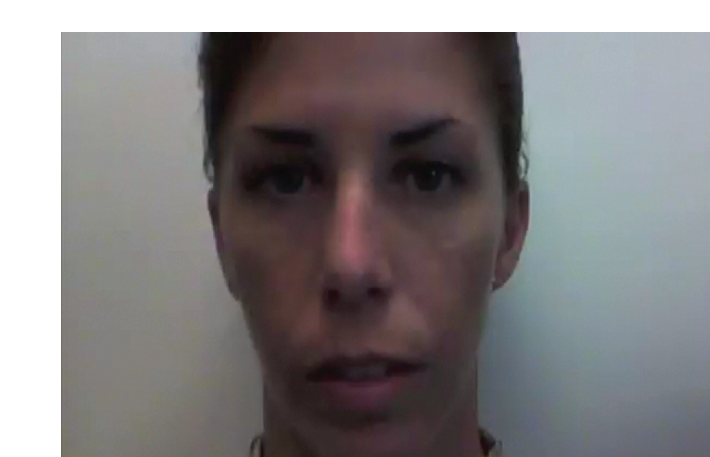
PROCEDURE

- Participants were instructed to "Touch the picture that matches the word the woman said"
- 43 Trials (3 practice trials, 40 test trials)
- Videos presented one at a time in a fixed random order on a touch screen monitor
- Counterbalanced location of pictures on screen (right side, left side)
- Programmed on PsyScope X

