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Gender and the Social Meaning of Non-Modal Phonation Types

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1   Introduction

Although sociophoneticians often remark on the dearth of linguistic research on voice quality, the last decade has witnessed a significant increase in the number of studies examining variation in voice quality (Stuart-Smith 1999, Lefkowitz and Sicoli 2007, Mendoza-Denton 2007, Szakay 2008, Nielsen 2010, Yuasa 2010, Sicoli 2010, Chun and Podesva 2010, Lopez 2010). While the term *voice quality* is used to refer to various articulatory configurations of the larynx, velum, tongue, and lips – with consequences for phonation, nasality, and tenseness – I limit my scope to the *laryngeal* properties of voice quality. By *phonation*, I refer to the configuration of the vocal folds during speech.

Much of the literature on phonation has linked specific non-modal phonation types to gender, which will be my primary concern in this paper. The proposed connections between particular phonation types and gender have been both direct and indirect. For example, a number of scholars have found creaky voice to predominate among male speakers, as reported by Stuart-Smith (1999) in Glasgow, Esling (1978) in Edinburgh, and Henton and Bladon (1988) for speakers of RP and 'Modified Northern' English. The creaky voice pattern may arise from iconic associations between creaky voice and masculinity – the low pitch characterizing creaky voice is interpreted as resembling masculinity, due to gross tendencies for men to have lower pitched voices than women. This indexical association can be recruited to link creaky voice to stances conventionally associated with men, like toughness, at higher orders of indexicality. For instance, Mendoza-Denton (2007) has reported high rates of creaky voice among Latina gang girls when telling fight narratives, a linguistic practice associated with toughness. Similar ideological processes link falsetto, and its characteristically high pitch, to femininity. Blount and Padgug (1976), for example, report that English-speaking mothers are more likely than fathers to address their children in falsetto. In an earlier study on intraspeaker falsetto variation patterns (Podesva

2007), I argue that a conventionalized link between falsetto and expressiveness is what enables one gay man's use of falsetto to be interpreted as sounding gay.

Many of the links I have been discussing find roots in what Ohala (1994) has termed the *frequency code*, that is the association of high frequency with small-ness and low frequency with largeness. High frequency sounds are iconic of the small vocal folds and small resonating cavities that produce them, while low frequency sounds likewise signal the large vocal folds and vocal tracts from which they emerge. Sex-based meanings stem from sexual dimorphism and the recognition that men tend to be larger than women. In a recent experimental study by Katherine Geenberg (2010), speakers asked to tell a stuffed pig toy how cute she was elevated both their fundamental frequency and second formants. Higher f0 levels are iconic of smaller vocal folds and higher F2 levels are similarly iconic of smaller vocal tracts; both suggest that adults draw on the frequency code in accommodating to the smallness of the addressee.

In spite of strong associations between particular phonation types and gender, associations that are facilitated by the frequency code, there seem to be some notable exceptions. For example, creaky voice – in spite of its low fundamental frequency – has been noted has been in the speech of young women. Lefkowitz (2007) found creaky voice to be prevalent in the speech of college-aged women in Virginia. In one of the most quantitative studies on creaky voice, Yuasa (2010) reports that young Californian women use creaky voice significantly more often than their male counterparts. Another exception appears to be that falsetto – in spite of its high fundamental frequency – has been widely observed in the speech of African American males (Alim 2004, Lopez 2010, Nielsen 2010). For example, Alim (2004) discusses his own use of falsetto when engaged in the discursive practice of 'battlin,' an important mode of interaction both in Sunnyside, where he conducted his fieldwork, and in the Hip Hop community more broadly.

The study I am going to discuss today will bring to light two additional phonation patterns that cannot be explained straightforwardly by the Frequency Code. My point is not that the code is flawed – it is clearly not a coincidence that so many cross-linguistic trends follow its predictions. Rather, I want to argue that we need to attend to the culturally specific ways in which it is interpreted and plays out. Ideology underlies even highly iconic interpretations of linguistic features of the sort I have discussed here. Irvine and Gal (1999) emphasize the importance of analyzing the ideological processes that lead us to naturalize the form-meaning connection. I stress that in spite of robust correlations between phonation patterns and identity categories, the social meanings of particular phonation types are culturally specific and should not be reduced to purely iconic or unanalyzed associations to either gender or race.

