

“Glottal Fry in Popular American Culture: An Intraspeaker Variation Study of *The Bachelor*”

An Honors Thesis

by

Marie C. Gruber

California, Pennsylvania

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California University of Pennsylvania

California, Pennsylvania

We hereby approve the Honors Thesis of

Marie C. Gruber

Candidate for the degree of Bachelor of Science

Date

Faculty

04-26-18



Robert Skwarecki, PhD
Honors Thesis Advisor

26 Apr. 2018



Susan Morris-Rutledge, PhD
Second Reader

4/26/18



Craig Fox, PhD
Associate Director, Honors Program

26 April 2018



M. G. Aune, PhD
Honors Advisory Board
Director, Honors Program

Marie Gruber

Communication Disorders

Dr. Aune, Dr. Skwarecki, Dr. Rutledge

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Abstract

Studies have found an increase in the use of glottal fry in recent years among young adult English-speaking women in the United States (Yuasa, 2010; Wolk et al., 2012). This increase is especially salient in popular American culture, occurring in movies and on television shows. This study explored current research on the topic of glottal fry and analyzed speech samples from one woman who exhibited notable glottal fry in the reality television show *The Bachelor*. While exploring glottal fry in particular episodes, this study compared its use by location in utterance in three different conversational settings: speaking to the camera, speaking to the bachelor, and speaking to the other women.

Introduction

Glottal fry (also known as vocal fry or creaky voice) is a voice quality characterized by “rhythmic creaking or popping quality that occurs below the lowest note of a speaker’s pitch range” (Shipley & McAfee, 2016, p. 424). It is the mode of vocal fold vibration that is the lowest vocal register that a person can produce; it is formed by compression of vocal processes at the back of the vocal folds while the rest of the vocal folds remain in a relatively loose position with very little airflow (Blum, 2016). Glottal fry occurs for two reasons: pathological issues (such as vocal fold lesions, respiratory pathology, etc.) or a linguistic style (Blum, 2016). As a linguistic style, it is considered a normal voice quality usually occurring at the end of sentences to mark finality of the speaker’s utterance (Wolk et al., 2012; Blum, 2016). While glottal fry is typical on occasion at the end of sentences, it is considered a voice disorder if it is habitual and draws negative attention to itself (Shipley & McAfee, 2016). A cursory overview of many forms of media and news reveals that people are taking note of the rising trend of glottal fry in the United States. Perspectives range sharply from praise at a new linguistic trend set by young American women (Quenqua, 2012), to lamentations of how “annoying” and “world-weary” it sounds (“Faith Salie on Speaking with Vocal Fry”, 2013).

Scholars have explored possible motivations for adopting this voice quality. Firstly, Kuang and Liberman (2016) found that glottal fry is related to and perceived as lower voice pitch. This study used synthetic glottal fry samples, and asked listeners to rate the samples on pitch. The results showed clear indication that listeners perceive glottal fry as a lower pitch, and that this perception depends not only on the speaker’s

fundamental frequency range, but also the level of glottal fry. The study also noted that heavier glottal fry almost always sounded lower. Although glottal fry occurs more often at a lower pitch, it is not the same as a lower pitch; rather, it is a quality that perceptually imitates a lower pitch.

Glottal fry is a growing phenomenon that is unique to American culture. Women have been found to use more glottal fry when speaking American English, as opposed to Japanese, Spanish, or French (Yuasa, 2010; Gibson, Summers, and Walls, 2016; Benoist-Lucy and Pillot-Loiseau, 2013). Likewise, actresses use more glottal fry while playing American roles (Shaw and Crocker, 2015; Jelle, 2017). Investigating these instances reveals sociolinguistic motivations that are unique to American women. Although this trend may belie more than nationality, it is undeniable that glottal fry is singularly linked to American culture.

The implications of apparent lower voice pitch are widely noted in American social culture: it is identified with positive perceptions of dominance, trustworthiness, and leadership (Borkowska & Pawlowski, 2011; Klofstad, Anderson, and Peters, 2012). Scholars hypothesize that speakers who use glottal fry adopt these positive social perceptions, and young listeners perceive them as “educated, urban-oriented, and upwardly mobile” (Yuasa, 2010). Researchers also link specifically women’s use of glottal fry to increased perception of attractiveness (Shaw and Crocker, 2015; Jelle, 2017, Pennock-Speck, 2005). Others find the opposite is true: higher pitch (within normal register) is perceived as more attractive. In work-related settings, as Anderson et al. (2014) found, listeners perceive glottal fry negatively overall. However, in romantic settings, actresses tend to use more glottal fry (Shaw and Crocker, 2015; Jelle, 2017;

Pennock-Speck, 2005). The social meaning of glottal fry thus remains contested, both among scholars and popular media.

This study addressed the social implications of glottal fry by analyzing the speech of one woman on the popular television show *The Bachelor*. *The Bachelor* was chosen because it contained a limited and unscripted group of women with predictable intentions in an isolated environment for a limited amount of time. Like Jelle (2014) and Shaw and Crocker (2015), the study will assess intraspeaker variation for differences in use of glottal fry across different settings.

Background and Literature Review

Human voice pitch has been found to greatly affect how the speaker is perceived. In Klofstad, Anderson, and Peters (2012) voice pitch affected listener's choice of leaders. The study recorded 10 men and 17 women saying, "I urge you to vote for me this November," and manipulated the recordings to higher and lower pitches (Klofstad et al., 2012, p. 2698). Across age groups and demographics, the listeners chose the male and female leaders with lower voices, demonstrating how lower pitch has correlated with favorable perceptions of leadership ability.

