

Generation Z's Perception of Glottal Fry

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Abstract

Glottal fry, a low-pitched grating voice type, has increased in prevalence over the past decade. Research conducted on previous generations regarding glottal fry indicates that women with glottal fry tend to be perceived more negatively than men with glottal fry in different settings. However, a major gap in this research exists in the individuals being studied: No studies have been conducted regarding Generation Z's perceptions linked to glottal fry. In addition to this, the rise of the digital age, alongside Generation Z, may have altered existing notions and perceptions about individuals with glottal fry. The purpose of this study is to investigate and identify the social perceptions associated with the use of glottal fry to provide insight into the generational perspective of existing research. Three male and two female voices were recorded to represent: a continuous glottal fry, end-of-sentence glottal fry, and non-glottal fry to act as samples. Each voice sample read a pre-prepared script. A survey was created using the REDCap system to include (a) the six voice samples and (b) items about aspects of personality and applied social skills. The survey was distributed on social media and distributed to a school; permission for students to access the link to the survey was granted by the principal. Means were calculated. End-of-sentence glottal fry was the most favorable male voice type and no glottal fry was the most favorable female voice type. Continuous glottal fry in males and females was the least favorable voice type with female continuous glottal fry being the most disliked voice type out of all the samples. Such information can provide new insight to increase awareness of the impact of a voice type on listener perceptions and communication, especially among female speakers. Additionally, contextual factors influencing listener perception are important to recognize in future research.

Introduction

Over the past two decades, the digital age has expanded exponentially. With the rise of the Internet, exposure to people and their opinions has increased dramatically. Generation Z, a generation heavily exposed to the Internet, undoubtedly has heard many different voices and opinions through the Internet. These voice types often cause viewers or listeners to perceive the speaker in different manners.

Voice type is almost always uncontrollable, with the exceptions being vocal therapy and voice coaching, and an individual with a less appealing voice type may be subjected to unfair, stereotypical perceptions and views. Among these voice types, glottal fry has been a topic of previous vocal research. Glottal fry, also known as vocal fry, is a vocal register—a way of producing sound that can have various tone qualities—that is, low-pitched with a characteristic rough or creaking sound (Akst and Pietsch).

The current climate of glottal fry research lies primarily in the gendered perceptions associated with glottal fry: women with glottal fry tend to be perceived more negatively than men with glottal fry in a social setting. However, there is a major lack of information regarding generational viewpoints of glottal fry, particularly in Generation Z. While the purpose of this study is not unique in identifying social perceptions of individuals with glottal fry, it is unique in its studied population.

Perceptions and social norms change with time and technology. Due to its heavy internet exposure, Generation Z may perceive glottal fry differently as compared to other generations that have been previously studied. Little to no information exists about Generation Z's perceptions of glottal fry to contradict or confirm previous notions associated with glottal fry. What has been identified is that glottal fry has started to become more popularized within Generation Z; several studies about the current climate of glottal fry suggest a possible, underdeveloped explanation: due to the rise of technology, Generation Z has become heavily exposed to glottal fry and individuals on the internet utilizing it (Grussl). Since glottal fry has only been studied among populations that are not Generation Z, research investigating Generation Z's perceptions of glottal fry could unveil previously overlooked opinions, thus bridging a knowledge gap.

The purpose of this study is to investigate and identify *general* trends in the perceptions that are associated with the use of glottal fry to provide insight into how Generation Z views glottal fry.

Literature Review

To fully understand this subject, the use of glottal fry and perceptions towards its usage must be evaluated within current literature.

The term vocal fry has been used for most existing literature regarding this topic, with the current, accepted definition of vocal fry being a deep, low-register voice. A vocal register is defined as a range of tones in the human voice produced by a vibratory pattern of the vocal folds (Akst & Pietsch). However, glottal fry is a more accurate term that has gained popularity within more contemporary literature. This register is produced by the glottis—a part of the larynx that contains vocal folds (Madill). For the purposes of this research, the term glottal fry will be used to describe the low-pitched register.