In what follows, I describe and discuss the significance of phonation variation patterns among African American and white residents of Washington, DC. In addition to exploring the nature of the connection between phonation and gender,

I show that gender and race cannot be analyzed as independent social factors. As a secondary goal, I aim to identify some prosodic and discourse constraints on phonation, since previous sociophonetic work devotes little attention to the linguistic factors that structure variation patterns in phonation.

2   Study

This phonation study is part of a larger project, Language and Communication in the Washington, DC, Metropolitan Area (LCDC). Even though the Washington Metropolitan area, which includes surrounding counties in Maryland and Virginia, is the ninth-largest in the United States, it is seriously understudied from a sociolinguistic perspective. The only large-scale variationist study conducted on the region to date is Fasold's study of tense marking among DC African Americans in the late sixties. The DC speech community is noteworthy in part because of its racial composition, with over half of its residents identifying as Black or African American. The remainder of the population is primarily white, at around 36% of the total population. There are also small but growing Hispanic and Asian American populations.

For this project targeting voice quality in particular,[1] the speech of 32 speakers, half African American and half white, was examined. Within each racial group, half of the speakers are male and half female, and we consider an array of evenly distributed ages within each group. Participants ranged from 18 to 75 years old.

Data are taken from a database of nearly 150 sociolinguistic interviews conducted by graduate students in the Georgetown sociolinguistics program. Given the potential for wide variation across topics, we considered only talk about the local community. This topic was not only discussed, but discussed at length, in all interviews. For each speaker, we divided all talk about the local community into intonational phrases, totaling nearly 10,000.

We coded each syllable auditorily -- totaling over 55,000 -- for the realization of phonation type, drawing six distinctions in phonation: modal (unmarked voicing), creaky voice (produced with relatively compressed and thick vocal folds, resulting in slow vibration, hence low fundamental frequency (f0), and low airflow rates), falsetto (produced with stretched and adducted vocal folds, which give rise to rapid vocal fold vibration, hence high f0), breathy voice (produced by keeping the glottis open along most of its length, vibrating without ever fully closing, typically with high airflow rates), whispery voice, and harsh voice (produced with a high degree of laryngeal tension, and acoustically characterized by jitter, or aperiodicity in f0). As Laver (1980) notes, although breathy and whispery voice are articulatorily distinct, their auditory differences are less

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[1] This study was conducted in collaboration with Sinae Lee at Georgetown University. We owe thanks to Hannah Yates, Chris Reid, and Elizabeth Ballance for their assistance with coding.

pronounced, as both are characterized by audible friction. We operationalized the distinction as one of voicing, with whispery voice being voiceless. Harsh voice was very rare in our data. Waveforms, spectrograms, and pitch tracks were displayed to search for acoustic evidence of auditory labels, and playback of data was conducted in Praat to facilitate repeated listening of isolated syllables. The coding was double-checked by a second researcher.

Data were coded for the social factors sex, race, age, and individual speaker. We also examined the effects of several linguistic factors, such as whether or not the IP contained constructed dialogue (or reported speech), the distance from the beginning and end of the IP (both in terms of number of syllables), and the length of the IP (also measured in number of syllables).

The percentage of each phonation type produced in each IP was calculated. For example, if a particular IP was 9 syllables long and 3 of those syllables were creaky, that IP would be 33% creaky, 67% modal, and 0% percent of the other phonation types. We then performed a mixed effects linear regression for each phonation type. The social factors age, sex, and race – which were factorially crossed – and the linguistic factors of whether the phrase contained constructed dialogue, and how long the IP was (in numbers of syllables) were included as fixed effects, and individual speaker was treated as a random effect.

We then conducted another series of binomial regressions treating each syllable – rather than each IP – as a token, so that we could examine the effect of prosodic position within the IP. We operationalized phrase position as the distance (in number of syllables) from the initial and final IP boundaries.

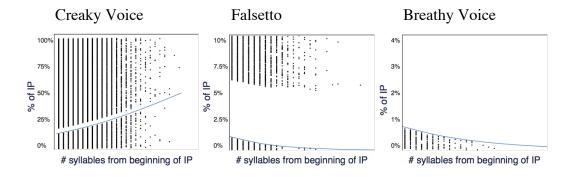## 3   Results

3.1.   Overall Frequencies

Unsurprisingly, modal voice occurred more commonly than any other phonation type, occupying nearly 79% of the IP on average. Creaky voice was the most common non-modal phonation type, occurring nearly 19% of the time. The remaining non-modal phonation types each accounted for less than 1% the IP on average: falsetto (.86%), breathy voice (0.71%), whispery (0.58%), and harsh (0.08%). The remainder of the analysis will focus on the four most common non-modal phonation types: creaky, falsetto, breathy, and whispery voice.