In a similar study, Tsantani et al., (2016) explored the influence of voice pitch on perceptions of trustworthiness and dominance from an unfamiliar voice. This study paired high and low-pitched voice recordings from the same speaker, edited them in Praat, a computer software program that analyzes speech in phonetics, and asked the listeners to choose which one they perceived as more dominant or trustworthy based on their first impression. On average, both male and female listeners chose low-pitched voices to be more dominant for male speakers. Perception of low-pitched voices in

female speakers to be dominant was only slightly more than chance level. Likewise, participants chose the lower pitched voices for perceptions of trustworthiness for male and female voices. These results were only slightly greater than those of chance were as well. Analysis of the data found that the preference for low pitch in female speaker with regard for trustworthiness is greater for female speakers than male; further, the preference for low-pitched voices with regard to dominance is greater for male speakers than for female speakers. Overall, the findings of this study indicate a positive correlation with low-pitched voice in perceptions of dominance and trustworthiness.

Borkowska and Pawlowski (2011) measured the fundamental frequency of recordings of five vowels from 58 women. They edited four of them digitally and categorized the voices into low, medium, high, or very high pitch. Men rated the original and altered voices on attractiveness, and both men and women rated the voices of perception of dominance. The results showed that women with lower voices are perceived as more dominant with a linear relationship. However, women with higher voices up to an optimal pitch (not exceeding 280Hz) were perceived as more attractive. Therefore, there appear to be benefits for women who have naturally low voice pitch in places where dominance is valuable, and benefits for women who have naturally higher pitches in situations where attractiveness is valuable.

Fraccaro et al. (2013) investigated the effect of changing one's natural pitch on perception of attractiveness, exploring the well supported claim that women prefer lower men's voices and men prefer higher women's voices. This study altered voice samples from men to have a lower frequency, and voice samples from women to have a higher frequency. Listeners preferred voices that were closer to the speaker's natural pitch,

except in the perception of dominance. For both male and female speakers, unnatural alterations to their voices had a negative effect on listener's perception of the speakers in ratings of attractiveness.

Kuang and Liberman (2016) found that using glottal fry, the speaker's fundamental frequency need not change much for a woman's voice to sound low pitched. Glottal fry, also known as vocal fry or creaky voice, is characterized by irregular vibration patterns and low energy vocalization, as opposed to the steady buzz associated with normal modal speech. This study used a digital voice changing program to add jitter to normal speech so that it classified as aperiodic glottal fry and presented it in pairs of altered and unaltered samples to 20 English speaking listeners. The listeners identified which sample was higher or lower in pitch. The results showed that listeners generally hear lower pitch in glottal fry speech indicating that glottal fry is perceived as lower pitch. Therefore, speakers can use glottal fry to imitate a lower pitched voice.

Wolk, Abdelli-Beruh, and Slavin (2012) found that glottal fry register is common in young adult standard American English (SAE) speakers. The study recruited 34 female college students (18 to 25 years old) and recorded them saying an isolated vowel /a/ and reading a sentence. The researchers analyzed the recording perceptually and acoustically. They found that approximately two thirds of the women used glottal fry, which they differed from normal voice register by fundamental frequency mean, frequency, range, and jitter local. The glottal fry occurred most frequently at the end of sentences. These findings indicate the widespread use of glottal fry among the demographic of young college age women.

Gibson, Summers, and Walls (2016) determined that mere exposure to use of

glottal fry among American women increases the likelihood that the listener will use glottal fry. This study analyzed the speech of 58 women, some monolingual English speakers, some monolingual Spanish speakers, and some Spanish-English bilingual speakers. The women repeated a list of non-words in the sound rules of English and non-words in the sound rules of Spanish and the researchers analyzed their speech for glottal fry. All groups used more glottal fry when repeating English than when repeating Spanish. The researchers speculate that the growing use of glottal fry in the United States is due to cultural influences.

Benoist-Lucy and Pillot-Loiseau (2013) studied the speech of six 20-year-old American women learning French. They recorded a reading task and conversational task in each language, finding more glottal fry in the English. They also noted more glottal fry in spontaneous English speech than in the reading task. The researchers summarized that when English speakers learn a second language they adapt their voice to exclude glottal fry but continue to use glottal fry when speaking their native language. These findings indicate that glottal fry is more acceptable in American speech.

Borrie and Delfino (2016) examined conversational entrainment, “the natural tendency for people to modify their behavior to more closely match their communication partner,” as it relates to glottal fry in young American women’s speech. Twenty SAE speakers, age 18 to 29, were recorded reading a standard passage using their typical speaking voice and assessed for prevalence of glottal fry. Those with high occurrences of glottal fry were paired with those who had lower occurrences and given a conversational task. The people who more closely matched the level of glottal fry of their interlocutor reported more enjoyment of the conversational experience and the more efficiency in

collaboration with their communication partners. Therefore, speaking with someone who uses glottal fry increases the likelihood of glottal fry.

Pennock-Speck (2005) compared the voices of three young American actresses in both American and British roles. The actresses that he chose were Gwyneth Paltrow, Reese Witherspoon, and Rene Zellweger. The researcher found that American characters use more glottal fry than British characters. Glottal fry occurred more often at end of utterances especially in intimate scenes, even more than breathiness. In one film, *Legally Blond*, Reese Witherspoon uses a noticeable amount of glottal fry, but when she plays a woman in a film set in the Victorian era, she uses none. He suggests that further research could analyze glottal fry from a practical point of view, based on the setting of the speech. Thus, he summarizes that “creak is desirable in America but less so in Britain” (Pennock-Speck, 2005, p. 2).

In a study of American and Japanese speakers, Yuasa (2010) found that glottal fry is a prevalent vocal affect among young American women, and that that American college students perceive it positively. The study measured the use of glottal fry among Japanese and American English speakers, surveyed them on the prevalence of glottal fry in their region, and evaluated a matched guise perception survey of an American female voice. The glottal fry measurements were taken from 12 female American students, 11 male American students, and 10 female Japanese students at the California University of Berkeley. The speakers conversed for 10 minutes with men and women on an emotionally neutral topic. Using Praat, the researchers collected and analyzed a 401-word speech sample for each participant. The results showed that American females tend to use glottal fry more than twice as often as American males. In addition, American females

showed a higher mean glottal fry usage than Japanese females, suggesting a cultural influence. Yuasa stipulates that a growing number of young women are using glottal fry sociolinguistically as a strategy to appear more masculine and gain the perceptual advantages of a lower voice.

