“Would you like fries with thaaaat?”
Investigating vocal fry in young female Canadian English speakers

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The vocal fry register has previously been detected in the voices of young women. The purpose of this study is to determine the extent to which vocal fry is present among young female Canadian English speakers and to investigate the attitudes people have towards speakers who exhibit vocal fry. To investigate the presence of vocal fry, we collected data from 21 female participants in an interview setting. The majority of participants exhibited vocal fry in their regular speech patterns, and this feature was more pronounced at the end of a phrase. Vocal fry is quite common at the end of a phrase or sentence; however, its use as a social marker has not been thoroughly studied. To investigate attitudes towards speakers with vocal fry, we collected data using an online questionnaire. Overall, we found the 56 male and female participants to hold negative attitudes towards speakers with vocal fry and positive attitudes towards speakers without vocal fry. Findings from this study will contribute to the growing literature on this vocal register.

1 Introduction

Young women are often credited with being linguistic innovators (Labov 1990), originating vocal trends and popular slang that later spread to the broader population. For example, young women are known to use like as a conversation filler and other vocal “fads” fitting the “Valley Girl” stereotype (Fessenden 2011, Quenqua 2012). Older speakers often hold negative attitudes towards these patterns and have been known to mock speakers who present these patterns in their everyday speech. One example of a vocal trend present in the voices of today’s young women is use of the vocal fry register. The presence of fry has been detected in young women, and listeners often hold negative attitudes towards those who exhibit this vocal register in their speech (Wolk, Abdelli-Beruh & Slavin 2011). The goal of our study is to further the literature on vocal fry by extending previous research completed with a female American English population to a population of young female Canadian English speakers, through an examination of the presence of vocal fry as well as an investigation of attitudes towards speakers who exhibit fry.

Vocal fry is a “form of phonation characterized by a distinct laryngeal vibratory pattern, distinct acoustic features, and a distinct vocal quality” (Wolk et al. 2011). It is characterized by greatly slowed glottal pulsing produced by the larynx (Laver 1980, Hollein & Wendahl 1968). This laryngeal production creates a lower, creaky-sounding quality of the voice that is usually heard at the end of a sentence. In American English, vocal fry has been found to signal the beginning of intonational phrases and/or syntactic boundaries, as the rate of glottalization is highest at the ends of paragraphs and the ends of sentences (Abdelli-Beruh, Wolk & Slavin 2014). A number of terms are commonly used in the literature synonymously with vocal fry. Vocal fry has been referred to as “pulse register, creaky voice, stiff voice, or glottal fry” (Wolk et al., 2011) as well as “creak, creaky voice, glottal pulse, and laryngealization” (Ishi, Ishiguro & Hagita 2005).

Historically, vocal fry was considered to be a vocal pathology associated with abnormal laryngeal outputs (Wolk et al. 2011). However, more recent research suggests that vocal fry is now considered to be one of several normal modes of phonation, occurring in the lower end of the frequency range below the typical modal register. In 1968, Hollein et al. were the first to hypothesize that the vocal fry register might actually be found in normal voice qualities. Hollein (1974) collected data that supported this hypothesis and since then, vocal fry has been recognized as the lowest of the three usual vocal registers, below the falsetto and modal registers. In 1998,
Blomgren, Chen, Ng and Gilbert conducted a study on various characteristics of vocal fry. Based on data from previous literature, the researchers extrapolated that the average frequencies of vocal fry vibration range from approximately 20 to 70 Hertz (Hz) with a mean of approximately 50 Hz (1998). Henton (1988) identified sex differences in voice quality and recommended that vocal fry or creak should be acknowledged as an important sociophonetic marker.

Allegedly, the origins of vocal fry lie on Wall Street, where women in business began to use the characteristic in order to sound more authoritative and assertive (Quenqua 2012). This is in line with previous research which has found that vocal fry has been interpreted as a quality of masculinity or authority (Yuasa 2010). Pittam and Gallois (1986) conducted a study to investigate listener interpretations of various voice qualities, including vocal fry. He found that the quality was associated with high social status. He suggested this might stem from the quality’s association with male speakers, perhaps because of its inherent low fundamental frequency. The prospect that this feature may be adopted by female speakers in order to sound more authoritative was reported by Dilley, Shattuck-Hufnagel and Ostendorf (1996). Previous literature has alluded to vocal fry being used as a strategy by female American newscasters to project a more authoritative image and has even been observed in speeches by Hillary Clinton (Yuasa 2010).