3.1   Linguistic Factors

Beginning with the linguistic factors that influenced the realization of non-modal phonation, the results reveal several effects of phrase position, as shown in (1). Creaky voice is more likely to occur toward the end of the intonation phrase (IP) (p < 0.0001). This finding, previously been reported by Henton and Bladon
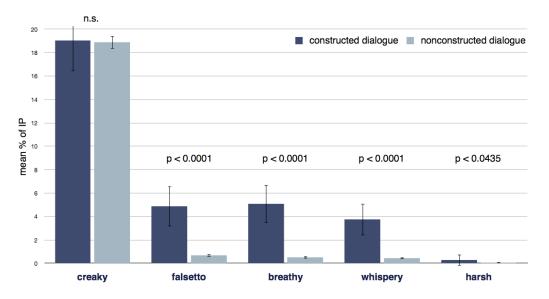
(1988), may relate to declination, whereby fundamental frequency gradually diminishes over the course of an utterance. Creaky voice appears at the ends of utterances when favorable aerodynamic conditions for modal voicing have faded. It may be also be a means of organizing breath groups, or viewed from an interactional perspective, serve as a means of marking the end of one's turn, as Ogden (2001) has found for Finnish. Falsetto shows the opposite pattern, as it is less likely to occur as one moves away from the beginning of the IP ($p < 0.0001$). This pattern may similarly relate to declination, or falsetto could be a phonatory means of realizing IP-initial high boundary tones. Finally, breathy voice is less likely to occur as the number of syllables from the beginning of the IP increases ($p < 0.0003$). Catford (1977) has noted the difficulty associated with sustained breathy voice due to the relatively high rate of airflow required to produce it. Thus, as airflow diminishes over the course of an utterance, it becomes progressively more difficult to phonate in breathy voice.

(1)   Effects of phrase position on non-modal phonation rate

A second linguistic factor that strongly conditions the use of non-modal phonation is whether or not the IP contains constructed dialogue, or reported speech. Following Tannen (2007) [1989], we use the term 'constructed dialogue' rather than 'reported speech' since these representations of speech are very often not verbatim but are instead approximations of speech or thought. In (2), the bars on the left of each pair represent mean non-modal phonation rates in constructed dialogue, while the bars on the right represent non-modal phonation rates in other types of discourse. Although there is no significant difference for creaky voice, we see that all other non-modal phonation types occur much more commonly in constructed dialogue than elsewhere.

(2)   Non-modal phonation rates according to discourse type

We suggest two primary reasons for why non-modal phonation predominates in constructed dialogue. On the most basic level, a shift into non-modal voicing marks a shift in footing, where the speaker distinguishes his or her voice in the present interaction from that of either another speaker or a past of future self. In other words, non-modal phonation is a means of 'othering' one's voice. In (3), Cassius (a 29-year-old African American male) recounts the first day of a new job. Herein, creaky voice is indicated in transcripts with underscores. Here Cassius is reporting the words, actual or approximate, of his superiors at work and uses non-modal voicing to mark a shift from his own voice to those of his superiors. To use Goffman's terminology, the vocal shift enables Cassius to indicate that he is simply animating the words of some other author.

(3)   First day, for about half an hour, they had me mopping up floors. And after that, they was like, "Cassius, you don't have to mop floors no more."

A second function of non-modal phonation in constructed dialogue is to convey a stance relating to the quotation itself, its speaker, or the event being narrated. In other words, I could not only be saying that these aren't my words, but that I disagree with the words, that I don't like the speaker, or that I'm not happy about what happened. An example of this function appears in (4), in which Carla (a 37-year-old white female) talks about taking her mother out for her seventieth birthday. Strikethrough text is used to indicate breathy voice. In this particular case, it is possible that Carla is distinguishing her speech in the interview from her words in the story world, but it is more likely that she never

actually uttered the words, "That's insane." The constructed dialogue here – and her shift in phonation – are instead marking her oppositional stance toward the expensive dinner.
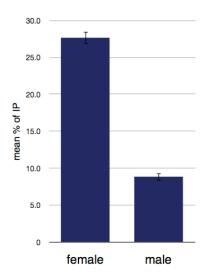
(4)   It was three hundred dollars a person for di<u>nner</u> to <u>start with</u>. And I was <u>like</u>, "That's in~~s~~ane."