The perceptual portion of Yuasa (2010) surveyed 175 American college students, with open ended questions on the prevalence of glottal fry in their region and how they perceive examples of glottal fry. The participants chose six opposite descriptors (confident/hesitant, pretentious/genuine, etc.). Results showed that 78.9% of college students hear glottal fry in their area, and that they perceive glottal fry in young American women as hesitant, non-aggressive, informal, educated, urban oriented, and upwardly mobile. Yuasa argues that her study indicates clearly regular usage of glottal fry in young American women due to sociocultural motivators.

Contrasting the findings of Yuasa (2010), Anderson et al. (2014) found among a larger national sample of listeners in the United States, that glottal fry is perceived as less competent, less trustworthy, less attractive, and less hireable. The speakers (seven males age 20-30 and seven females age 19-27) were taught to use the glottal fry affectation and recorded saying the common job interview phrase, "Thank you for considering me for this opportunity," one mimicking glottal fry and one in a natural voice. These stimuli were presented in pairs to 800 people (400 men and 400 women) who rated the speaker regarding their hireability. The results showed a significant preference for natural voice for all speakers. Interestingly, the male listeners perception of women using glottal fry were negative except in the case of attractiveness. "The negative perceptions of women who used glottal fry are stronger when the listener is also a woman" (Anderson et al., 2014).

Additionally, this study found that older listeners perceived glottal fry more negatively than young listeners. Overall, glottal fry elicits a negative response from listeners of all ages according to this study, although the use of glottal fry is increasing in prevalence in the United States.

Other studies have looked at the prevalence of glottal fry in popular media. Shaw and Crocker (2015) studied intraspeaker variation of Scarlett Johansson's voice in 6 of her films. The study evaluated her glottal fry usage by coding for glottal fry on the nuclei of syllables with tokens (1=present, 0=absent) and position of the nuclei, final or non-final. They further analyzed the usage of glottal fry qualitatively, by character traits, scene setting, and nationality. The results indicated more glottal fry use in roles where Johansson plays an American character (114 tokens) rather than a British character (70 tokens). The fry also occurred more often at the end of utterances. No significant differences appeared in relation to the type of phoneme or length of utterance. However, the study showed that Johansson's glottal fry in one British film was markedly increased, although Johansson was not playing an American. Reviewing the scene from which the researchers took the speech sample, Shaw and Crocker noted that Johansson is acting seductively with a male interlocutor. Moreover, the researchers found that glottal fry usage is more prevalent in intimate or seductive scenes across all six movies. Overall this study reinforces the idea that glottal fry is "used stylistically by the general young American female population," that it is more common in the final position of utterances, and that it is linked to sexual context (Shaw & Crocker, 2015, p. 23). However, the researchers speculate that coding for the severity of the glottal fry usage may expand the study and better differentiate between phonetic and stylistic impetuses for glottal fry.

Jelle (2017) analyzed Scarlett Johansson's use of glottal fry related to romantic intention in the movie *Her*. This study counted the number of clauses in four scenes of the movie and the number of occurrences of glottal fry in the clauses. The scenes were characterized either by sexually romantic interaction, nonsexual romantic interaction, or nonsexual, nonromantic, friendly interaction. The romantic scenes showed more instances of glottal fry per clause than the nonromantic scenes. There was notable difference in glottal fry usage between the sexual romantic scene and the nonsexual romantic scenes with the nonsexual scenes showing more usage particularly in the shift from nonsexual to explicit scene. As other studies have noted, more glottal fry occurred at the end of sentences. Thus, in intraspeaker variation studies of Johansson there is more glottal fry in scenes where the character has romantic intentions.

Scholars, such as Brown (2014) have identified such changes in speech style as part of a phenomenon called sociolinguistic competence, or "the ability to follow sociocultural rules of language, in the social context of the language": participant's roles, information shared, and the function of the interaction (Brown, 2014, p. 208). Following this relation between speech style and conversation setting and similar to the studies of Scarlett Johansson, an intraspeaker variation study of Krystal on *The Bachelor* would add to the literature on the subject of voice change in different settings. Krystal is a woman contestant on the 22nd season of *The Bachelor*, a reality television show where women compete for the affection of one bachelor. Her voice called attention to itself among the other women on the show; one woman accused her of having a "fake voice," meanwhile the bachelor praised her for her "soothing" voice. Outside of the show, others commented on Krystal's voice, such as Jimmy Kimmel who claimed on his show that Krystal's voice

was “the single most annoying voice in not just bachelor, but television history” after showing clips of her talking with the bachelor. Since her voice change is so noticeable from setting to setting, Krystal is a prime candidate for this study on the use of glottal fry.

Purpose of the study

This study will investigate the intraspeaker variation of one woman on the television show *The Bachelor*. It will compare the prevalence of glottal fry in her speech by interlocutor, episode, and location of the glottal fry in her speech.

Methods

In this study, speech samples were collected from Krystal’s speech in episodes 1 and 5 of the 22nd season of *The Bachelor*. These episodes were used because they were the first and last episodes in which Krystal appeared as a contestant on *The Bachelor*. As a baseline for analysis, her utterances were written, separated by episode, and divided by interlocutor: the camera, the bachelor and others. For the purposes of this study, “others” referred to the other women contestants. The speech sample excluded speech directed to unidentified listeners (such as the show’s crew) and speech recorded without a microphone.

