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Perceptual Differentiation of African American and European American Children Based on Gender and Ethnicity of Listeners

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BACKGROUND

- Thomas and Reaser (2004) demonstrated that adult speakers can be perceptually differentiated by listeners with respect to gender and ethnicity. They presented data from various studies with respect to adult speakers, but no data for child speakers.

- It follows that there are cues in the acoustic signal that support making distinctions amongst adult speakers. Following the onset of puberty, these acoustic parameters begin to emerge, enabling listeners to reliably identify speaker characteristics in adulthood (Berger, 2008).

- The question remains, at what point across the pubertal transition does perceptual accuracy meet the level for adult speakers?

- The goal of our research is to examine how the gender and ethnicity of the listener affects the accuracy with which they are able to identify these same aspects of a child speaker.

What We Know:
- There are studies that discuss the "aging voice" (American Academy of Otolaryngology, 2011). The aging voice is conventionally conceived of as the change in voice from mid- to late adulthood; however the developmental progression actually begins in childhood, with the most dramatic effects typically noticed during adolescence.

- Few studies have investigated the developmental changes of the voice from the perspective of acoustic phenomena leading to perceptual variation

- Studies have suggested that there is evidence of both perceptual and acoustic variation with respect to speaker ethnicity (Trent, 1995)

Why:
- Adult voice is typically achieved by age 14 for girls and 15 for boys (Berger, 2008). However, there is a gradual lowering of the voice beginning with the onset of puberty, which could begin as early as age 10 (Teen Growth, 2000).

- The fundamental frequency of a child's voice lowers, influencing the phonological space, which could result in differences across gender especially for the 11 and 12 year olds.

HYPOTHESES

- We expect that minority (African American, Hispanic, Native American, Pacific Islander, and Asian American) and female participants will have greater accuracy for all speakers.

- We also anticipate that accuracy of identification will improve as the age of the speaker increases due to the changing of the voice as a result of puberty.

RESULTS

Main Effects: Identification Accuracy

p=.004; η^2_p=.398   p=.000; η^2_p=.762   p=.000; η^2_p=.540   p=.000; η^2_p=.666

Speaker Ethnicity x Speaker Gender

$F(1,17)$=64.579; p=.000; η^2_p=.792
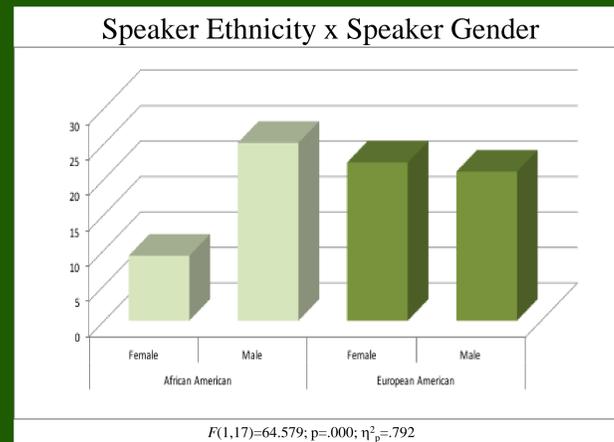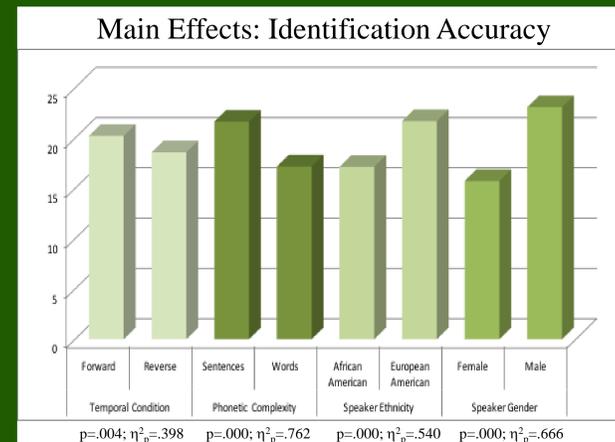
- Listeners identified **forward** blocks, **sentences**, **European American speakers**, and **male speakers** with significantly <u>greater accuracy</u>.