3.2   Social Factors

The linguistic factors identified in the previous section were included in the regression analyses used to determine the effects of the social factors gender, race, and age. Interestingly, age was not selected, on its own or in interaction with any of the other social variables, for any of the phonation types considered. Gender and race, however, had a significant effect on a number of our phonation variables.
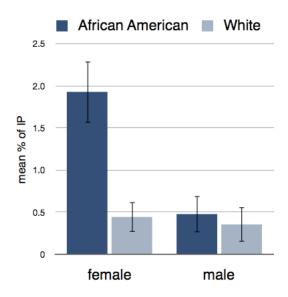
Beginning with creaky voice, females use considerably more creaky voice than male speakers (p < 0.0003), regardless of race, as shown in (5). This is an interesting finding in light of the previous quantitative work reviewed above reporting the prevalence of creaky voice among men, though it is consistent with more recent reports of women's high rates of creaky voice.

(5)   Effect of Gender on Creaky Voice
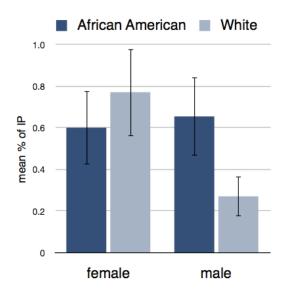

The results also show that females use falsetto more than males (p < 0.0297), but a gender*race interaction showed that this pattern was attributable to especially high rates of falsetto among African American women (p < 0.201). As illustrated in (6), falsetto accounted for approximately 2% of African American women's IPs, while this value was less than 0.5% for each of the other groups.

(6)   Effect of Gender and Race on Falsetto

A gender effect is also evident for whispery voice, as shown in (7). Just as Stuart-Smith (1999) found that women were more whispery than men in Glasgow, we see here that white females are more whispery than white males ($p < 0.0362$), though there is no difference among African Americans.

(7)   Effect of Gender and Race on Whispery Voice

Regarding the other remaining phonation types, neither breathy voice nor harsh voice was influenced by gender, race, or their interaction.

4   Significance of Gender Patterns

4.1   Whispery Voice and White Men

In this section, I discuss the significance of the three main findings for the social factors, beginning with the pattern for whispery voice, as illustrated in (7). An interaction between gender and race revealed that white men use less whispery voice than all the other groups. This pattern is noteworthy because it illustrates that white men diverge from the norm established by the three other groups. Here, I want to stress the importance of including a diverse speaking population in investigations of phonetic variation. Had we considered the pattern for white speakers only, we would see that (white) women use more whispery voice than (white) men, a finding reported previously in at least one study (Stuart-Smith 1999). This finding establishes only that white women and men use significantly different rates; it does not reveal which pattern should be considered marked. But as Henton and Bladon (1985) have pointed out, the female pattern in such cases would often be characterized as marked, as if the default pattern were no whispery voice at all. However, when we also consider the whispery rates of African American speakers, we see that in fact it is the white male pattern that is marked. That is, the white men in the DC corpus use relatively little whispery voice, with African American men, and both white and African American women using similar rates as one another. Thus, it is not the case that whispery voice indexes femininity, or even white femininity. Rather, low rates of whispery voice characterize the speech of white men. I do not mean to suggest that low rates of whispery voice "mean" white masculinity, though the data are more consistent with that interpretation than one linking whispery voice to femininity.

4.2   Creaky Voice and Women

The second gender pattern I want to discuss is the prevalence of creaky voice among women, as shown in (5). That creaky voice is so strongly represented in the speech of the women in our study is evidence that the conventional association between creak and masculinity has been weakened, at least in the community under investigation here.