In 2011, Wolk et al. brought a new wave of attention to the trend when they conducted a study on vocal fry among university students at Long Island University in New York. While past researchers have noted the presence of vocal fry, the study by Wolk et al. was the first of its kind to quantify the prevalence of vocal fry in normal speech. The researchers concluded that more than two-thirds of university-aged Standard American English females in their study used vocal fry and furthermore that it was most likely to occur at the ends of utterances. However, when participants were recorded sustaining a vowel, vocal fry rarely occurred. Thus, speakers did not always exhibit fry. This supports the notion that vocal fry is not the result of an underlying vocal pathology but rather a characteristic that can be selectively (albeit, subconsciously) used. From these findings, Wolk et al. hypothesized that the trend of vocal fry is increasing in frequency among university-aged women.

Following the publication of Wolk et al.’s (2011) results, vocal fry has received attention from the media and gained notoriety for the negative connotations associated with the quality. The trend has been described in the media as a “lazy, drawn-out effect” and has been associated with speakers who are insecure, emotional or stupid (Quenqua 2012). The trend has been observed in the voices of several celebrities, notably pop singer Kesha and the daughters of the Kardashian family, whose reputations in the media only further instill the negative connotations associated with fry. Associations with vocal fry seem to have shifted from power and assertiveness to ditziness and apathy in young women (Quenqua 2012).

The first objective of our study was to determine if vocal fry is found among female speakers of Canadian English. Based on the previous literature on vocal fry, we hypothesized that the majority of female Canadian English participants, aged 18 to 25, would present some degree of vocal fry in their speech and that the vocal fry would most likely occur at the ends of utterances. We based our methodology on an experiment by Wolk et al. (2011) which examined the presence of vocal fry in American English. The second objective of our study was to investigate the attitudes people hold towards Canadian English speakers who exhibit vocal fry. We hypothesized that both male and female Canadian English speakers would have more negative attitudes towards female speakers who exhibit vocal fry compared to female speakers who do not exhibit vocal fry. We expected participants would give speakers with vocal fry higher ratings on negative personality characteristics such as ditziness, indecisiveness and laziness.

2 Methods

2.1 Acoustic Study

For the first portion of our study, we recruited 21 female Canadian English speakers from Queen’s University in Kingston, Ontario, aged 18 to 25. All participants were born in Canada and were native English speakers. Participants were recruited through social media, where friends of the researchers were invited to participate in an “interview-style, 15-minute data collection session.” Participants 10 and 16 were excluded from analysis due to interference with the recording and/or
our inability to calculate a clear F0 value from the waveform; therefore our final acoustic analysis is based on data from 19 speakers.

Data collection occurred in a silent study room on the Queen’s University campus. Participants read a letter of information and signed consent forms indicating that they agreed to have their voice recorded for the purpose of our study. The experimenters asked a series of demographic questions, including questions about age, gender and native language. Participants sat comfortably in a chair with a microphone on a table in front of them, and the experimenters instructed them to read a passage in a normal speaking voice. When the participants indicated they were comfortable, recording began. Participants read aloud a modified version of the “Rainbow Passage”, which was the passage used by Wolk et al. (2011) in their study of habitual use of vocal fry (Appendix A). We chose this passage because of its popularity in research and clinical settings. We modified the passage to make it shorter and rearranged the sentences in order to position our target words. Specifically, we arranged the passage so that the target word rainbow appeared sentence-initially and sentence-finally. We made the recordings with an LG external USB microphone connected to a MacBook Pro laptop, using Praat version 5.3 at a sampling rate of 44100 Hz. During the recording, each experimenter made a perceptual judgment about the presence or absence of fry in order to impressionistically code the data.

After we collected the recordings, we segmented the target words in the passage using Praat: sentence-initial tokens were identified as Rainbow 1 (hereafter “R1”) and sentence-final tokens as Rainbow 2 (hereafter “R2”). Examples of spectrograms can be found in Appendix B. We chose to use F0 values as our measure of vocal fry, as fry is commonly associated with lower fundamental frequency. We calculated F0 for the middle portion of the final diphthong [oʊ] in R1 and R2 for each of the tokens, using the formula number of periods/duration (for example, 10 periods lasting 0.109 seconds would be 10/0.109 to equal an F0 of 91.74 Hz). We then calculated the average F0 values for R1 and R2 in speakers with and without perceived fry to determine if there was a significant difference between the F0 values of speakers in the two groups. We also calculated the average difference in F0 values between R1 and R2 within speakers to determine if speakers with fry at the ends of sentences would show a greater discrepancy between sentence-initial F0 and sentence-final F0 values. We expected that the F0 range would be significantly different between speakers exhibiting fry versus those exhibiting a normal register, which would be in keeping with the results of Wolk et al.’s 2011 study of American English speakers. A full list of all F0 values can be found in Appendix C.