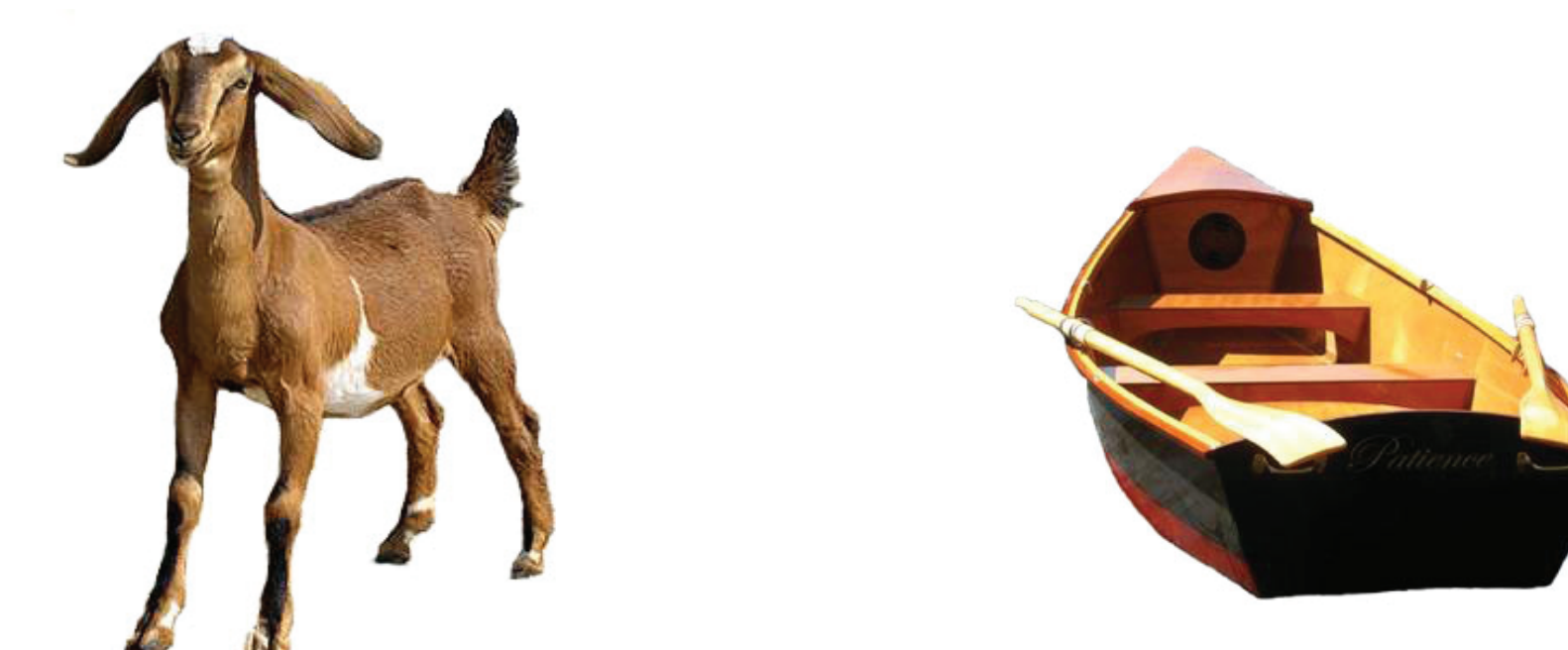


MOVIE STIMULI

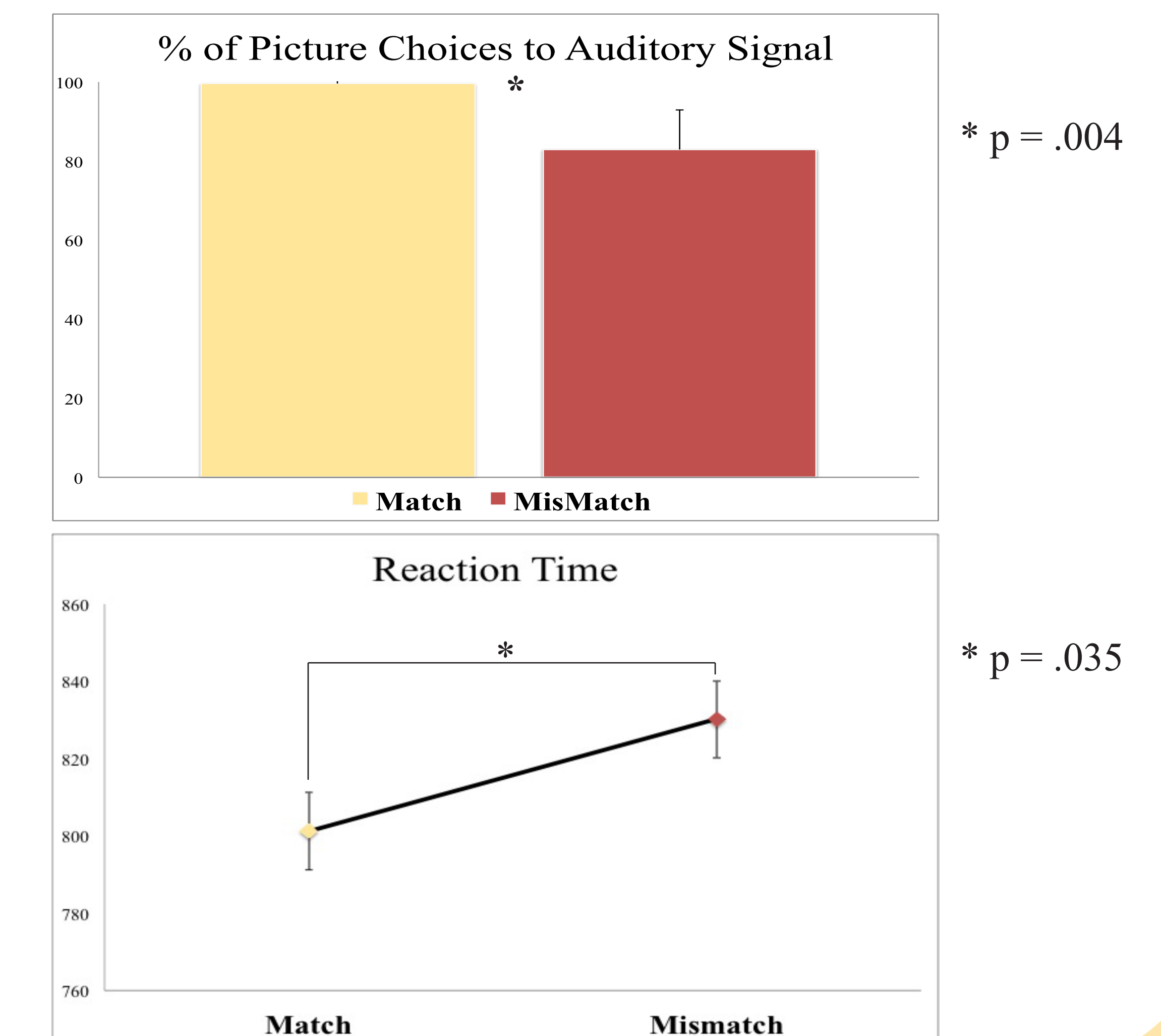
	Match	Match	Mismatch "Visual Goat"	Mismatch "Visual Boat"	Control
Audio	Boat 	Goat 	Boat 	Goat 	Oat
Video	Boat 	Goat 	Goat 	Boat 	Oat