The question now is what does creaky voice mean? A handful of studies have examined this question, and proposals are widely divergent. In reviewing previous proposals, I will assemble a preliminary indexical field for creaky voice in (8). As Eckert (2008) proposes, an indexical field is a representation of the range of social meanings, as well as their inter-relations, that can be activated in the social contexts in which variables are used. Importantly, indexical fields collocate different classes of meaning that can range from fleeting interactional stances (like 'emphatic' or 'careful'), which are indicated in plain text in the indexical

field, to more enduring personas (like divas or nerds), which are indicated in bold text. At the interactional level, Brown and Levinson (1987) have proposed that creaky voice can be used to commiserate or complain. Dilley et al. (1996) found that creaky voice is frequent in the speech of female radio newscasters and suggest that creak can be used to take an authoritative stance. Lefkowitz (2007) provides further support for this proposal. He found that college-aged women used creaky voice most often when taking authoritative stances. Tannen (unpublished) argues that creaky voice enables female speakers to be authoritative without being overly aggressive. Mendoza-Denton (2007) discusses a rather different meaning of creaky voice – toughness. She reports that Latina gang-affiliated girls in Northern California use creaky voice most often when telling fight stories. Most recently, Yuasa (2010), who found high rates of creaky voice among young Northern Californian women, proposed that creaky voice indexes a new upwardly-mobile, or professional, female persona. Over 56% of her respondents judged creaky voice to sound what Yuasa labels urban-oriented and upwardly mobile, using descriptors like 'professional,' 'graduate student,' and 'urban.' She speculates that creaky voice enables women to index 'the image of educated urban professional women capable of competing with their male counterparts.' According to this interpretation, then, the social meaning of creaky voice is rooted in its resemblance to men's voices.

(8) Indexical field for creaky voice

gang-affiliated Latina

tough   young**?** **professional**^**American woman**

men

authoritative

non-aggressive

commiserating

complaining

The current study sheds some light on the configuration of the indexical field for creaky voice. One question is how widely does the professional young woman persona circulate? On the one hand, the DC data suggest that it circulates widely, since it appears that women in both DC and Northern California phonate extensively in creaky voice. It may not extend far past the East Coast, however. Yuasa reports on Pennock-Speck's (2005) finding that American actresses use significantly lower rates of creaky voice when playing British characters. The professional young woman persona may therefore be a distinctly American one. Issues of geography aside, can we be sure the professional woman persona is young?

The participants in Yuasa's study were all under the age of 34. In the DC study, we found that younger women were no more likely to use creaky voice than older women, as age had no significant effect.

4.3   Falsetto and African American Women

I devote the remainder of the paper to the final gendered phonation pattern – that falsetto was used most in the speech of African American women, as shown in (6). This finding is noteworthy because falsetto has been described in particular as a feature used by African American males (Alim 2004, Lopez 2010, Nielsen 2010). Of course, previous scholars have noted African American men's use of falsetto, precisely because the pattern bucks conventional associations between high pitch and femininity – an association that may in fact only be at play among white speakers. However, even though falsetto may be culturally licensed for African American men, they do not use it as often as the African American women represented in our data, nor do they use it more than the white speakers, male or female, in the DC corpus. Noting the use of falsetto among African American men is on the one hand empowering to African Americans because it brings to light a non-hegemonic, and culturally important, form of communicative practice. Yet on the other hand, it runs the risk of representing the use of falsetto by African American males as an African American practice more generally. In so doing, it erases the experience of African American women, when it is in fact they who use the feature the most.

Before I address why African American women use falsetto the most, I want to be clear that I am not claiming that falsetto should not be viewed as a feature of African American English. Speakers' metalinguistic talk indicates that falsetto is viewed as a feature of at least some African American ways of speaking. In the extract in (9), Zara (a 21-year-old African American woman) describes distinctive African American cultural practices in lines 1-9. In what follows Zara introduces and performs a speech style that she views as a distinctively African American way of speaking. Falsetto is marked here in italics, and descriptions of non-speech sound appear in angled brackets. We know from line 3 that Zara is exemplifying elements of African American culture in this extract, and we know from her use of first person plural pronouns in lines 7 and 8 that the speech she produces in her performance is not her idiolect, but rather a more general style shared by African Americans. Before entering the performance frame, Zara uses habitual be in line 11, and then draws attention to her use of this distinctively AAVE feature in line 12 because it foreshadows the dialect performance she's about to produce. In the performance itself in lines 14-15, Zara begins with suck-teeth, which Rickford and Rickford (1976) and Alim (2004) describe as a discursive feature of African American English, Carribean creoles, and several African languages. In line 15, Zara's utterance is incomprehensible to start, but it is clearly produced in falsetto.

