



Do African Americans really have lower voices? Pitch, gender and ethnicity in Memphis

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Pitch



Ethnicity



Gender

Pitch and Ethnicity

- **Black (vs. white) American men — mixed results!**
 - Lower pitch? (Hollien & Malcik 1962; Hudson 1977; Hawkins 1993; Wheat & Hudson 1988)
 - Wider range? (Hudson & Holbrook 1981; 1982)
 - Different stylistic effects? (Snidecor 1943; Richardson 1973)
 - Lower HNR? (Walton & Orlikoff 1994)
- **AAE Intonational phenomena**
 - More L+H* pitch accents (McLarty 2018)
 - More level boundary tones in questions (Holliday 2019)
- **Limitations of studies on pitch in AAE**
 - Different tasks, different measures, different analyses
 - Other social dimensions are relevant, e.g. gender
 - Very little work on women (cf. Hudson & Holbrook 1982; Ducote 1983)

Pitch and Gender

- **Physiological basis for sex difference in vocal pitch** (Ohala 1984; Bachorowski & Owren 1999)
- **Vocal pitch as a sociolinguistic resource for performing gender** (Zimman 2018)
 - In prepubescent children (Ingrisano *et al.* 1980; Ferrand & Bloom 1996)
 - To different, culturally specific, extents (Loveday 1981; Yuasa 2008)
 - Dynamically according to context (Michalsky & Schoormann 2017)
- **Gendered intonational variation** (McConnell-Ginet 1983; Slobe 2018)

Gender and Ethnicity

- The experience and performance of social category membership is **intersectional** (Crenshaw 1989; Hooks 2014; Levon 2015; Calder & King 2020)
- But may be evaluated through the lens of stereotype and hegemonic models, predominantly informed by white perspectives
- AAE is ideologically associated with the performance of certain 'masculine' traits
 - E.g. toughness (Sneller 2020), coolness (Bucholtz 2011)
 - Resource for Black (Barrett 1998) and non-Black (Bucholtz 1999; Cutler 1999; Chun 2001; 2003) speakers
 - Associated with a drop in pitch (Barrett 1998; Holliday 2016)

The current study

- F0 differences in a corpus of read speech
 - Control for phrase content and length
 - Efficient analysis of larger number of speakers
 - Examine implementation of phrasal pitch contours using SSANOVA
- Includes relevant speakers to explore social dimensions of ethnicity and gender (self-reported)
 - Black and white speakers
 - Male and female speakers

Research questions

1. Do Black speakers, both men and women, use lower/higher F0 than their white counterparts?
2. Do Black speakers, both men and women, display a wider/narrower F0 range than their white counterparts?
3. Do Black speakers, both men and women, implement intonational contours differently than their white counterparts?

The Data

- Data from Fridland (2001)
 - 94 recordings of the same passage
 - 47 Black (male=33, female=14) and 47 white (male=32, female=15) speakers (mean age: 21.4)
- # of phrases: 33
- Average sentence length: 7.9 words/phrase

Measurement

- Phrase boundaries identified according to text, regardless of idiosyncratic pausing/disfluencies
- Boundaries manually placed using Praat textgrids
- Pitch settings: 75Hz ~ 300 Hz
- Measurements automatically extracted: F0 mean, max, min, and standard deviations (Busa & Urbani 2011)
- Pitch range measures calculated: +/- 2 standard deviations around the mean (SD4), 80% range, 90% range and 100% range (Mennan *et al.* 2012)