Research regarding glottal fry primarily revolves around how people perceive it and the associations people tie to its use. Many of these perceptions toward individuals who use glottal fry are linked to job prospects. Job prospects refer to an individual's ability to get a job, and current research suggests that one's use of glottal fry has an impact on job application processes. In their peer-reviewed article, Sally Gallena and James Pinto surveyed individuals to determine characteristics, correlated to job prospects, that are linked to the use of glottal fry. The characteristics include "speaker competence, education, hireability, and professionalism" (Gallena & Pinto). Women with glottal fry were rated and perceived more negatively, indicating that they would lack "good" job prospects (Gallena & Pinto). Furthermore, individuals already employed in voice-dominated occupations may be perceived differently due to their use of glottal fry. Charles P. Schmidt, a researcher from the University of Alabama, and his coauthors assessed the perceptions toward glottal fry in teaching by using audiotape recordings and conducting a perceptual analysis (Schmidt et al.). Schmidt states, "Voice use seems to be tied directly to teaching effectiveness. Researchers have identified many indicators of effective teaching such as classroom organization and management, communication skills, knowledge of subject matter, personality, and so forth" (Schmidt et al.). A person's abilities and skills are essentially perceived differently if they use glottal fry as opposed to someone who does not. Another study conducted by Rindy Anderson, a researcher from Florida Atlantic University, and

her coauthors provide an additional example of how glottal fry usage in women is looked upon unfavorably. A survey was administered to study participants who listened to audio recordings; the participants then completed an online survey about the recordings: women using glottal fry (Anderson et al.). She states, “Young adult female voices exhibiting vocal fry are perceived as less competent, less educated, less trustworthy, less attractive, and less hireable.” (Anderson et al.). The findings of the survey indicated that the use of glottal fry is generally looked down upon in job settings and can harm an individual’s job prospects. It can be reasonably concluded that compared to other, high-pitched voice types, the use of glottal fry carries negative perceptions within a job setting. Generally, glottal fry research has found that women with glottal fry are perceived more negatively than women without glottal fry. In their peer-reviewed article, Monika Chao and Julia Bursten found that glottal fry in women was perceived as “distracting” and that there are “demands for women to change their phonation” (Chao & Bursten). With glottal fry research, it is widely accepted and understood that women should avoid using glottal fry when talking in social or professional settings because it is perceived negatively. While an overall theme lies in that glottal fry harms an individual’s job prospects, these studies were concerned with how women with glottal fry were perceived rather than men or other genders. Research on gendered perceptions of the use of glottal fry answers further details regarding other aspects of glottal fry.

In contrast, men with glottal fry are perceived differently. Nassima B. Abdelli-Beruh, a speech scientist with a Ph.D. in Hearing Sciences, and her coauthors conducted a study regarding how men with glottal fry are perceived. Men who speak with glottal fry were found to be “associated with high social status and authority” and “such traits confer men the dominant and controlling role in speaking and social interactions...” (Abdelli-Beruh et al.). Essentially, men with glottal fry were perceived positively, indicating a clear gender difference in the perceptions of men and women with glottal fry. The common theme in most glottal fry research is that women who have glottal fry are perceived more negatively than men who have glottal fry; consequently, each gender is perceived differently in social settings and may have limited or boosted job prospects. However, all previous studies regarding perceptions linked to glottal fry studied older generations and how they perceived glottal fry.

All existing studies have been conducted on older generations such as Generations Y and X and indicate that women with glottal fry are perceived negatively while men are not

(Valley). This theme has stayed consistent within prior literature; however, no literature could be found on whether Generation Z follows this trend. It is evident from reviewing existing research that there is a need for research on how Generation Z perceives glottal fry. Moreover, Generation Z's emergence into the digital age may have altered existing perceptions and notions about people with glottal fry due to increased exposure to them, thereby making glottal fry research on Generation Z even more crucial. Considering the existing research conducted on previous generations and the need to fill a generational gap, the question is raised: How does Generation Z perceive the use of glottal fry in men and women?

Method

This study explored the generational gap in existing research on glottal fry. The goal was to bridge a significant knowledge gap in how Generation Z views glottal fry by identifying *general* trends. Voice types act as signals that provide a large amount of information about the individual speaking (Bachorowski). This is important seeing as such information could provide insight into how Generation Z perceives individuals with glottal fry in a social setting.