Here, the content of the utterance is incidental to the way it is realized. Zara is producing an African American style, and falsetto at least partly constitutes that style.

(9)   Falsetto as a feature of African American English

    1   you know
    2   like slavery and oppression has like messed us up
    3   (but) we have never lost our culture
    4   like it's- it's different
    5   but it's still there
    6   like the way we practice religion
    7   the way we talk to our friends
    8   even- even in the way we talk
    9   like I was telling my mom how she used to
          always get on me for how I talked
    10 cos I talk like this when I'm at home
    11 and I be talking to my dad like
    12 see "I be talking"
    13 I be talking to my dad like
    14 "<suck-teeth> I mean, da:d."
    15 "*<incomprehensible>* I don't understand"
    16 you know

I would therefore argue that one of the social meanings of falsetto is 'African American,' but what are the others? In a paper on a gay man's intraspeaker falsetto patterns (Podesva 2007), I argued that the core social meaning of falsetto is 'expressive.' Expressiveness is recruited in various ways to do many kinds of interactional work. For example, Goodwin et al. (2002) argue young Latina girls use falsetto to take an oppositional stance when playing games. The gay man I studied used falsetto for still other purposes, such as expressing excitement and entertaining his interlocutors. For these and other reasons, I argued that falsetto was used as a linguistic element of the gay man's diva persona.

In spite of good reasons for thinking that the indexical field for falsetto presented in (10) may circulate across very different kinds of communities, it is important to understand that in the situated use of a variable, only a limited subset of the variable's meanings are activated. Studies concerned with the social meaning of variation have devoted little attention to this issue. Such studies deal a fair amount with how social meanings relate to one another, and in particular with how stances build up into personas. But we pay less attention to the fact that not every speaker necessarily shares all these meanings, and that many of these meanings are not relevant in particular contexts. I turn now to consider the

situatedness of linguistic features. The instances of falsetto under discussion are on the one hand situated in a particular speech community – that of Washington, DC. They are also situated in talk about the local community; recall that we limited our analysis to talk about this topic. Finally, falsetto is situated in particular discourse contexts, in moments of interaction. Examining how falsetto is used at these moments, I argue, sheds valuable light on the social meanings of falsetto in the local DC context. In particular, it may illuminate the stance-based meanings of falsetto.

(10) Indexical field for falsetto

African American

oppositional   **Gay Diva**

expressive   entertaining
excited

While definitions of stance vary widely, common to all of them is the notion that stance refers to speakers' evaluations (Clift 2010:518). We are adopting Du Bois' (2007) framework for stance, what he terms the stance triangle. According to the framework, a stancetaking subject (which forms one corner of the triangle) evaluates a stance object (at another corner), thereby positioning him/herself with respect to that object. The same stance object is understood to position another stancetaking subject (at the third corner of the triangle), which also evaluates the stance object. That both stancetaking subjects are evaluating the same object creates an alignment (or disalignment) between them.

To pursue an analysis of stance-taking in our data, we decided to narrow our scope to stretches of speech containing the most highly falsetto utterances. Working under the assumption that the most telling examples of falsetto would be the ones in which it lasted for long stretches of time, we ruled out IPs with two or fewer syllables of falsetto. We further assumed that isolated IPs bearing falsetto would be less informative than stretches of speech containing more than one falsetto-carrying IP. We therefore considered only those examples of falsetto where two IPs containing three or more falsetto syllables occurred in the same turn. These rather strict criteria yielded 17 "highly falsetto" turns for deeper analysis. We could have used more permissive criteria in selecting utterances for coding, thus increasing our N, but we wanted to ensure that the utterances we were examining were phonetically comparable. It is not necessarily the case that extreme instances of falsetto, like those we're examining, would function the same way as instances in which it occurs on isolated syllables. In spite of the

small number of discourse segments we examined – which is a well-recognized hurdle in attempts to combine conversation analysis and phonetic variation – a few noteworthy trends emerge.

The most striking pattern we found was that in all 17 instances, speakers used falsetto when negatively evaluating the stance object. This pattern is consistent with previous claims by a number of researchers, such as Goodwin et al. (2002), Alim (2004), and Nielsen (2010). The 'oppositional' meaning of the indexical field in (10), then, appears to be a highly conventionalized meaning of falsetto that recurs across communities. It is important to note, however, that falsetto does not always express an oppositional stance, as illustrated by several examples in Podesva (2007), in which falsetto is used to positively evaluate stance objects.