2.2 Perceptual Study

In order to assess attitudes towards vocal fry, we constructed an online survey where respondents listened to clips of speakers who either exhibited or did not exhibit vocal fry and then answered a series of questions regarding their attitudes towards each speaker. To create the survey, we recorded four speakers reading the same few sentences, which consisted of directions to a hypothetical location. We chose to use directions because it is a completely neutral content and thus would allow listeners to make judgments based on voice quality rather than content. The recordings were controlled for other potentially negative triggers such as uptalk and the use of like. The speakers for these recordings were selected from those who participated in the acoustic portion of the study. They were chosen based on the perceptual judgments of the experimenters who believed them to be good examples of speakers who did or did not exhibit fry. All were female, age 21, Canadian and native speakers of English. The script for the recording can be found in Appendix D. In each case, the presence or absence of fry was most prominent in the words “Division”, “right” and “street.”

We recruited eight male and 48 female listener participants, aged 17 to 47, through social media by posting to a Facebook group called “A Super Awesome Study.” All participants were born in Canada and were native English speakers. Participants listened to a total of four YouTube clips – two of speakers exhibiting fry and two of speakers not exhibiting fry. There was no video component to the clips, so the participants heard the speakers but were unable to see them.

After each recording, participants were asked to rate the speakers on three positive personality characteristics – assertive, responsible and hardworking – and three negative personality characteristics – ditzy, lazy and indecisive – using a 5-point Likert-type scale. We chose these
characteristics to ensure there was a range of both positive and negative characteristics and also so that each characteristic had an opposite match in the other category (e.g. positive “responsible” vs. negative “lazy”). Finally, there was one open-ended question following each audio clip where respondents could elaborate on their attitudes towards each speaker. An example of our survey format can be found in Appendix E.

After collecting the responses, we conducted the first independent samples t-test using SPSS to compare participants’ negative impressions of speakers who presented and did not present vocal fry in their speech. This test compared each participant’s composite score of their ratings for “ditzy”, “lazy” and “indecisive” for the two speakers who presented vocal fry and another composite score of the same characteristics for the two speakers who did not present vocal fry. This analysis was repeated to compare participants’ positive impressions of speakers who presented and did not present vocal fry in their speech, using composite scores of participants’ ratings of “assertive”, “responsible” and “hardworking” for two speakers who presented vocal fry and two speakers who did not present vocal fry. Ten incomplete responses were not included in the analysis, so the data presented includes the results from 56 complete surveys.

3 Results

3.1 Acoustic Study

The researchers perceived 16 out of 19 speakers to exhibit fry in at least one of their two tokens (R1 or R2). The determination was based on simply listening to and impressionistically coding whether or not fry was present. The experimenters were in agreement in all cases. Below are sample spectrograms from a single speaker. Figure 1 illustrates a lack of fry in sentence-initial R1 while Figure 2 illustrates the presence of fry in sentence-final R2.

Figure 1. Spectrogram of an R1 token (sentence-initial) with no fry. Window duration is 0.407846 seconds. (Same speaker as Figure 2.)
INVESTIGATING VOCAL FRY IN YOUNG FEMALE CANADIAN ENGLISH SPEAKERS

Figure 2. Spectrogram of an R2 token (sentence-final) with fry. Window duration is 0.407846 seconds. (Same speaker as Figure 1.)

The following figures display the results for all 19 speakers. The division between the “fry” and “no fry” groups is based on the impressionistic coding of the experimenters. (Impressionistic coding was compared against, but not dependent upon, F0 measurements.) Because our study only included female speakers, we felt justified in grouping F0 values together to calculate average values, assuming that females do not differ greatly in their F0 values. However, we acknowledge that this could potentially limit the generalizability of our results. F0 values were lower in the sentence-final position (R2) than in the sentence-initial position (R1) for all speakers. This is expected, as it is natural for speakers to lower their pitch at the ends of utterances, independent of vocal fry. However, as can be seen in Figure 3, speakers categorized as having fry had lower F0 values in both the sentence-initial and sentence-final positions. These results are suggestive, not conclusive, as the small sample size of speakers without vocal fry provides minimal statistical power for further comparison of groups.