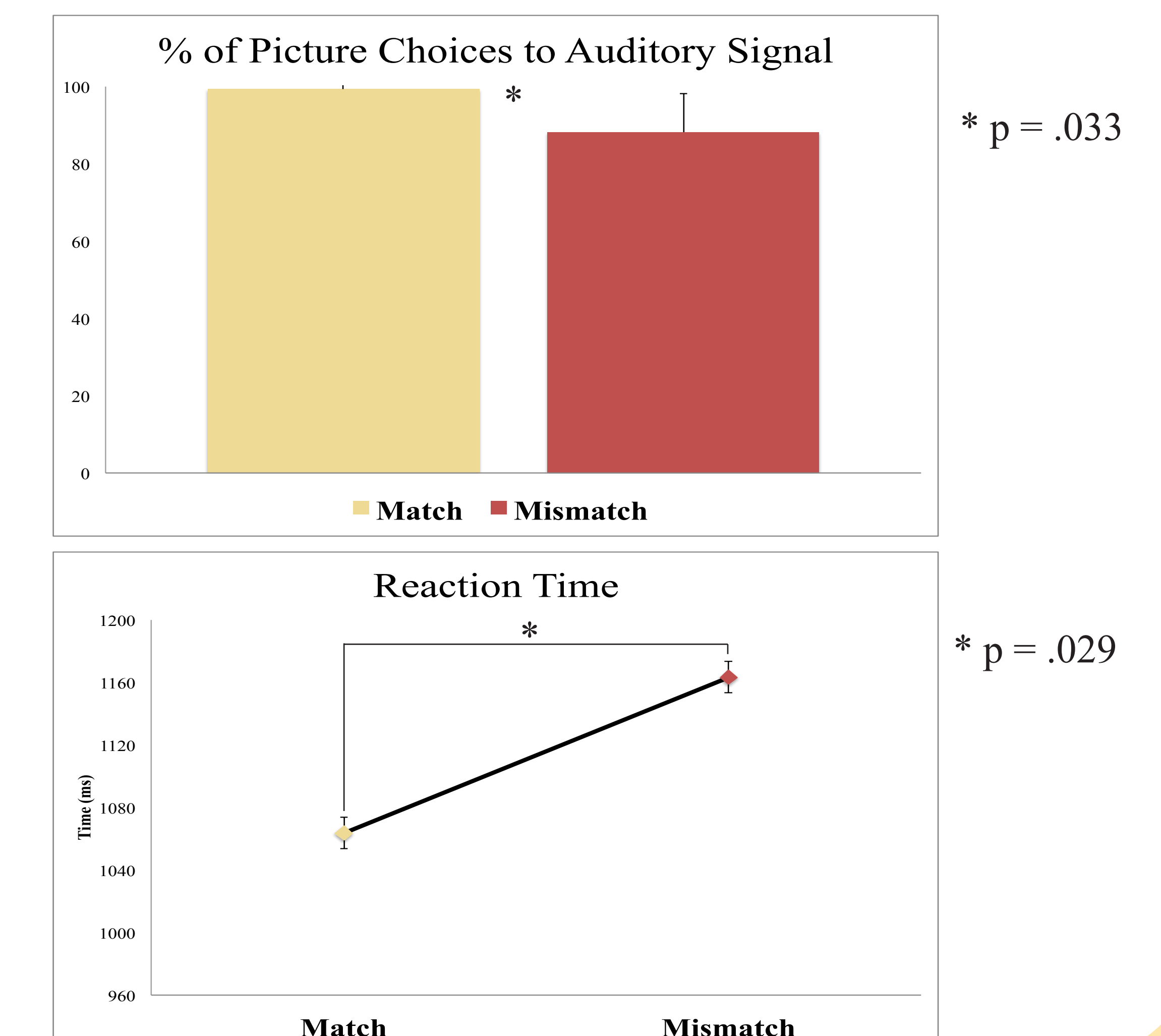
RESPONSE PICTURES



RESULTS - Adults



RESULTS - Children



SUMMARY

- 1) The experimental paradigm detects McGurk effects in school-age children.
- 2) The experimental paradigm may be sensitive to the development of auditory and visual processing in school-age children.