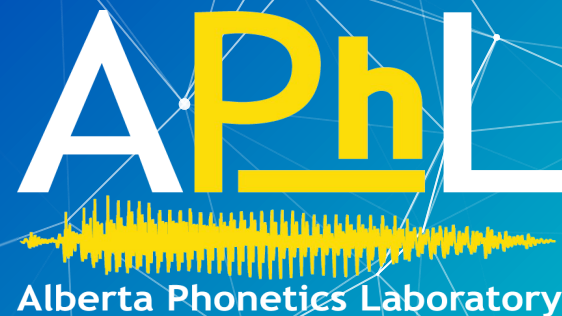


Changes of Production and Perception of the Aging Voice



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Introduction

Speech production and perception differs with age due to a variety of physiological and cognitive changes. By the age of fifty, the laryngeal system and cognition starts to degenerate leading to noticeable changes in the fundamental frequency (f_0), First Formant (F1), Speech Rate, cognitive tasks, and voice perception.

Background Information



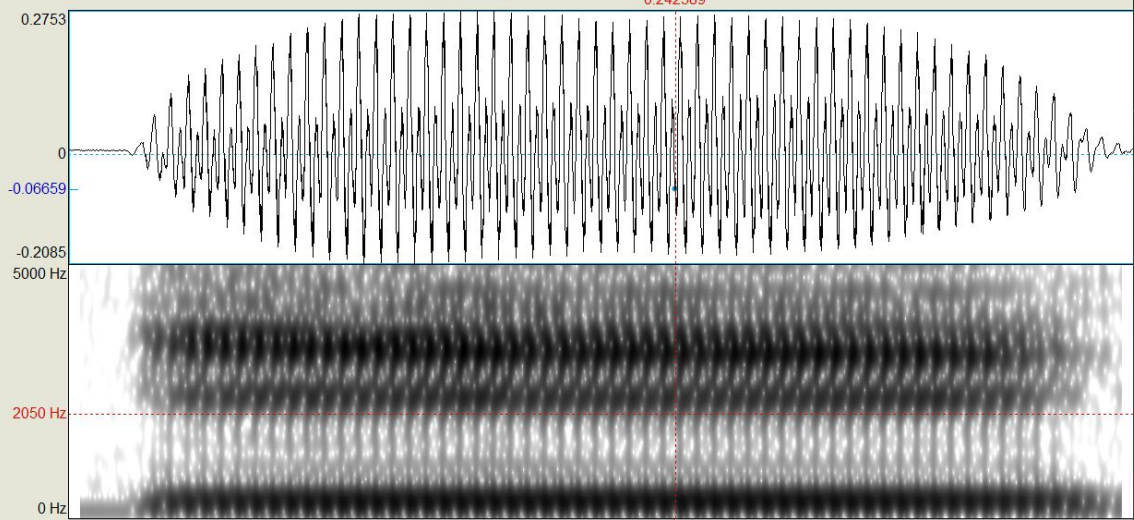
Variables

Fundamental Frequency (F0)- Similar to pitch, F0 describes the waveform of sound at the lowest frequency.

Formant Frequency (F1)- Is a stronger resonant frequency that changes with different vowel productions.

Speech Rate- Is a person's speaking speed, as in how many words or syllables per minute.

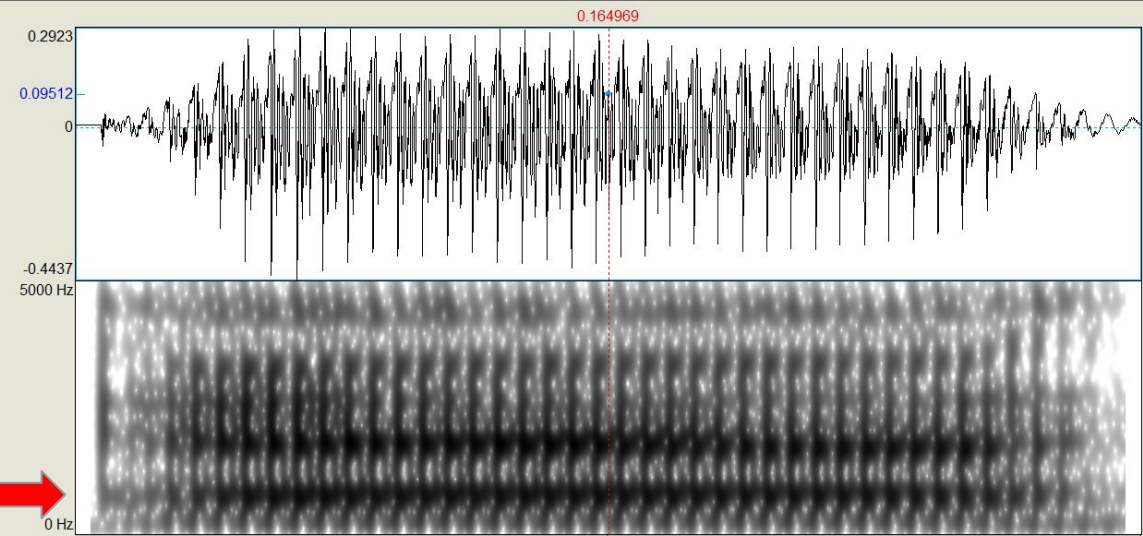
Signal to Noise Ratio (SNR)- Is one's ability to understand speech in the presence of other sounds.



Sustained /i/ as
in 'jeep'



Sustained /ae/
sound as in 'cat'



Perception vs. Production

The two main focuses of my research project will be the perception and production of voices and how it is affected by age.