In addition to the question of what kinds of stances are being taken when using falsetto, we might ask who in particular is engaged in negative evaluation via falsetto. Out of the 17 disalignments expressed with highly falsetto utterances, 13 were produced by African Americans, and of these, 10 were produced by women.

Finally, we can consider what African American women are negatively evaluating when they use falsetto. An analysis of the stance objects reveals that 5 are about the same topic: gentrification. As discussed by Williams (1988) and Modan (2007), gentrification is one of the most salient socioeconomic issues in DC. Of course, gentrification also a racial issue, frequently described by our interviewees as a phenomenon whereby whites are driving African Americans out of traditionally black neighborhoods into more affordable housing in the suburbs. On a related note, an additional 3 of the examples from African American women are about racism.

It is important to note that the data under analysis cover a number of other topics apart from racism and gentrification, but it is these topics in particular that inspire speakers – African American women, in particular – to use highly falsetto speech. None of the white speakers use falsetto to take a stance against gentrification or racism; they talked about local issues in their interviews, but they oriented to them differently.

To better understand how falsetto functions in these data, consider the example in (11). In this excerpt, Mona (a 40-year-old African American woman) has just been asked whether she sees the gentrification process around her neighborhood, where the interview was taking place. Falsetto is indicated in italics, as in previous examples, and the maximum pitch level is indicated in the following parentheses. The stance object to which Mona is orienting is gentrification. She evaluates it negatively, given that it is driving up taxes, leaving some people unable to pay them. Her use of generic second persons in lines 4-7 indicates that the problem is not her individual problem, but one that several members of the community are facing. Her negative evaluation of gentrification positions her in opposition to gentrifiers, or those who are making gentrification "happen on

purpose." Mona first asserts that gentrifiers are not intentionally driving out longstanding inhabitants of the community in line 11, but she expresses a slight change in her position in line 13. Not coincidentally, she reaches her peak f0 for the entire turn – at 543 Hz – in this final stretch of falsetto.

(11) Use of falsetto to negatively evaluate gentrification

     1   the property taxes are going up
     2   and people are on their fixed incomes
     3   and
     4   you can't af*ford* (502 Hz)
     5   to repair your house
     6   and pay your taxes
     7   so you just kind of have to *choose* (407 Hz)
     8   which one
     9   so
   10   I *think it's* (470 Hz) happening
   11   but I *don't think it's* (392 Hz) happening all of the time on purpose
   12   I think in some of the communities
   13   I *think it does* (543 Hz) happen on purpose

To address why African American women, like Mona, are using falsetto more than African American men, I appeal to intersectionality theory. The concept of intersectionality, coined by legal scholar Kimberlé Crenshaw (1989), emphasizes the fact that intersecting dimensions of identity do not simply amount to the sum of the component identities. Thus, to be an African American woman is not equivalent to being African American plus being a woman, because such a view does not capture all dimensions of oppression that multiply marginal people experience. Wong (2010) points out that intersectionality theory encourages us to 'take seriously the lived experiences of those we study.'

So what are the local power dynamics that position African American women in DC? If we look more closely at the four most vociferous falsetto users (those that produce the greatest number of highly falsetto utterances) we see that they all live, work, and study in their local communities. Zara, for example, is a student at Howard University, a historically black university in the district. Howard is located in the Shaw neighborhood, which borders on the U Street corridor, the epicenter of gentrification in the district where over 2,000 luxury condos have been built in the last 10 years. Carrie works as an audio technician at a radio station just blocks away from her home in Northeast DC. In fact, she claims that she took her job in response to the encroachment of the large satellite radio station. In her words, "I'm getting a piece of it." Mona works for a local non-profit organization, and Olivia is the president of the neighborhood association.

All four are strongly tied to their communities, and none of their traditionally black communities are immune from the gentrification that puts their socioeconomic vitality at risk. None of these women explicitly comment on the gender inequalities they experience. But their use of falsetto, I would argue, is motivated not so much by their gender identities, but rather by the locally oriented positions they occupy in DC. For them, falsetto is a linguistic act of resistance to the sometimes hostile environment in which they live and work.