Figure 3. Average F0 values for word-final [oʊ] when target word is in sentence-initial vs. final-final position, comparing speakers perceived to have fry and those perceived not to have fry.

The average F0 value in sentence-initial position was 284.90 Hz for speakers with fry and 322.60 Hz for speakers without fry. The average F0 value in sentence-final position was 76.48 Hz for speakers with fry and 144.90 Hz for speakers without fry. Furthermore, it is interesting to note that speakers with fry showed a larger discrepancy between F0 values sentence-initially and sentence-finally. This can be seen in Figure 4. The average difference between F0 R1 and F0 R2
for speakers with fry was 212.70 Hz. The average difference between F$_0$ R1 and F$_0$ R2 for speakers without fry was 177.75 Hz. Individual F$_0$ values for each speaker can be found in Appendix C.

![Figure 4. Average F0 difference in word-final [oʊ] when target word is sentence-initial vs. sentence-final, comparing speakers with perceived fry to those without fry.]

### 3.2 Perceptual Study

In order to test if participants had more negative attitudes towards those exhibiting vocal fry, an independent samples $t$-test was conducted using SPSS, analyzing each participant’s composite score of their ratings of “ditzy”, “lazy” and “indecisive” for the two speakers who presented vocal fry and another composite score of the same characteristics for the two speakers who did not present vocal fry in each audio clip. The independent samples $t$-test was found to be statistically significant, $t(110) = -3.823$, $p < .001$. These results indicate that participants rated speakers with vocal fry ($M = 2.121$, $SD = 0.637$) significantly higher on negative personality characteristics than speakers without vocal fry ($M = 1.676$, $SD = 0.582$). As well, we analyzed separate overall ratings for each negative personality characteristic. Speakers with fry obtained the highest ratings for “ditzy” and “lazy”. However, a speaker without fry obtained the highest rating for “indecisive”. For a full outline of ratings on each negative personality characteristic, see Figure 9 in Appendix F. When participants were asked to elaborate on their impressions of the speaker, responses followed a negative trend. One participant stated that the speaker “expressed herself in an unsociable and unfriendly manner.” Common characteristics expressed by participants about speakers with vocal fry included “sarcastic”, “unsure”, “disinterested” and “flippant”.

In order to test if participants had more positive attitudes towards those not exhibiting vocal fry, an independent samples $t$-test was conducted using SPSS, analyzing each participant’s composite score of their ratings of “assertive”, “responsible” and “hardworking” for the two speakers who presented vocal fry and another composite score of the same characteristics for the two speakers who did not present vocal fry in each audio clip. The independent samples $t$-test was found to be statistically significant, $t(110) = 4.069$, $p < .001$. These results indicate that participants rated speakers without vocal fry ($M = 3.134$, $SD = 0.598$) significantly higher on positive personality characteristics than speakers with vocal fry ($M = 2.70$, $SD = 0.560$). A visual representation of all mean total ratings for positive and negative characteristics can be found in Figure 5. As well, we analyzed separate ratings for each positive personality characteristic. Speakers without fry obtained the highest rating for “assertive”, “responsible” and “hardworking”. For a full outline of ratings on each positive personality characteristic, see Figure 10 in Appendix F. When participants were asked to elaborate on their impressions of the speaker, responses followed a positive trend. One participant stated the speaker “sounded confident and straightforward”. Common personality
characteristics of speakers without vocal fry included “confident”, “clear”, “friendly”, “trustworthy”, “professional” and “intelligent”.

![Figure 5. Mean total attitude ratings (5-point Likert-type scale) of three positive characteristics and three negative characteristics of speakers with and without vocal fry, based on listener scores.](image)

### 4 Discussion

The purpose of our study was to determine if vocal fry is prevalent among young female Canadian English speakers and to investigate the attitudes people hold towards young female Canadian English speakers who exhibit vocal fry. The results of our study supported both of our hypotheses. First, we hypothesized that the majority of female Canadian English speakers would display fry. We observed that 16 of the 19 speakers had some perceivable degree of fry. One limitation of our study is that the researchers were responsible for coding for presence or absence of fry, and this presents a potential source of bias. Our results support previous findings from Wolk et al.’s 2011 study with American English speakers, where more than two-thirds of participants displayed fry. However, since our results are based on a small number of participants, any findings are only a suggestion that vocal fry is increasing in frequency among young female Canadian English speakers. Furthermore, in regards to our acoustic analysis, we acknowledge that using \( F_0 \) values alone to indicate the presence of vocal fry is not ideal. Vocal fry is produced by an irregular vocal fold setting that complicates the measurement of \( F_0 \). For future research we recommend another method for measuring vocal fry, such as calculating the difference in altitude between the first two harmonics (Hanson 1997), since the relationship between formant values and voice quality is not fully understood. However, from the results of our impressionistic coding, it is clear that vocal fry exists in the speech of these women. All of the aforementioned issues present potential limitations to the results of our acoustic analysis, although we do believe that our results are suggestive enough to recommend further research.