A two-part study was conducted. First, two male and two female voices were recorded as samples of no glottal fry, end-of-sentence glottal fry, and continuous glottal fry. End-of-sentence glottal fry differs from continuous glottal fry because the drop into the fry, the low-raspy pitch, occurs at the end of the sentence; in continuous glottal fry, the fry stays consistent throughout the sentence. Having samples from both men and women is significant because it gives a more comprehensive view of Generation Z's attitudes regarding glottal fry. Having different voice types on the survey allows similarities and contrasts between the voices to be drawn, answering how high schoolers perceive the voice samples. Second, to properly identify how high schoolers perceive glottal fry, this research used data collected from an online questionnaire using quantitative data. This is important because an online questionnaire acts as a tool for randomized population sampling, and it could be easily accessed by the research subjects. Identifying perceptions is also simple through the use of an online questionnaire. Past research on glottal fry has used a similar method; Natalie Pointer and her co-researchers collected voice samples by using a script, and a mixed-method survey to determine how glottal fry affects employers' perceptions of young women with glottal fry (Pointer et al.). The method for evaluating perceptions is rooted in survey research techniques; therefore, the use of a survey with audio samples makes this method design effective. The nature of a survey in my study

allows it to be an effective method for determining Generation Z's perceptions towards glottal fry usage as surveys allow qualitative data to be easily organized and trends to be identified.

The subjects of this study were high school students. This research investigates how Generation Z perceives glottal fry. Thus, studying high school students, a population that constitutes a significant portion of Generation Z, would be effective in analyzing how Generation Z perceives glottal fry. As previously mentioned, high school students have considerable online exposure, which likely means they have been exposed to individuals with glottal fry, making them optimal subjects for understanding how Generation Z perceives glottal fry usage. Furthermore, surveying high school students acts as convenience sampling.

Voice samples were recorded from four, 18-20 year-olds. All participants provided informed consent prior to the screening and collection of voice samples, and these voice samples were screened to ensure eligibility of the voice type and categorized to fit one of the following voice types: no glottal fry, end-of-sentence glottal fry, and glottal fry. For the screening for the voice types, participants read sentences based on the Consensus Auditory-Perceptual Evaluation of Voice (CAPE-V). CAPE-V is an instrument used to assess voice quality and type. Participants read out the sentences on the CAPE-V sheet, and the CAPE-V protocol was used to determine the voice types of participants. Richard Zraick, a professor from the University of Central Florida, and his coresearchers researched the reliability and empirical validity of CAPE-V, finding the instrument to be an accurate technique for determining voice type (Zraick). Therefore, using CAPE-V is an effective technique for accurately determining the participant's voice type and eligibility. Other eligibility requirements included the participant being in the age range of 18-20 years old and being cisgender. Due to the process of transitioning and the changes in voice quality and pitch, this study excluded both trans-gendered females and trans-gendered males. This study obtained voice samples from individuals aged 18-20 as the voice samples should be similar to avoid confounding variables, such as the perceived age of the speaker. All participants were recruited using flyers and word of mouth. One of the male participants was able to produce two of the voice types: end-of-sentence and continuous glottal fry. The other male participant represented no glottal fry. One of the female participants was able to produce two of the voice types—no glottal fry and continuous glottal fry. The other female participant represented end-of-sentence glottal fry. In total, 4 participants' voices were used in the survey. Each participant read a pre-prepared script for a casual, high-school conversation,

and the recordings were taken in a Voice Physiology Lab in Yoakley Hall at a public four-year university in East Tennessee. The voice samples were recorded using the Apple Music application on a MacBook. All participants recited the same script to simulate a conversation in a high school setting. All procedures regarding the collection of the voice samples were reviewed and approved by the Institutional Review Board (IRB).