5   Conclusion

To conclude, I want to step back and consider the two main gendered phonation patterns I have addressed. First, I reported that creaky voice is most commonly used in the speech of women. Second, falsetto occurred most commonly in the speech of African American women. Neither pattern is straightforwardly explained in terms of the Frequency Code. The creaky voice pattern is noteworthy because creak is characterized by low f0, which is not a typical characteristic of women's voices relative to those of men. Of course, there is another possible sound symbolic explanation here, too. The elongated closed phase of the phonatory cycle that characterizes creaky voice gives the impression of discontinuous speech – which has led Tannen (unpublished) to hypothesize that creaky voice can be used to place limits on how authoritative one sounds. The falsetto pattern is noteworthy for two reasons. First, if falsetto is gendered as female, then we would expect it to predominate in both African American and white women's speech, when in fact it is African American women only that use it a lot. The other point worth drawing attention to is that falsetto was used as a form of resistance, as a linguistic form of power. Here, too, we might appeal to a sound-symbolic explanation. Specifically, even though falsetto is characterized by high pitch, it can also vary in terms of pitch dynamism or intensity, and it may well be one of these dimensions that conveys its powerfulness. This interpretation would be consistent with what Gussenhoven and Chen (2000) call the Effort Code.

In both of these cases, I have drawn attention to the phonetic multidimensionality of voice quality. Frequency is only one of the phonetic dimensions that characterizes phonation. It is likely that different phonetic dimensions of phonation index different meanings. Decomposing the phonetic dimensions of particular voice qualities will facilitate the semantic decomposition of the meanings they convey.

The research presented here can be extended in a number of directions. First, given that the racial composition of DC differs considerably from that of many other American cities, it would be interesting to compare the findings I have presented here to those in communities with different race dynamics. Another useful extension of this project would be a deeper phonetic analysis. Although I have focused on the categorical realization of phonation types, we may find that

examining the phonetic character of particular non-modal phonation types may uncover additional systematic patterns of variation in measures like H1-H2. Surprisingly, we found that age did not influence patterns of variation for any of the phonation types, in spite of claims that creaky voice is gaining in its use. Participants in the LCDC project are in the process of digitizing Fasold's data from 40 years ago, which will enable us to investigate the issue of language change in greater detail. In particular, we can address Yuasa's (2010) conjecture that recent high rates of creaky voice among women is a consequences of pitch lowering. Third, even though we have identified a number of linguistic constraints on particular phonation types, there are likely to be others. We could consider whether there is a connection between creaky voice and (-t) glottalization, for example. Eddington and Taylor (2009) and Eddington and Channer (2010), for example, found that women glottalize (-t) more than men, which is what we found for creaky voice. A preliminary analysis of word-final (-t) glottalization in the speech of 48 speakers in DC reveals that women glottalize more than men. Thus is appears that in DC, women use more creaky voice and glottalize (-t) more than men, which may be indicative of a more general pattern of greater laryngeal activity. Finally, this project would benefit from drawing on alternative methods for studying social meaning. I have taken an approach centered on locating strong falsetto in its discourse contexts because I was interested in the locally significant cultural value of falsetto. In the future, it would be worthwhile to use more controlled perceptual methods in a matched guise-style study. While the synthesis of phonation can be challenging, there are promising strategies for resynthesizing creaky voice and falsetto from utterances originally spoken in modal voice.

I hope to have shown here that voice quality, especially as it is used in constructed dialogue, is a rich site of sociolinguistic investigation. In addition to examining how constructed dialogue is introduced, which is one of the most studied sociolinguistic variables in recent years, we can examine how dialogue is constructed. The content and function of constructed dialogue or reported speech has traditionally fallen under the purview of discourse analysis, but I believe variationists can contribute new insights, as well.

The results I have presented here underscore the importance of including a diverse speaker sample when examining phonetic variation. Had I not sampled African American speakers, for example, I might have concluded that women use high rates of whispery voice and that gender had no effect on the use of falsetto – neither of which is true in DC. Ideally, speaker samples will reflect the important axes of social differentiation in the communities under investigation.

Finally, we saw that the social meanings of phonation types are culturally specific and should not be reduced to purely iconic or unanalyzed associations with either gender or race. The frequency code underlies a great deal of linguistic practice, but it plays out differently in different cultural contexts. The high pitch characterizing falsetto can be interpreted as small or weak in some contexts, but

as large, resistant, and powerful in others – as in the case of the African American women that I have discussed here.

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