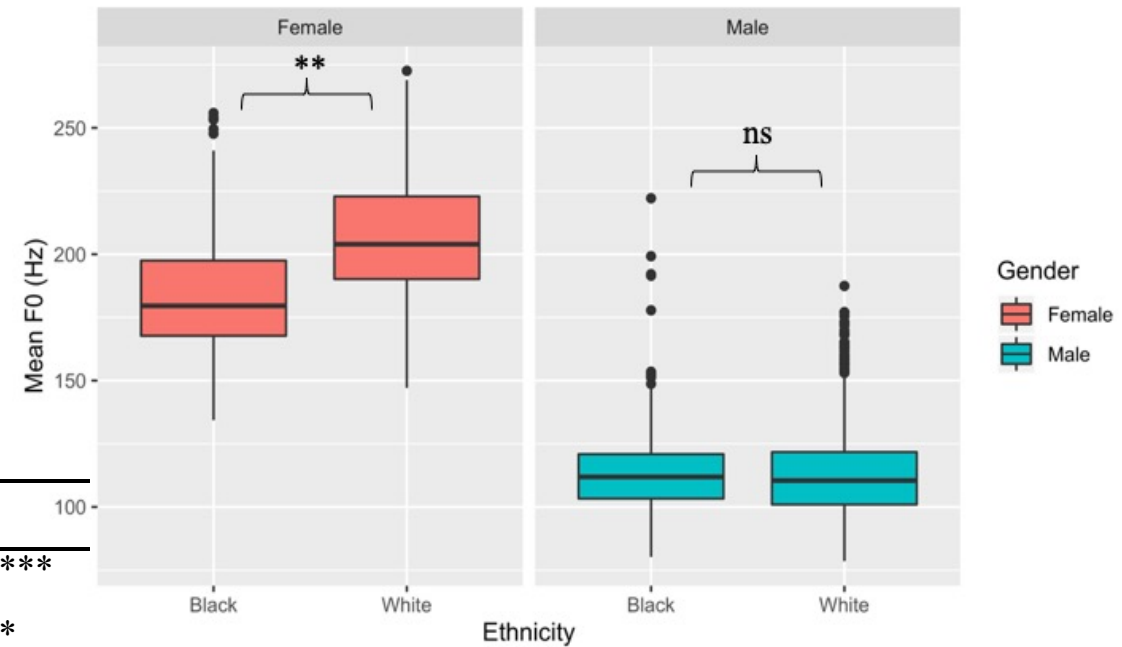
Mixed-effects modelling

- Linear mixed effects regression models conducted in R (R Core Team et al. 2013; Bates et al. 2014)
- Separate linear mixed-effects models for mean F0 and pitch range
- Fixed effects: Ethnicity (Black/white) and Gender (male/female)
- Random effects: Speaker and Phrase
- Mean F0/Pitch range ~ Ethnicity * Gender + (1|Speaker) + (1|Phrase)

Results: Pitch Level

- mean F0

	Estimate	Std. Error	df	t value	Pr (> t)
(Intercept)	5.32	0.03	97.72	171.93	< 0.001 ***
Ethnicity (vs. white speakers)	-0.12	0.04	90.00	-2.67	< 0.01 **
Gender (vs. female)	-0.60	0.04	90.00	-16.47	< 0.001 ***
Ethnicity : Gender	0.11	0.05	90.00	2.16	0.03 *