The second part of this study's method involved the development and distribution of a survey. The survey was distributed on Instagram and Snapchat (social media), to allow easy access to the survey link. Additionally, the survey was emailed to high schoolers in a small public laboratory school in East Tennessee. This survey was developed using Redcap, a web-based application designed to support data capture. The six audio samples recorded from the first part of the method were uploaded to the survey. The survey began with a preliminary screener that included the individual assent form. Eligibility criteria, detailed in the assent form of the survey ensured that participants were: (1) currently enrolled in high school, (2) in the United States, (3) able to speak fluent English, and (4) consented to participate. The preliminary instrument then directed the participant to the actual survey instrument; this ensured that the assent data stayed unlinked to the actual survey responses. After assent was obtained, participants were able to access the survey. The questionnaire in this study consisted of three parts. The first part of the questionnaire contained demographic questions. These demographic questions were structured with radio buttons and asked the participant about his or her grade in high school, gender identity, and race. The second part of the survey asked several items derived from social constructs. These questions were meant to determine high school student perception of the person behind the voice sample. Researchers Porter and coauthors used similar items derived from social constructs in their study about employers' perceptions of glottal fry in women. Glottal fry perceptions were assessed through the use of answers to open-ended questions and multiple frequencies in the survey (Porter); in contrast to Porter's study, the questions in this survey were targeted towards a high school demographic as compared to that of job employers and were, therefore, more suitable to determine Generation Z's attitudes towards glottal fry usage. The last portion of the questionnaire included generalized statements that helped determine overall attitudes toward the voice itself. The last two parts of the survey consisted of a five-point Likert-type scale that had a slider so that participants could position the slider in accordance with how they felt about the voice type. Five positions were on the visual

analog scale (1 being on the left and indicating favorability, 3 indicating neutrality, 5 being on the right and indicating unfavorability, and 2 and 4 indicating mixed feelings) which indicated how the participants felt towards the person speaking and the voice itself. Similarly, researcher Whitney Chappell, from the University of Texas, and her coauthors used a Likert scale to determine how people perceived a *cappella* performances by assigning social and stylistic attributes to the singer (Chappell et al.). Using a Likert scale is an effective way to measure respondents' attitudes; therefore, the use of a five-point Likert-type scale within this study is an effective instrument for determining how high schoolers perceive glottal fry usage. The second and third parts of the survey were repeated for each of the six audios. The survey was left up for the participants to take over the window of February 21st - March 2nd, 2023. Using the questionnaire, qualitative information related to high school students' perceptions of glottal fry was collected.

Findings and Data Analysis

The original data yielded 93 records, 54 of which were eliminated for being incomplete responses. The resulting sample consisted of 39 completed entries. Study data were collected and managed using REDCap, an electronic data capture tool, and extracted from REDCap using Excel forms. Upon completion of data collection, the data from each survey question was organized by each specific aim for analysis.

Demographic Distribution

Three different demographic information questions were asked. For gender identity, the sample consisted of 19 females, 16 males, 3 non-binary individuals, and 1 genderfluid individual. The sample reported their ethnic background as follows: (7.7% Native American, 23.1% Asian/Pacific Islander, 7.7% Black/African-American, 7.7% Hispanic, 51.3% White, 2.6% Prefer Not to Answer). As for grade level, the sample reported as follows: (15.4% Freshman, 17.9% Sophomore, 23.1% Junior, 43.6% Senior). A major limitation of this sample is the lack of diversity, as it is not fully representative of all high school students.

Results

Means were calculated using Google Sheets for all 30 semantic differential items (6 voice samples with 5 questions each). Questions that did not provide much insight based on a lack of differentiation in means were eliminated from the graphs. I chose 5 questions to quantitatively analyze that provided me with the most information based on the largest differentiation between

the means. The questions include the following: (Pleasant vs. Unpleasant, Motivated vs. Unmotivated, Sociable vs. Solitary, Friendly vs. Grouchy, and Nice vs. Rude). The means for each question under each voice sample are as follows.