Our results do support notions that vocal fry is characterized by lower \( F_0 \) values than the modal register. Speakers who were impressionistically coded as exhibiting sentence-final fry had considerably lower \( F_0 \) values in the sentence-final position than speakers without fry, and furthermore the discrepancy between the sentence-initial \( F_0 \) value and the sentence-final \( F_0 \) value was greater for speakers with fry than speakers without fry. This is in keeping with what we expected, as vocal fry has been most notably found at the ends of utterances. However, our numbers were not in keeping with the numbers presented by Blomgren et al. (1998). They suggested that based on previous literature, the vocal fry register should range from about 20 Hz to
70 Hz with a mean of about 50 Hz. We found speakers who showed sentence-final fry to have a mean of about 76 Hz in sentence-final position. However, this discrepancy could be due to the fact that we were only looking at vocal fry in women, who tend to have higher frequencies in general than men. It is common for $F_0$ to lower at the ends of utterances regardless of whether speakers exhibit fry. However, the observation that speakers with fry showed a greater difference between $F_0$ values sentence-initially versus sentence-finally than speakers who did not exhibit fry supports the hypothesis that vocal fry is a socio-stylistic characteristic that speakers are employing at the ends of utterances. In other words, it appears that speakers with fry show an exaggerated lowering at the ends of utterances when compared to speakers who do not exhibit fry, and this exaggeration is potentially a stylistic choice. However, other interpretations of the data are possible, and further research is needed to support this hypothesis.

Second, we hypothesized that people would hold more negative attitudes towards speakers with fry than speakers without fry. The results of our perceptual study supported this hypothesis, as speakers with fry received significantly higher scores on negative attributes and significantly lower scores on positive attributes than speakers without fry. Our results support the findings of a previous study by Carmen Fought as quoted in Quenqua’s 2012 article, stating women’s use of vocal fry is “immediately interpreted as insecure, emotional, or stupid.” These negative attitudes towards speakers with vocal fry coincide with our results, describing speakers as “dizzy”, “indecisive” and “lazy”. The fact that vocal fry has become a stigmatized feature likely has nothing to do with the properties of the feature itself. Rather, we feel that the fact that a feature employed by women gains negative connotations, as observed with other trends such as uptalk, is a reflection of residual negative attitudes towards women as a group in today’s society.

For our acoustic study, we recruited participants through social media, bringing in participants primarily from the Queen’s University community. In the future, our study could be improved by expanding the range of participants. If we were to interview females from a wider variety of regions, socio-economic groups and ethnicities we may find a wider range of results regarding the presence of vocal fry in young women, and by doing so, the generalizability of our results would cover a more diverse population. Regarding the administration of our perceptual study, we found that almost half of all participants did not complete the online survey. There may have been critical differences in the way these participants analyzed the sound clips and formed attitudes towards the speakers. However, because they did not finish the questions, their attitudes towards the speakers were left unknown. In order to increase completion rates, our questionnaire could be redesigned with shorter speaker samples or a wider variety of passages to maintain the interest of participants.

Our results support the growing observation that vocal fry is present in the voices of young, female Canadian English speakers. Our study was limited to females ages 18-25, where we found a high prevalence of vocal fry. Future research could investigate the extent to which vocal fry has entered other populations, such as males and other age groups. As well, future research could analyze the presence of vocal fry based on the setting in which the speech is taking place, to determine whether the use of this feature is context-specific or if speakers who exhibit fry do so in all contexts.

Our results suggest that people hold negative attitudes towards those exhibiting vocal fry. Future research could be done to investigate if there are any deleterious physiological and/or social effects of long-term use of the vocal fry register in normal speech. Future research also needs to be done to better acoustically analyze and quantify the presence of vocal fry in Canadian English.