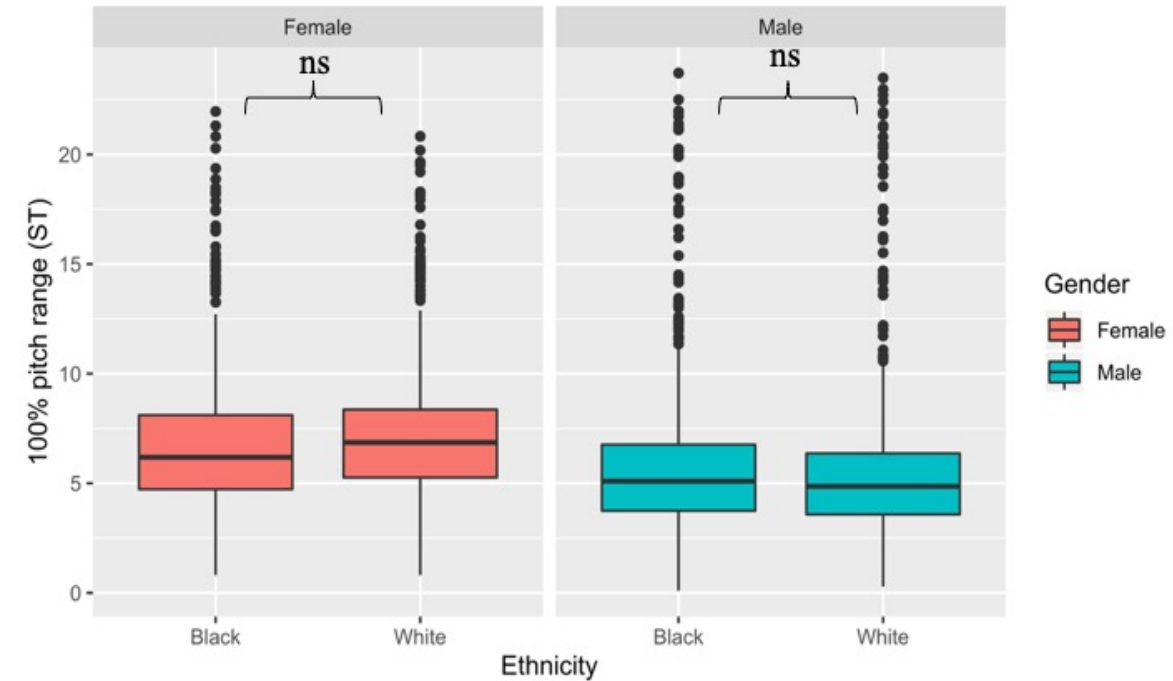
- Ethnicity and Gender treatment-coded
- Main effects: Ethnicity (Black women < white women) ; Gender (white men < white women)
- Interaction effect: Ethnicity x Gender
- Other comparisons: Black men ≈ white men; Black men < Black women; Black < white; men < women