Krystal’s utterances were segmented into breath groups, which are groupings of speech that begin at one breath and end at the next breath. This study used breaths as utterance markers for consistency in recording that allowed for sentence fragments and incomplete clauses. While complete phrases and sentences may follow the breath group, they do not necessarily. The breath groups were then transcribed into the International Phonetic Alphabet (IPA), in order to more easily and accurately note occurrences of glottal fry.

Objectively, glottal fry is measured through the speaker's fundamental frequency, vocal qualities on a spectrogram using instrument analysis. However, because glottal fry is clearly audible, it is also measured by the perceptual characteristics evident to the listener, as in Jelle (2017), although this method is subjective if not supported by spectral analysis. The current study used an auditory analysis similar to Shaw and Crocker (2015) and Jelle (2017) which excluded spectral analysis due to time constraints. It rated glottal fry by its number of instances per breath group, marked on the syllabic nuclei of utterances. Shaw and Crocker (2015) cites that "creak can be present anywhere there is voicing" so they limited the variables to "syllabic nuclei: this is typically the vowel in the middle of a syllable, although it may include syllabic consonants [l], [r], [m], [n], or [ŋ]" (Shaw & Crocker, 2015, p. 23). In this study, glottal fry is distinguished from normal voice by its perceptually low pitch and rhythmic clicking quality.

The breath groups were split into thirds by number of syllables, so that the occurrences of glottal fry could be marked by their location in the breath group: in the beginning, middle, or end. For breath groups that had only two syllables, the first syllable functioned as the beginning, the second syllable functioned as the end, and the middle was marked with no glottal fry. There were some breath groups with only one syllable, although none had glottal fry, so all three locations were marked as without glottal fry.

Number of instances of glottal fry per breath group were compared by interlocutor (camera, bachelor, or others), episode (1 or 5), and location of the glottal fry in the breath group (beginning, middle, or end). The findings were calculated by mean number of instances of glottal fry per variable, and by percentage of glottal fry by syllable count. The results yielded information on the social meaning of glottal fry in

popular American culture.

Results

The results were calculated by determining the mean number of instances of glottal fry per variable, and the percent of glottal fry by number of syllables. The categories assessed were Krystal’s interlocutor, location of the glottal fry, and episode of the speech sample.

Figures 1 and 2 (below) show the mean number of instance of glottal fry per breath group by episode and interlocutor. The camera has the highest mean glottal fry use in both episodes and in the overall mean. Slightly less than that is the bachelor in episode one and in the overall mean. Others has the least glottal fry in both episodes and in the overall mean.

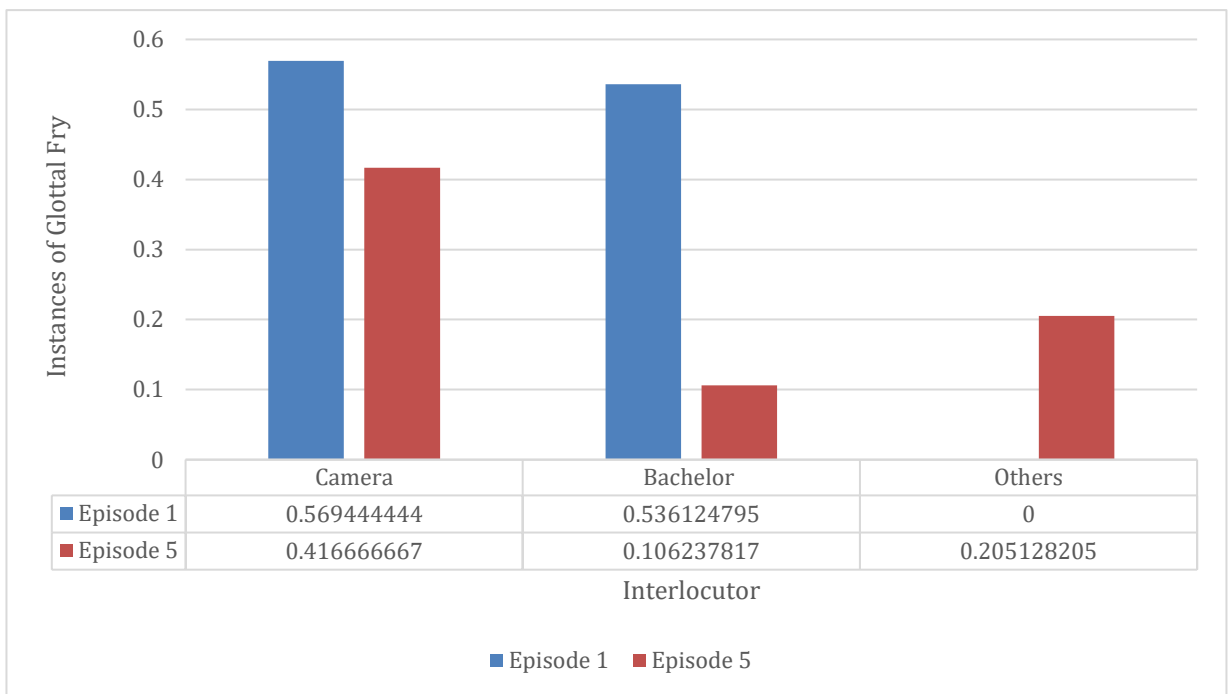


Figure 1. Mean Instances of Glottal Fry per Breath Group by Episode and Interlocutor.