- **African American male speakers** were identified most accurately, followed by: European American females, and European American males, with African American females being the least accurately identified.

- For both listener genders, **European American** speakers were identified with the greatest accuracy. For male listeners, temporal condition did <u>not</u> make a difference for African American speakers, but did make a difference for European American speakers. Temporal condition did not affect female listeners' accuracy in identifying ethnicity.

- All listeners were most accurate with **male speakers**. AHANA female listeners were more accurate than the European American female listeners with female speakers. European American male listeners were more accurate than male AHANA listeners with female speakers.

Listener Gender x Temporal Condition x Speaker Ethnicity

$F(1,17)$=5.647; p=.030; η^2_p=.249

Listener Gender x Listener Ethnicity Group x Speaker Gender

$F(1,17)$=5.726; p=.029; η^2_p=.252
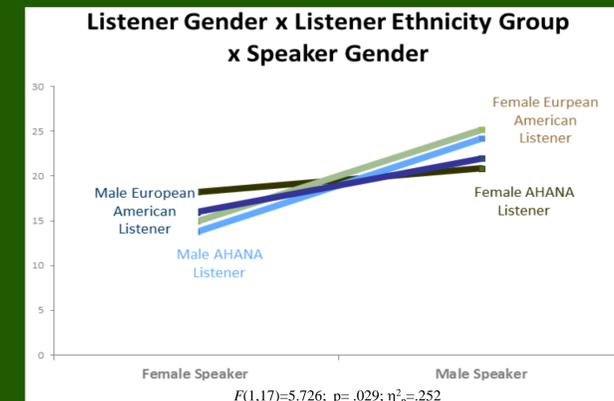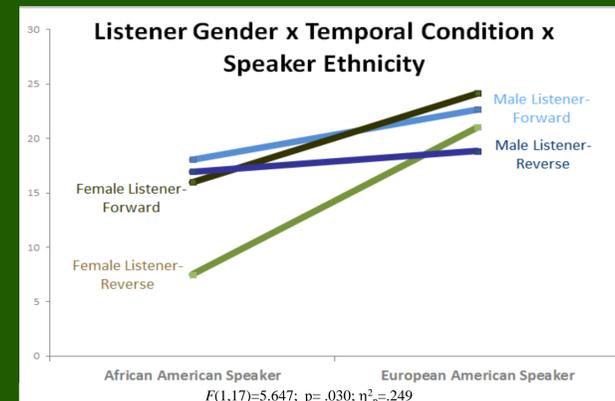
MATERIALS AND METHODS

PARTICIPANTS
- Audio recordings of the children's voices came from 20 male and female, African American and European American children.

- Adult listeners were comprised of 20 Hope College undergraduate students currently enrolled in a psychology or communications course, the majority being underclassmen.

EXPERIMENTAL DESIGN, MATERIALS & PROCEDURE
- Participants completed a language background questionnaire and then listened to 4 blocks of audio recordings of European American and African American children producing words and sentences containing /h-vowel-d/ target stimuli in General American English.

- Each block contained an equal number of items spoken by children of each ethnicity and consisted of either forward words, reverse words, forward sentences, or reverse sentences.

- The /hVd/ words which the listeners heard contained each of the 11 General American English vowels.

- The listeners identified which ethnicity and gender they believed the speaker to be, and then indicated how confident they were of their choice using a 7-point scale.


| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

I'm NOT sure!   I'm VERY sure!
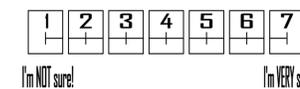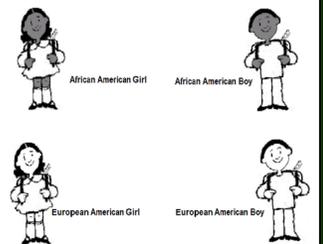
- E-Prime psychology application suite was utilized for experiment design and implementation.

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