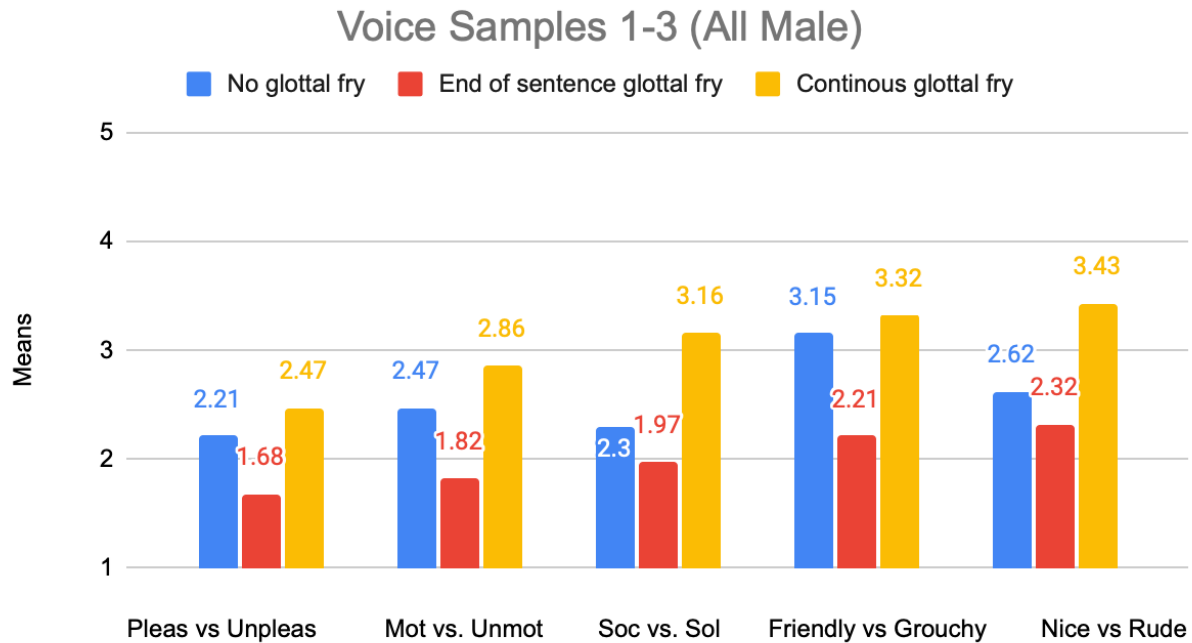


Fig 1: Means for Male Voice Samples

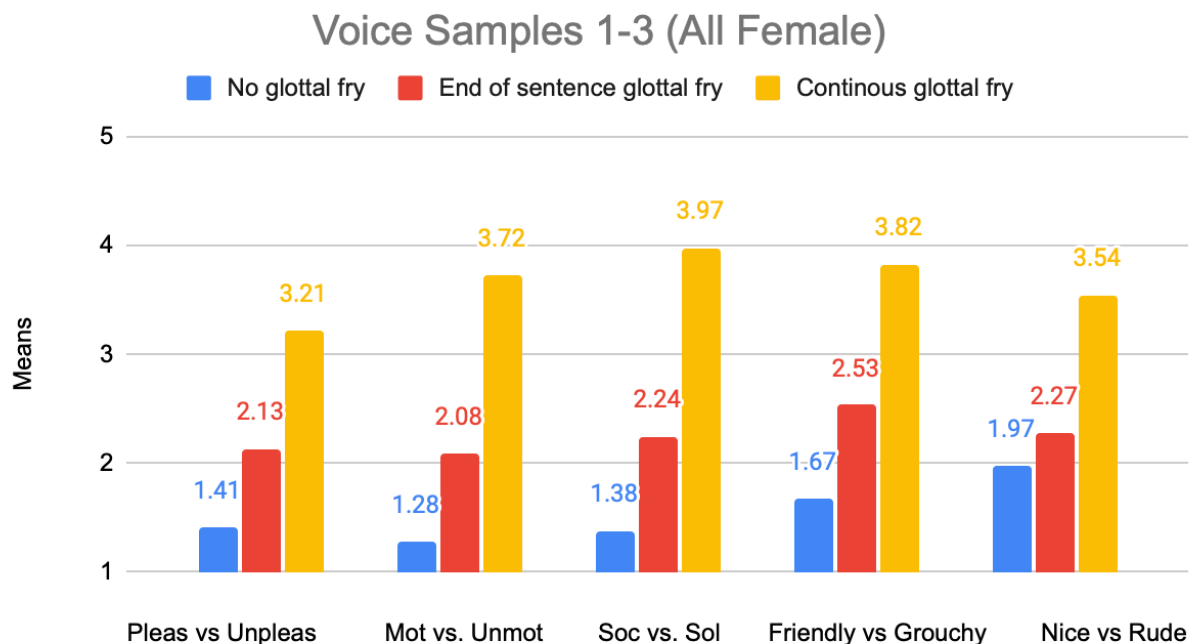


Fig 2: Means for Female Voice Samples

As previously stated in this paper, these questions were structured as a five-point Likert-type scale (1 being on the left and indicating favorability, 3 indicating neutrality, 5 being on the right and indicating unfavorability, and 2 and 4 indicating mixed feelings). These means are indicative of the overall trends about how high school students perceive glottal fry usage and the speaker.

