

# Vocal strategies to signal biological fitness in public speaking: a study on the effects of aging in American English charismatic speech

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## Introduction

Voice signal speaker's biological fitness through language-based learned ways to convey it [1, 2]. Speakers involved in public speaking perform voice quality manipulations to convey charisma in order to influence others emotionally [1]. Charismatic voice defines the ensemble of vocal quality patterns used by public speakers with the intent to persuade the audience: it conveys personality traits and arouse emotional states in listeners. Listeners exposed to public speaking rely on charismatic voice to assess effective leadership [1].

Perceived vocal quality features could then lead to misunderstanding speakers' biological fitness and, in turn, to affect the effectiveness of leadership. It is, for example, difficult to guess speakers chronological age from voice, as aging voice is difficult to assess both in its acoustic and perceptual correlates. A previous study [2] had indicated that perceived vocal disorder, which is the acoustical and perceptual variation of an expected normal quality of the sound of the voice, was the only way that listeners have to precisely assess how much someone has aged. Vocal disorder seemed to form the bridge between charismatic voice and aging in voice: political leaders that had experienced vocal disorder suffered from an impact to their charisma and political career since listeners were very good at rating speakers' chronological age, if the individual has vocal disorder [3].

The goal of this study is to investigate the vocal strategies that American English charismatic leaders use to cope with the acoustical and perceptual effects of chronological aging as possible sign of lack of biological fitness in vocal performance while engaging in public speaking.

## Methods

*Voice acoustic data* were collected for American English charismatic leaders Donald Trump (68–69 years old at the time of the recording), Bernie Sanders (74 y.o.), and Barack Obama (51–53 y.o.). Data were recorded in different periods of time (during the 2012, 2016, and 2020 United States presidential primaries) and while engaging in three different contexts of communication: a monologue addressed to followers (MON), a monologue addressed to other politicians (CON), and an informal interview during which the speaker addressed one listener only (INT). Longitudinal and cross-sectional analyses were performed on fundamental frequency (f0) and sound pressure level (SPL) measured from /a/ vowels.

## Results

Preliminary cross-sectional analyses of average f0 and SPL show that speakers Obama (t(149)=6.27, p<.001, r=.45) and Trump (t(952)=16.44, p<.001, r=.47) present stronger positive correlations between the two acoustic parameters than speaker Sanders (t(113)=2.94, p=.003, r=.26) while addressing a large audience (context MON). Additionally, speakers Obama (t(121)=5.52, p<.001, r=.44) and Trump (t(157)=5.03, p<.001, r=.37) presents positive correlation between average f0 and SPL while addressing other politicians (CON context), differently than speaker Sanders, who presents non-significant correlation (p>.05). On the contrary, speaker Sanders (t(29)=7.89, p<.001, r=.82) presents stronger positive correlations between f0 and SPL than speakers Obama (t(161)=4.97, p<.001, r=.36) and Trump (t(172)=8.36, p<.001, r=.53).

## Discussion

This study investigates aging voice as possible sign of lack of biological fitness in public speaking. On one hand, correlated f0 and SPL in one-to-many charismatic speech (MON and CON) could be a signal of low chronological age (even in discrepancy with actual age) and high biological fitness. This vocal behavior would be a positive predictor for effective charismatic leadership [1]. On the other hand, weaker or negative correlation between f0 and SPL in one-to-many charismatic speech (MON and CON) and higher or positive correlation in one-to-one speech (INT) could show advanced chronological age (even in accord with actual age) and low biological fitness. This vocal behavior would be a negative predictor for effective charismatic leadership [1].

## References

- [1] Signorello et al, *J Voice*, 45:1-10, 2018.
- [2] Kreiman and Sidtis, *Foundations of Voice Studies*, 2011.
- [3] Signorello and Demolin, *JASA*, 142: 2641-2641, 2017.