Results: Pitch Range

- 100% range

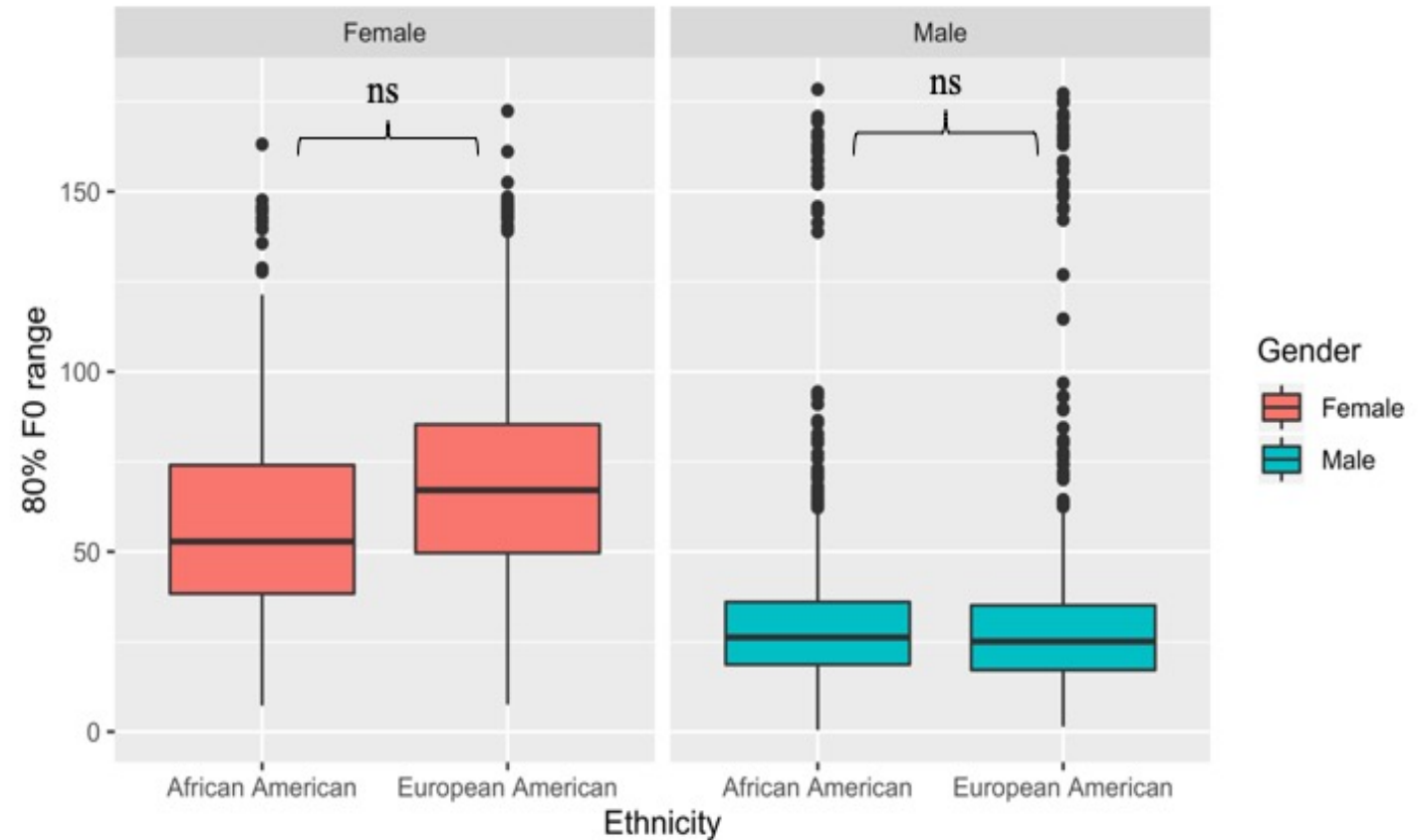
	Estimate	Std. Error	df	t value	Pr (> t)
(Intercept)	7.52	0.44	117.97	17.05	< 0.001 ***
Ethnicity (vs. white speakers)	-0.57	0.52	89.97	-1.09	0.28
Gender (vs. female)	-2.15	0.44	89.98	-4.89	< 0.001 ***
Ethnicity : Gender	0.81	0.63	90.01	1.29	0.20

- No effect of Ethnicity: Black women \approx white women
- Gender: white men < white women
- No effect of interaction
- Other comparisons: Black men < Black women; men < women; Black \approx white
- Range differences persist when semitone transformed