In all of the items, the means among the male samples were all relatively close together, and the means were all lower numbers, indicating a trend that the sample felt that the male voices were looked upon favorably by the sample population for each item. For each item, male end-of-sentence glottal fry had the lowest means, indicating that it was generally looked upon the most favorably among the male voice samples and vice versa for the male continuous glottal fry sample. The means between the types of male voices did not show any progression or regression as glottal fry usage increased (from no glottal fry to continuous glottal fry). This means that the sample, high schoolers, did not present any trends regarding the progression of glottal fry usage in the male samples. However, the female voice samples did; the means increased in accordance with glottal fry usage. The female no glottal fry and female end-of-sentence glottal fry had low means, but the female continuous glottal fry had a much larger mean than both the other female voices and all the male voices, indicating that the no glottal fry and end-of-sentence glottal fry for the female samples was viewed more favorably for each item while the continuous glottal fry sample was viewed more unfavorably. A trend that can be identified from this data is that the female voice samples were looked upon as progressively unfavorable and as glottal fry usage increased while the male voice samples were not, indicating a clear gendered perception difference. No trend could be identified with the progression of glottal fry usage in the male voice samples, but a distinct trend could be seen with the female voice samples; as glottal fry usage increased, unfavorability within the aspects increased as well.

Standard deviations were calculated for all 30 questions to measure central tendency around the mean values. No tests of statistical significance were necessary for the purpose of this research as means are indicative of *general* trends of Generation Z's perception of glottal fry usage.