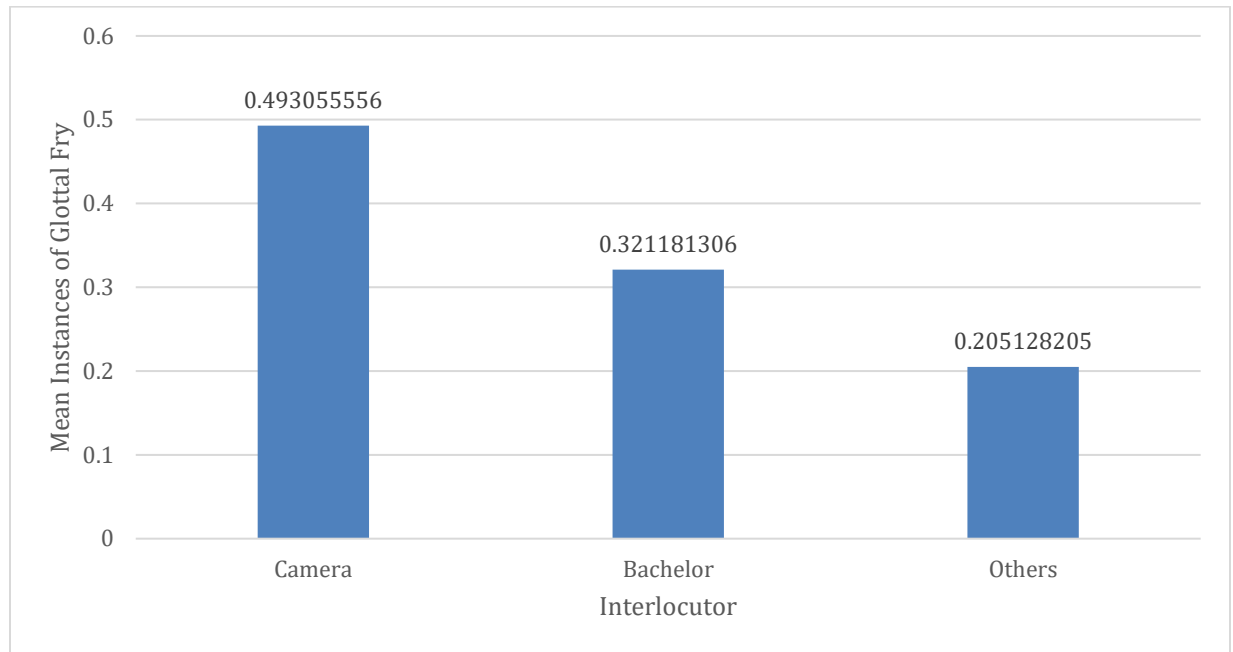


Figure 2. Mean Instances of Glottal Fry per Breath Group by Interlocutor.

Figures 3 and 4 (below) show the mean instances of glottal fry per breath group by location in the utterance. Krystal's glottal fry was most common at the end of breath groups. There also seemed to be an increasing pattern of glottal fry use from the beginning to the end of a breath group in the average of both episodes: the least glottal fry was found at the beginning of a breath group, a nearly linear amount more was found in the middle, the most glottal fry was found at the end. This possible trend held true except in the location of glottal fry in the first episode, which had less glottal fry in the middle of breath groups.

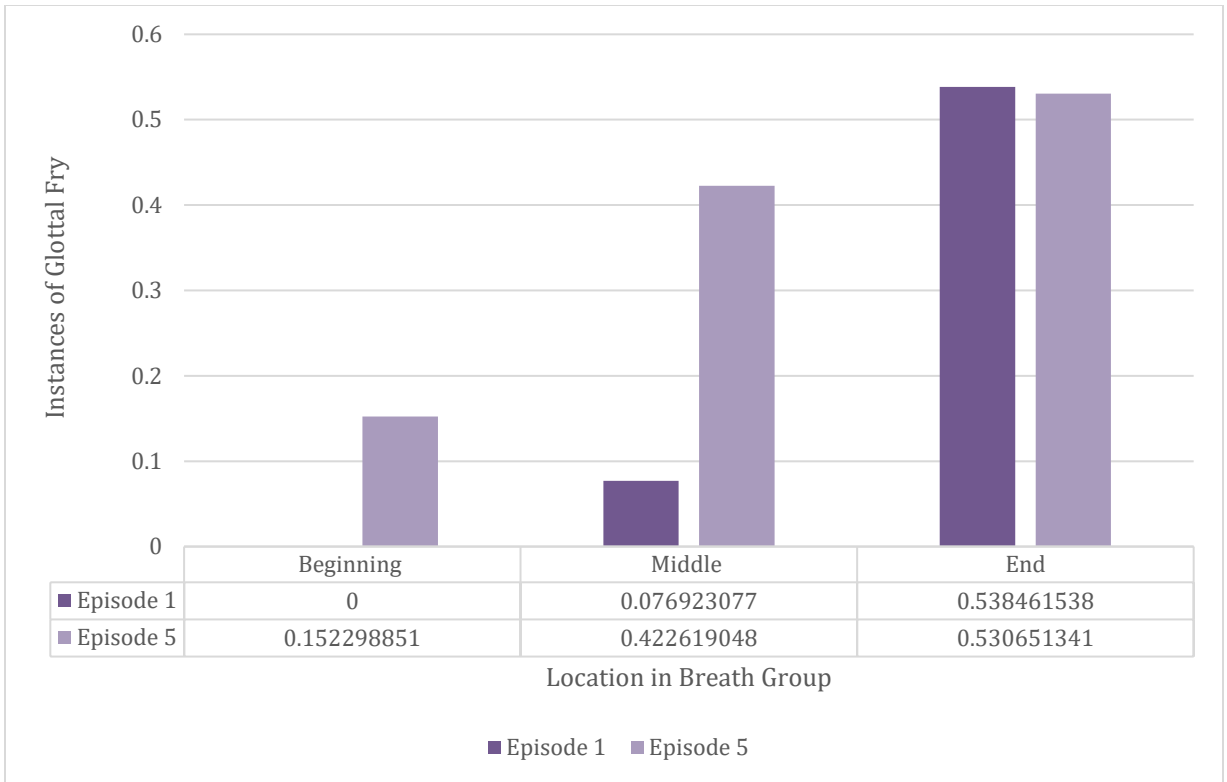


Figure 3. Mean Instances of Glottal Fry per Breath Group by Episode and Location in Utterance.