Results: Pitch Range

- Similar pattern for 80% and 90% range measurements



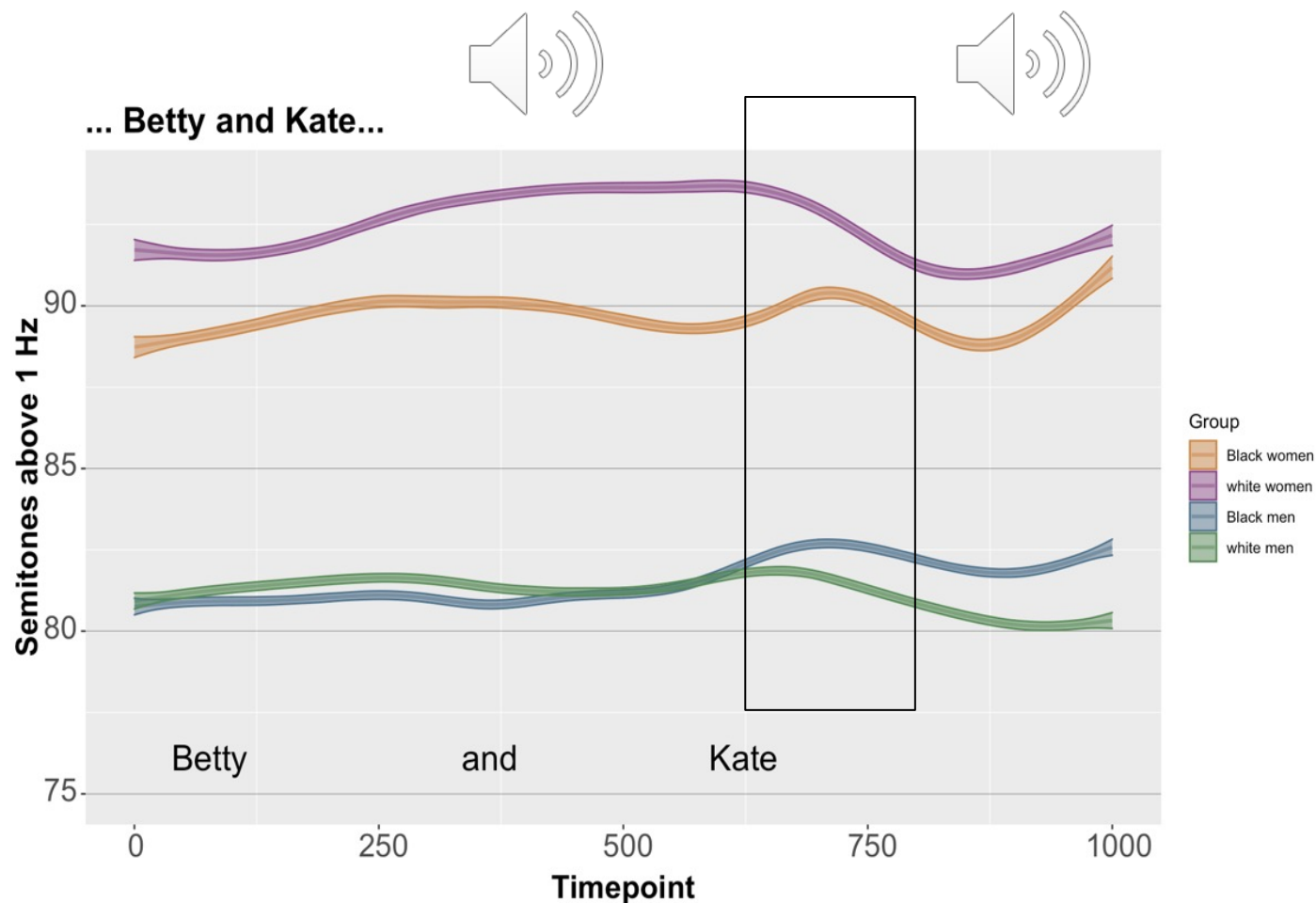
Summary: Mixed-effects modelling

- Women have higher mean F0 and wider pitch range
- No difference by ethnicity in both mean and range measurements
- But there is an interaction: white women > Black women in mean F0
- Findings **fail to support** the basic stereotype of Black men having a lower F0 than white men, and underline the need to further explore these variables in women's speech.