5 Conclusion

Through an acoustic study and online questionnaire, we were able to test two hypotheses examining the growing trend of vocal fry in the voices of today’s young Canadian English-speaking women. In conclusion, the results of our study support both of our hypotheses. The first set of results supports the hypothesis that vocal fry is extremely prevalent in university-aged female speakers. Historically, chronic vocal fry was considered a vocal pathology and had been associated with contact granulomas (Wolk et al. 2011). However, vocal fry is now appearing in normal speech. Clinicians should be aware that this is becoming a commonly used trait in normal speech and that it is likely to become more and more prevalent in speakers. Furthermore, because
this is a recently appearing trend, we have yet to see any long-term effects of the habitual use of this characteristic. Thus, long-term studies are recommended in order to determine if there are any deleterious effects of the habitual use of vocal fry on the larynx or vocal folds.

The second set of results supports the hypothesis that vocal fry has become a stigmatized feature and that people generally hold negative attitudes towards the feature. This is a departure from older associations that fry held with authority and masculinity (Yuasa 2010). These results also have implications for women who exhibit vocal fry, as they may be unfairly judged or discriminated against in certain situations, such as a job interview setting. Future studies should focus on broadening the demographic characteristics of participants in order to determine the exact demographic and personal qualities that are associated with the presence of the vocal fry register. Finally, while the results of our study support our hypothesis that people hold more negative attitudes towards speakers with fry, more research is needed to offer evidence for the legitimacy and sociolinguistic function of this vocal feature.

References


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Appendix A
Rainbow passage (as modified for this study)

A rainbow takes the shape of a large, round arch, with its path high above and its two ends apparently beyond the horizon.

When a man looks for something beyond his reach, his friends say he is looking for the pot of gold at the end of the rainbow.
Appendix B
Sample spectrograms

Figure 6. An example of the vowel [oʊ̯] in sentence-initial position (R1) without fry.

Figure 7. An example of the vowel [oʊ̯] in sentence-final position (R2) with fry.
## Appendix C

**R1 and R2 frequency values**

<table>
<thead>
<tr>
<th>Participant</th>
<th>Perceived fry</th>
<th>$F_0 R1$</th>
<th>$F_0 R2$</th>
<th>Difference ($F_0 R1 - F_0 R2$)</th>
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<td>288.85</td>
<td>172</td>
<td>116.85</td>
</tr>
<tr>
<td>2</td>
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<td>273.82</td>
<td>68.77</td>
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</tr>
<tr>
<td>3</td>
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<td>265.38</td>
<td>105.59</td>
<td>159.79</td>
</tr>
<tr>
<td>4</td>
<td>yes</td>
<td>276.83</td>
<td>52.25</td>
<td>224.58</td>
</tr>
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<td>5</td>
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<td>286.7</td>
<td>46.03</td>
<td>240.67</td>
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<td>6</td>
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<td>288.18</td>
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</tr>
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<td>yes</td>
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</tr>
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<td>310.17</td>
<td>44</td>
<td>266.17</td>
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<td>no</td>
<td>271.08</td>
<td>---</td>
<td>---</td>
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</tr>
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</table>

Figure 8. Individual $F_0$ values for the word-final target vowel [ʊ] sentence-initially and sentence-finally for speakers with fry and without fry, as well as the difference between R1 (sentence-initial) and R2 (sentence-final) $F_0$ values. Participants 10 and 16 were excluded due to difficulty in calculating $F_0$ values.
Appendix D
Recording script for online survey

Go up Collingwood Street to Johnson Street.

Turn right on Johnson, then, walk down Johnson to Division.

Turn left on Division.

Look for the blue house on the right of the street, just North of Princess.
Appendix E
Online survey questions

The following audio clips portray four speakers reading the same passage. Please listen to each recording and answer the following questions regarding your attitudes towards each speaker.

Audio clip: Speaker A
Indicate on a scale from 1-5, where 1 = not at all, and 5 = very high, the level to which you believe this speaker portrays these personality characteristics.

<table>
<thead>
<tr>
<th>Personality Trait</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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</thead>
<tbody>
<tr>
<td>lazy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>indecisive</td>
<td></td>
<td></td>
<td></td>
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</tr>
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<td>responsible</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
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<td>ditzy</td>
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<td>hardworking</td>
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Please write a response indicating your attitudes towards speaker A:

(Note: The above questions were repeated for speakers B, C, and D)
Appendix F
Attitude ratings towards speakers

Figure 9. Mean ratings of three negative characteristics for two speakers with fry and two without, based on 5-point Likert-type scale.

Figure 10. Mean ratings of three positive characteristics for two speakers with fry and two without, based on 5-point Likert-type scale.