1. Perception is how a listener interprets a voice.
2. Production is how the sound is actually made by a speaker.

Perception

- Perception of age
- Perception based on cognition
- Perception based on hearing loss

Perception of Age

Studies have shown that listeners tend to underestimate the age of older talkers and overestimate the age of young speakers with the crossover point being about 50 years (Hunter, 2016). This perception is greatly affected by the changes in f_0 and less so, but still noticeably, affected by the changes in F_1 (Reubold et al, 2010).

Perception Based on Cognition

Cognitive decline happens to many people as they get older. It can affect the person's ability to perceive noise. It is also greatly influenced by background noise. Older and/or hearing impaired people require a more favourable SNR to recognize speech patterns (Helfer, 2014).

Perception Based on Hearing Loss

Perception changes with age as a result of hearing loss.

- **Many people experience hearing loss as a function of age and physiological changes.**
- **This affects the ability of people to hear different frequencies and therefore perceive speech.**

Production of Speech

- Production of aging voice
- Speech tempo of aging voice
- Production of F0 and F1

Production of Aging Voice

As a result of physiological changes due to aging the vocal tract changes in many way.

- These changes affect the production of formants by changing the volume and shape in the vocal tract.
- This shift causes a decrease in formant values, and are thought to be caused by the lengthening of the vocal tract with age (Reubold et al, 2010).

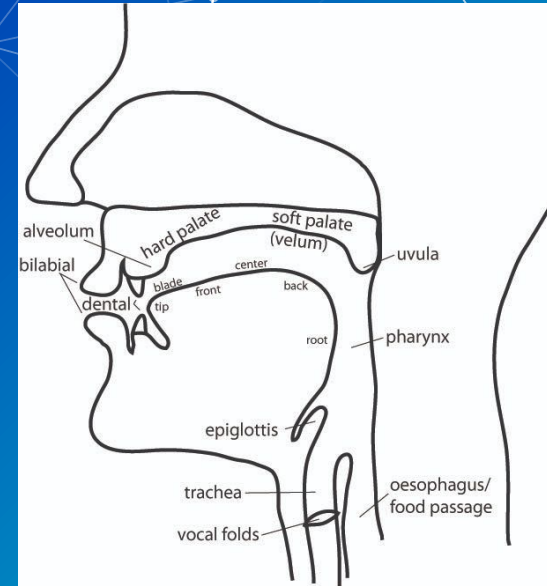
Speech Tempo of the Aging Voice

As a person ages their speech tempo generally gets slower. This is due to a variety of physiological changes in the vocal tract and cognitive changes. It is notable that one study found an increase in speech rate possibly due to the speaker accommodating to a faster speech rate in society (Quene, 2013).

Production of F0 and F1

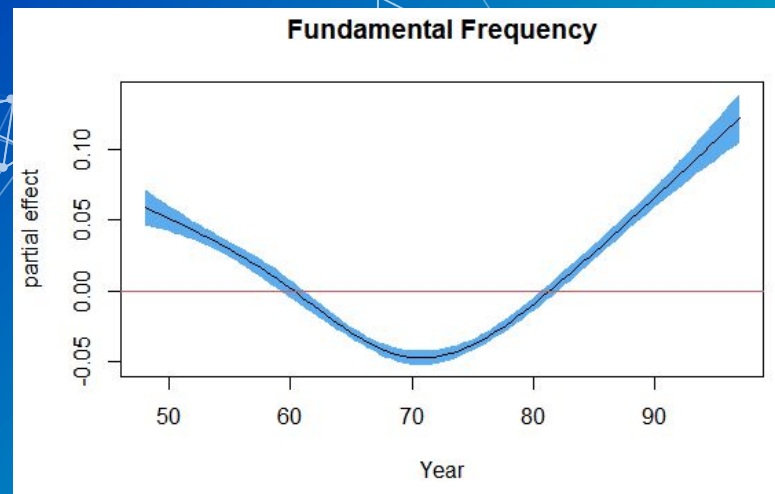
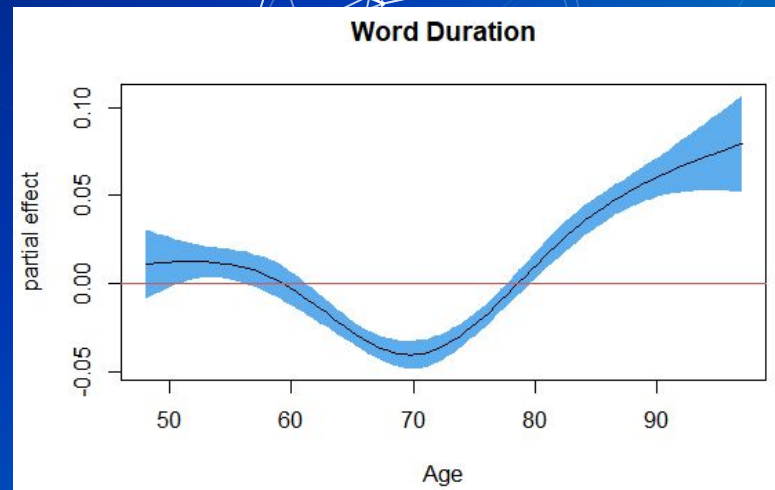
The different formants are produced through different parts of our vocal tract.

- F0 is created in the vocal folds.
- F1 is produced by changes in the volume space in the vocal tract.



Description of our Study

Our study was a longitudinal study of three religious speakers from the midwestern part of the USA. We measured production data from the last 40-50 years of their lives and tracked changes in their f0, F1, and speech rate.



Conclusion

Speech perception and production are affected by physiological changes in the vocal tract and cognitive factors. The purpose of our study is to further discover what those factors are and how they affect a person's voice and perception.

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Citations

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