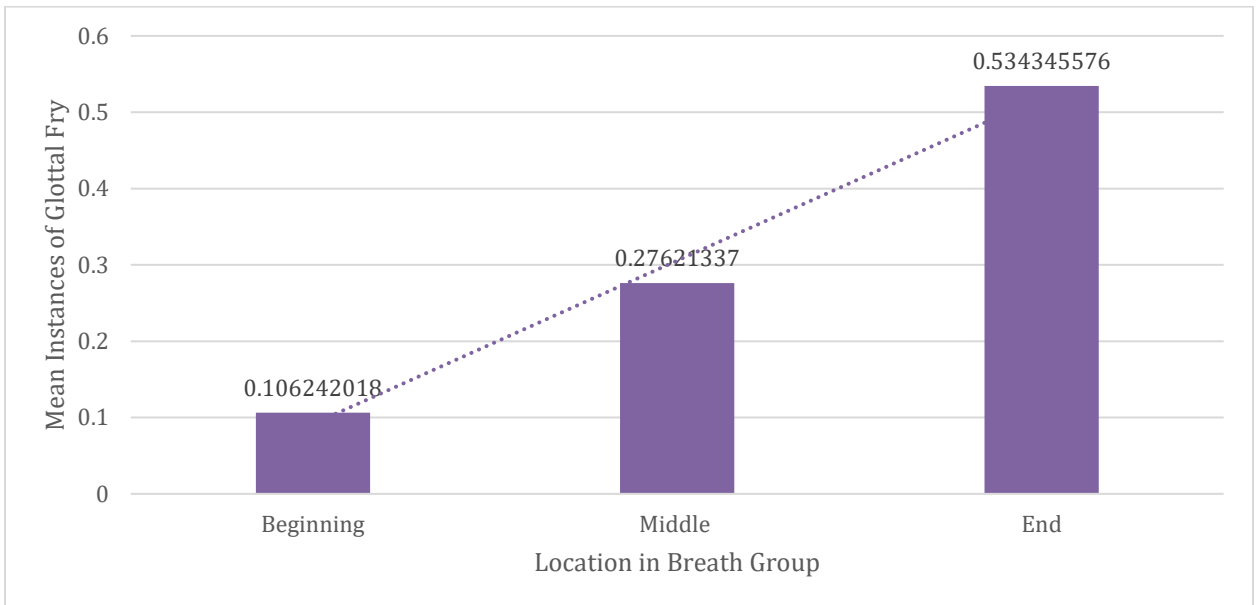


Figure 4. Mean Instances of Glottal Fry per Breath Group by Location in Utterance.

Figures 5, and 6, and 7 (below) address the data in terms of syllable with and without glottal fry. Because the corpus of the speech sample differed in number of breath groups and number of syllables per interlocutor, this analysis shows those variances. There were 40 breath groups collected for camera, 48 for bachelor, and 30 for others. These calculations by syllable show that the bachelor has the highest percent of glottal fry usage, camera has the second highest percent, and others has the least.

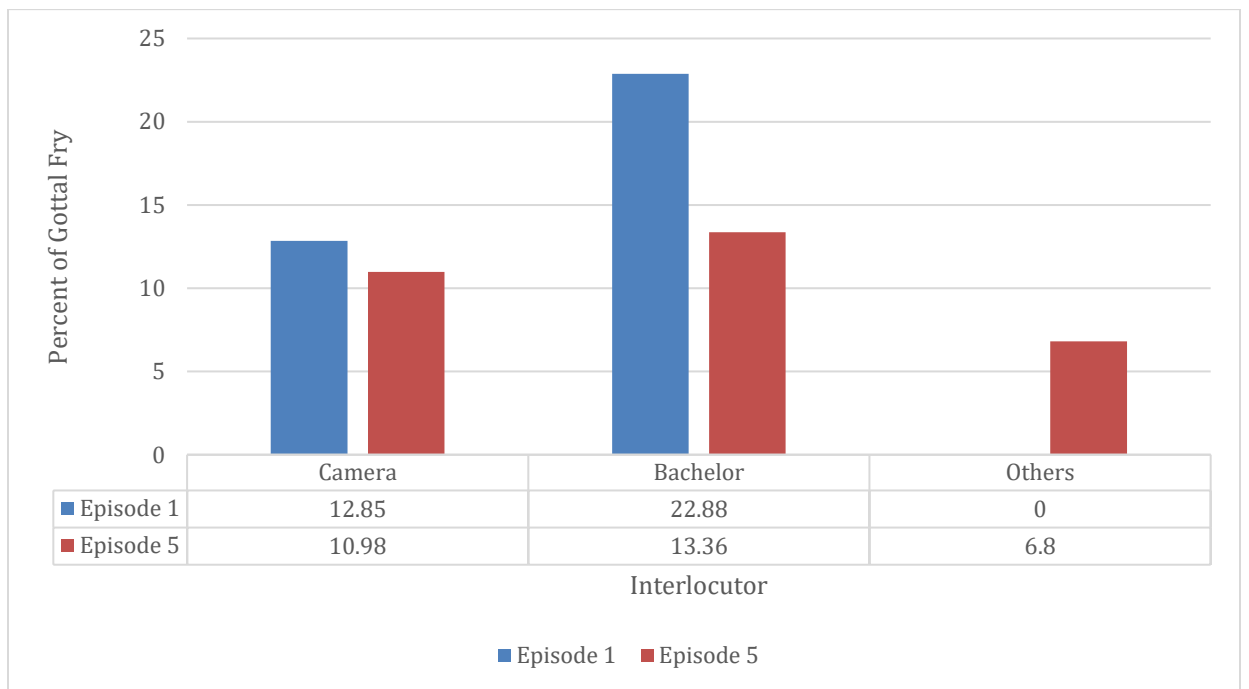


Figure 5. Percent Glottal Fry by Syllable by Episode and Interlocutor.