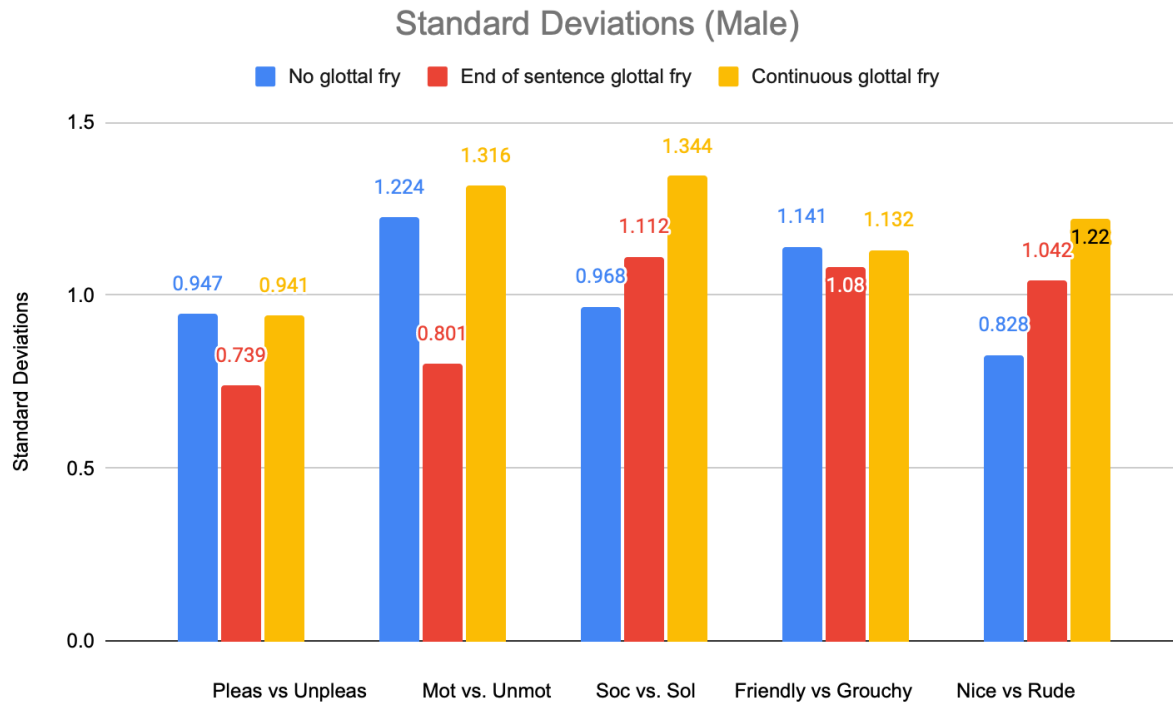


Fig 3: Standard Deviations for Male Voices

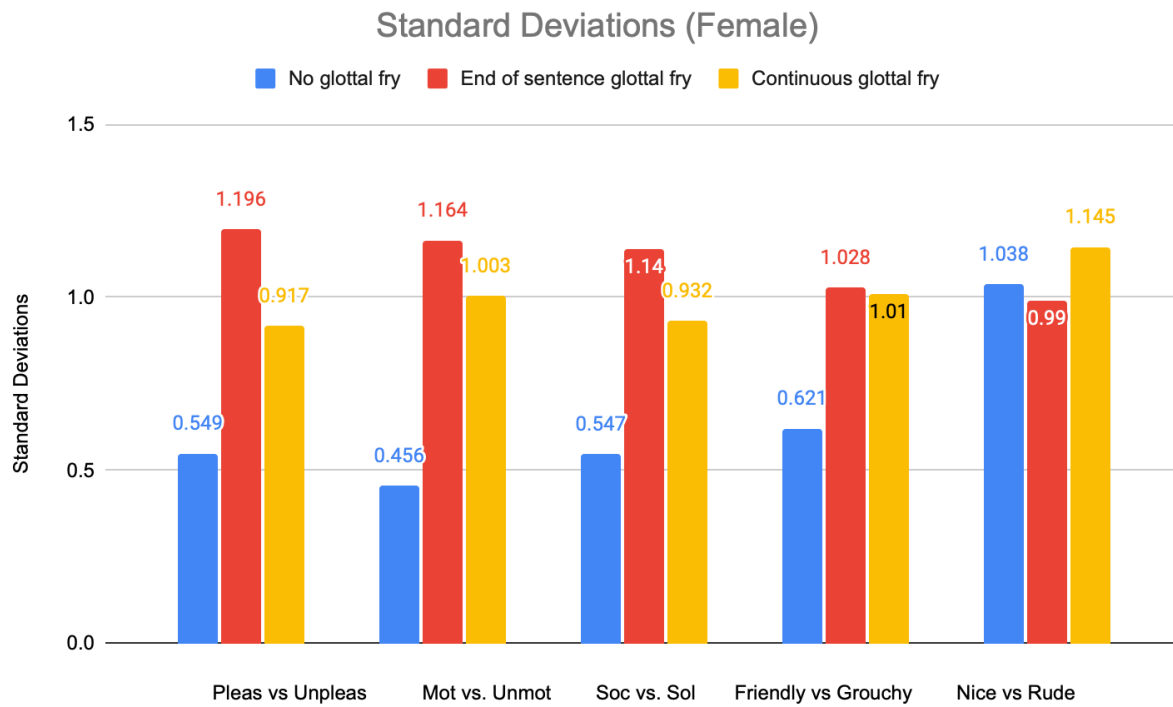


Fig 4: Standard Deviations for Female Voices

This qualitative analysis yields trends that provide insight into how Generation Z perceives glottal fry usage. The averages of the semantic differential items provide a deeper understanding of Generation Z's perceptions, perception difference between sexes, and perception difference between glottal fry types.

Discussion

The main aim of this study was to ascertain the trends associated with high schooler perception of glottal fry usage. Overall, the data supports the premise that Generation Z does not present trends toward the progression of glottal fry usage in men but does in women; when women's glottal fry usage increases, unfavorable attributes tend to be assigned to them. It is important to analyze this trend's consistency with prior literature.

These results are consistent with prior literature. As seen in the literature review, prior research on glottal fry usage and perceptions, showed women with glottal fry are perceived more negatively than women without glottal fry; this trend stays consistent with this study's data as the means for each item increased as glottal fry usage increased within the female voice samples. As for gender differences, the overall means for the end-of-sentence glottal fry and continuous glottal fry for the male samples were mostly lower than that of the corresponding female samples, indicating that women who have glottal fry are perceived more negatively than men who have glottal fry, a theme consistent with prior literature. Prior literature in glottal fry research was conducted on older generations. This study focuses on Generation Z's perceptions of glottal fry usage. The results of this study demonstrate trends that are consistent with the results from prior studies, indicating that there is no generational difference between how Generation Z perceives glottal fry and how other generations such as Y and X perceive it. Overall, negative perceptions are associated with progression in glottal fry usage among women, but not among men. This study contributes to existing literature, as well as provides insights into Generation Z stakeholders, which have not been studied previously. The results of this study provide meaningful results regarding the trends in perceptions that Generation Z has towards glottal fry usage in both men and women.