SSANOVA

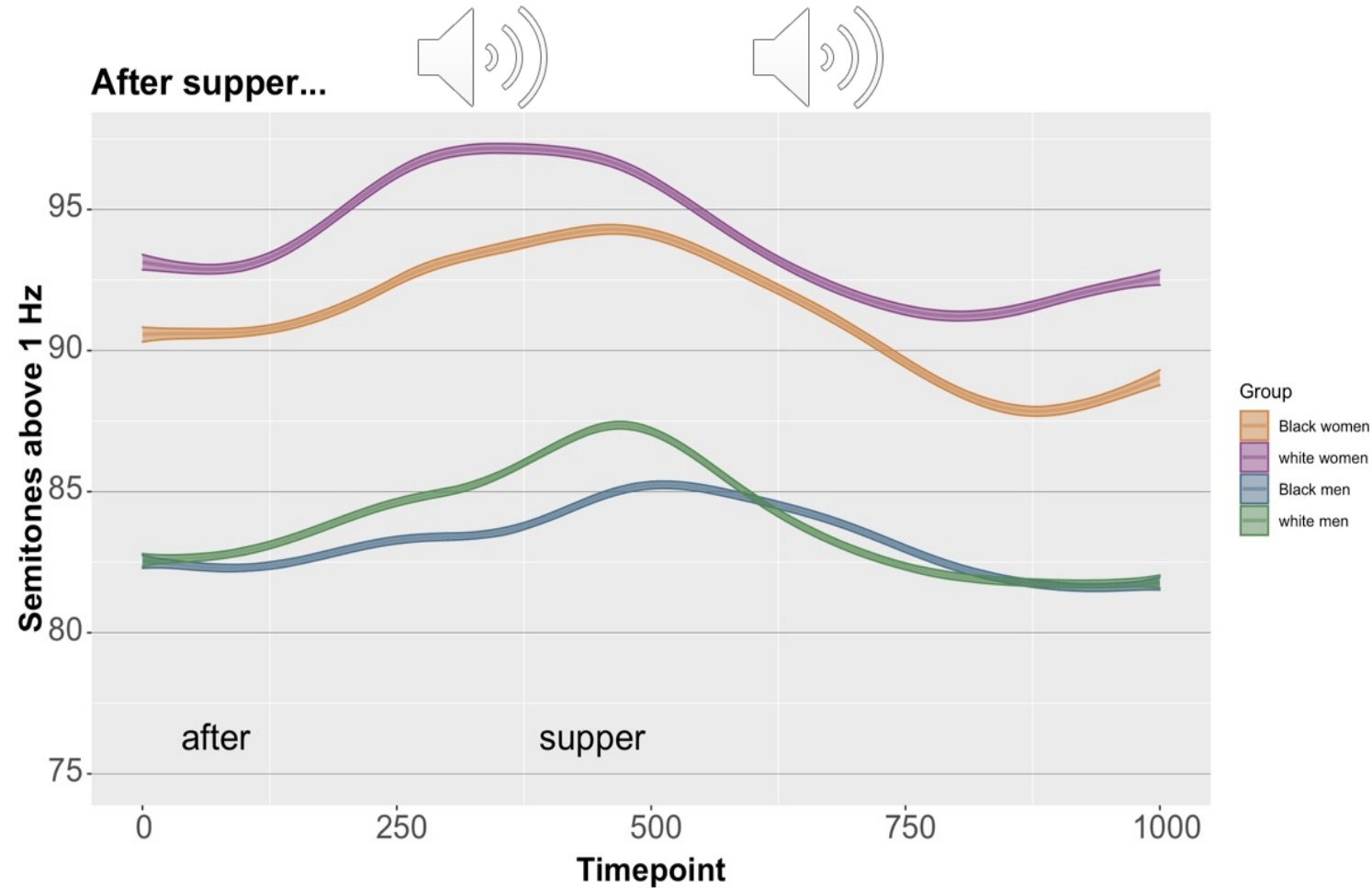
- Designed for the comparison of curves along multiple reference points (Gu 2013)
- Effective for examining contours over phrases with longer time scales (e.g., Morrill 2015)
- 1000-point pitch (F0) contour extracted using Praat auto-correlation algorithm (50–450Hz range)
- Converted to semitones relative to 1Hz
- Gaps in the contour interpolated from points on either side; artifacts removed by smoothing (bandwidth =5Hz).
- SSANOVA modeling implemented with the gss package in R (Gu *et al.* 2014) to visualize the data.