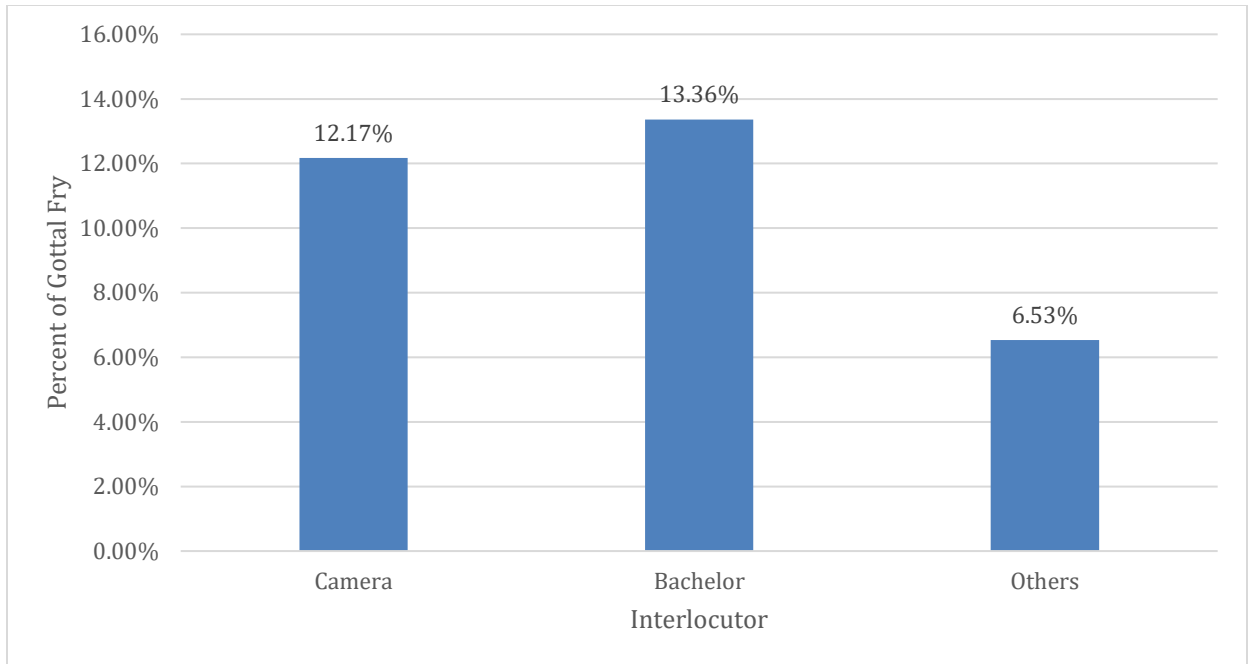


Figure 6. Percent of Glottal Fry by Syllable by Interlocutor.

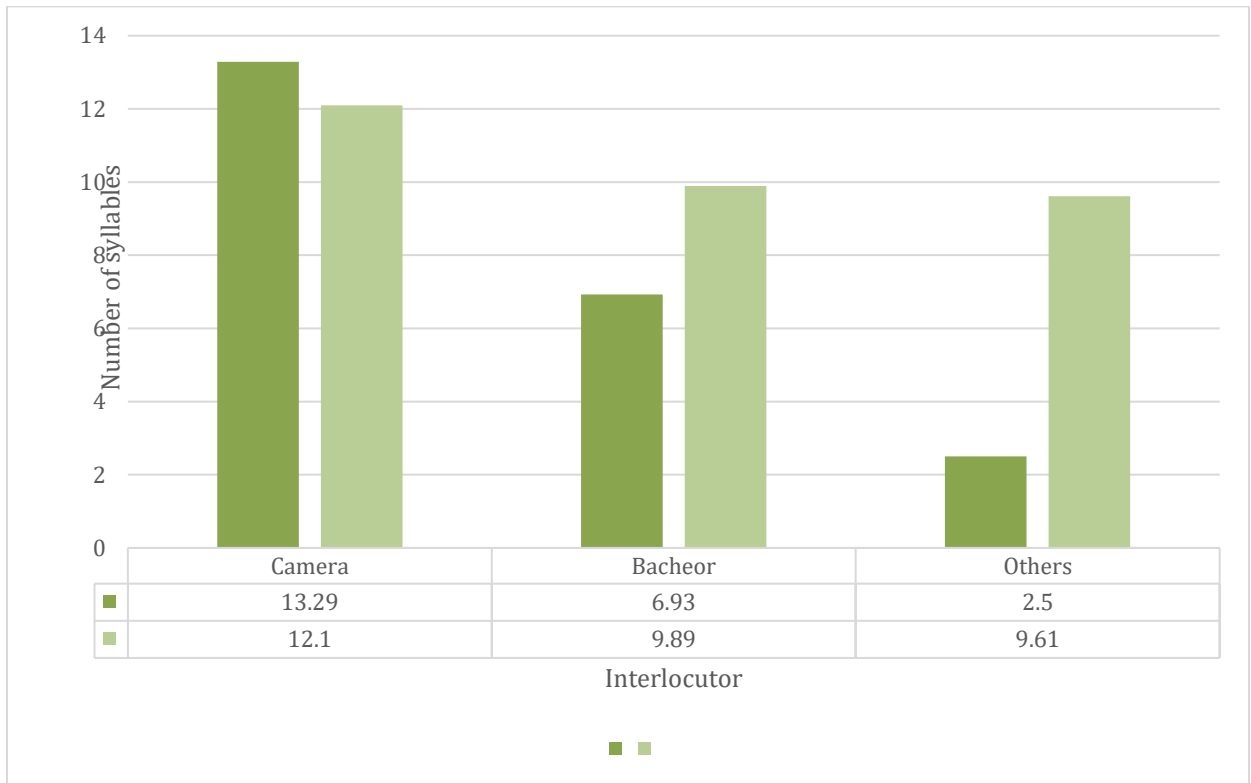


Figure 4. Mean Number of Syllables per Breath Group.