Implications

The implications of this study provide greater insight into the vocal register of glottal fry, its impact on perceptions, and highlight the impact of glottal fry within Generation Z. The results of this study are consistent with prior literature, suggesting that females using glottal fry are

perceived as ruder, grouchier, less motivated, and more solitary than their peers who do not use glottal fry. Especially for female speakers, this knowledge can open up new perspectives and raise awareness of listener perception of glottal fry. An individual does not want to be perceived negatively simply because of his or her voice type; as a result, vocal awareness is important to limit vocal bias. In particular, women with continuous glottal fry are perceived negatively and are at the largest disadvantage; therefore, this implication applies to this demographic the most. Additionally, this implication applies to Generation Z's understanding and awareness of glottal fry as a whole. Additionally, this study simulated a high school conversation. The results of this study were influenced by not only voice but also context. To measure personality traits, it is necessary to match the constructs of the person and the situation in which they are judged; thus, the communication environment is essential to consider in these types of studies. In social situations, a woman speaking in continuous glottal fry might appear trustworthy and dominant. However, the same vocal type in a different situation, such as in a job interview, may yield different perceptions. This has implications for both future research and also individuals in general when understanding contextual factors in how they perceive someone along with that individual's voice. Therefore, contextual factors influencing listener perception are an important implication to recognize in future research.

Limitations

The current study has some limitations including the sample, length of the survey, accessibility of the survey, and the task used regarding the collection of the voice samples. Four different participants provided the voice sample for each specified voice type to ensure the typical vocal characteristics of each voice sample instead of a simulated voice type. A simulated voice type might have produced a more accurate version of the voice types being researched. Additionally, this study has a sample size of 39 high schoolers with the respondents being primarily white seniors. As a result, this study's findings may not accurately reflect the general population or apply to underrepresented groups. Another limitation of this study is the length and nature of the survey. The survey consisted of three demographic questions, 30 questions pertaining to the speaker and the voice itself, and three voice samples lasting approximately 30 seconds each, resulting in a completion time of approximately 10 minutes. The survey required respondents to listen to audio files that were embedded in a specific survey webpage, Google Chrome, that could only be supported on computers, which may have been detrimental to the

completion of the survey (eg, respondents unable to listen to the audio files due to their environment, respondents not willing to access the audio files due to security, etc). These could be potential reasons for the increased incomplete response rate of the respondents. As a result of means being the only indication necessary to identify *general* trends toward glottal fry usage, no statistical analysis was used. Thus, no concrete assumptions can be made as the purpose of this research was to identify *general* trends toward glottal fry usage. The task used in the current study may also be a limitation. This study used a simulated casual conversation script to simulate a high school conversation, whereas previous research has used single-sentence stimuli or story-reading passages to collect voice samples. The recreated script used in this study is a speech perusing as opposed to an exchange that would happen in an eye-to-eye discussion. Other vocal aspects, such as intonation and rate of speech, that would naturally occur in a casual conversation, may have been altered by the use of a monologue-reading task. Lastly, a major limitation of this study is that high schoolers do not represent the full population of Generation Z, but rather a portion of it. Thus, the results of this study may not be completely generalizable to Generation Z as a whole. Regardless of these limitations, this study provides meaningful results and offers insight into the perceptions of glottal fry usage in men and women.

Conclusion

To the best of my knowledge, this is the first study to evaluate Generation Z's perceptions of glottal fry usage with foundations from glottal fry literature regarding social settings and the impact of these perceptions on the speaker. The findings of this study shed light on Generation Z's negative perceptions of female speakers with glottal fry, a finding consistent with prior literature. Personality traits, applied social skills, mental capabilities, and physical appearance are all conveyed by a person's voice. Results from this study can be used to build familiarity with the effect of voice on audience discernment and correspondence among speakers. Given the increased prevalence of this vocal quality among Generation Z, this study provides the foundation for subsequent research.

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