Discussion

The findings of this study suggest that there is in fact a correlation between glottal fry use and sociolinguistic competence, as evidenced by the differences in glottal fry use between interlocutors. In accord with the findings of Jelle (2017) and Shaw and Crocker (2015), the interlocutor of romantic interest elicits the most glottal fry from the speaker. However, Krystal's use of more glottal fry with the bachelor than with others may contradict the findings of Borkowska & Pawlowski (2011) that higher pitched women's voices are perceived as more attractive. However, it follows the results of Jelle (2017) and Shaw and Crocker (2015), which found that Scarlett Johansson used more glottal fry in scenes where she was pursuing a man romantically. This distinction may also reinforce the findings of Pennock-Speck (2005) that indicated the uniqueness glottal fry as a stylistic feature of American women's speech. Although higher pitched women's voices sound more attractive to men and voices that are most similar to one's natural voice are better received, Krystal does the opposite.

However, Krystal's sociolinguistic intentions may not be more competitive than romantic in pursuit of the bachelor. In competition, as in the voting study of Klofstad, Anderson, and Peters (2012), lower pitch gives an advantage in gaining favor with one's listener. It may be this lower pitch advantage that motivated Krystal to use more glottal fry in competing for a romantic connection with the bachelor.

While Krystal used the least amount of glottal fry talking to the other women, she used the most talking to the camera. The high amount of glottal fry to the camera may support the studies relating low pitch and glottal fry to positive perceptions of dominance, trustworthiness, education, urban orientation, and upward mobility (Borkowska &

Pawlowski, 2011; Klofstad et al., 2012; Yuasa, 2010). Krystal's intention in talking to the camera is to appear to the audience as superior to the other women contestants. Whether she was conscious of the affect or not, Krystal may have used glottal fry more while talking to the camera to attain the benefits to social reputation associated with lower pitch.

Meanwhile, in both mean and percentage, Krystal used the least glottal fry with other women. She used a mean of 0.2051 instances of glottal fry, and a percentage of 6.53 syllables with glottal fry to total syllables. In episode one, Krystal used no glottal fry while talking to the other women. These findings may indicate a relationship between glottal fry use by setting, more so than interlocutor. In the first episode, Krystal greeted the other women and engaged in light, emotionally neutral conversation. In the fifth episode, Krystal was in competition with the other women in bowling and arguing with them over the bachelor. The increase in glottal fry use from the first to the fifth episode suggests a correlation between glottal fry and emotional conversation, or a correlation between glottal fry and competitive atmosphere.

Krystal's use of glottal fry with regard to interlocutor indicated more glottal fry to the camera and bachelor, and the least glottal fry use to the other women. However, these results differed slightly between reports of means and percentages, indicating that by percentage of syllables Krystal used the most glottal fry talking to the bachelor. This difference may be related to the number of syllables available for analysis, as the mean number of syllables was the smallest in the first episode talking to others. Yet, the correlation between glottal fry use and a competitive social setting remains in both instances.

In line with previous research on glottal fry location in utterances, Krystal's glottal fry was most common at the end of her breath groups (Jelle, 2017; Pennock-Speck, 2005, Shaw & Crocker, 2015; Wolk et al., 2012). There also seemed to be an increasing pattern of glottal fry from the beginning to the end of a breath group in the average of both episodes. However, the location of glottal fry in the first episode did not follow the same trend – there was more glottal fry in the middle of utterances in episode five than episode one. A potential explanation of this difference may be the change in Krystal's tone from episode one to episode five. In episode one, she introduced herself in a positive upbeat tone, while for much of the speech sample of episode five she shared intimate feelings of hurt and anger. The change in tone may have affected the style of glottal fry she used, limiting it more to the end of utterance in the relatively emotionally neutral first episode, and extending more into the beginning and middle of utterances in the more emotionally charged fifth episode.

Some limitations of the study were its subjectivity and sample size. The methods were necessarily subjective, as the speech sample and ratings were recorded by one listener. Although ratings were detailed and recorded at the most precise perceptual level, this study did not include instrument analysis which could verify the presence of glottal fry objectively. Also, because the speech samples were obtained from a television show, this was a case study with a relatively small corpus of speech samples rather than a controlled single subject design.

Conclusion

Glottal fry is sociolinguistically correlated to Krystal's speech in *The Bachelor*, reflecting the rising trend in glottal fry use in popular media and in certain social situations in American culture. Her glottal fry use changed not only by location in her utterances, but also between people that she spoke with, enough so that her glottal fry could be easily perceived and compared from setting to setting. Whether consciously or not, she changed her voice to include more glottal fry when speaking with her romantic interest, and when speaking in interview to the camera, and less glottal fry when speaking with the other women. The effect of her vocal style is also evident in the negative attention it received from both her peers and the public. Whether or not it achieved her aim in *The Bachelor*, Krystal's intraspeaker variation in voice has added to the body of knowledge on glottal fry in popular American culture.

In future studies, this research design could be used to assess the same variables as another case study, or it could be expanded to include multiple settings, people, shows, languages, or cultures. To make the methods more objective and increase interrater reliability, other studies could use panels of raters, and devise a severity rating to more closely see the level and style of glottal fry in each setting. Perhaps another wider-ranging study could use speech samples from multiple people on the same show or include other shows, including some in different languages to assess glottal fry from a multicultural perspective. While leaving room for further studies to supplement these findings, the limited scope of this study allowed for an incisive analysis of glottal fry in popular American culture.

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