SSANOVA analysis: Peaks



- Black speakers realize a similar peak at a later timepoint than the white speakers
- Supports earlier studies that have found that black speakers may realize F0 peaks later than white speakers (Holliday 2016)

SSANOVA analysis: Peak Height

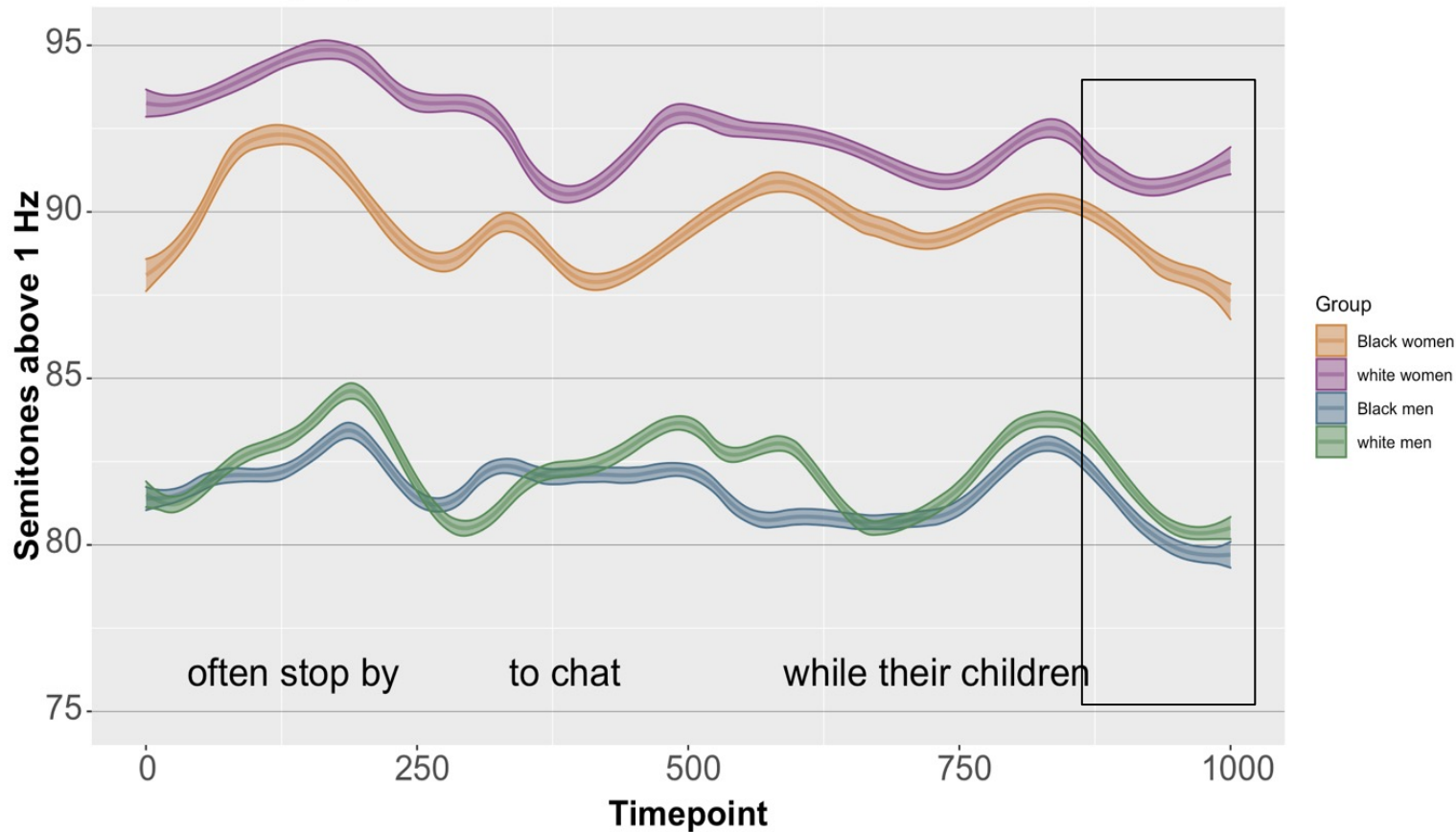


- Height of the F0 peaks also appears to differ by group across some phrases.
- White speakers typically employ higher peaks, as displayed.

SSANOVA analysis: Boundary

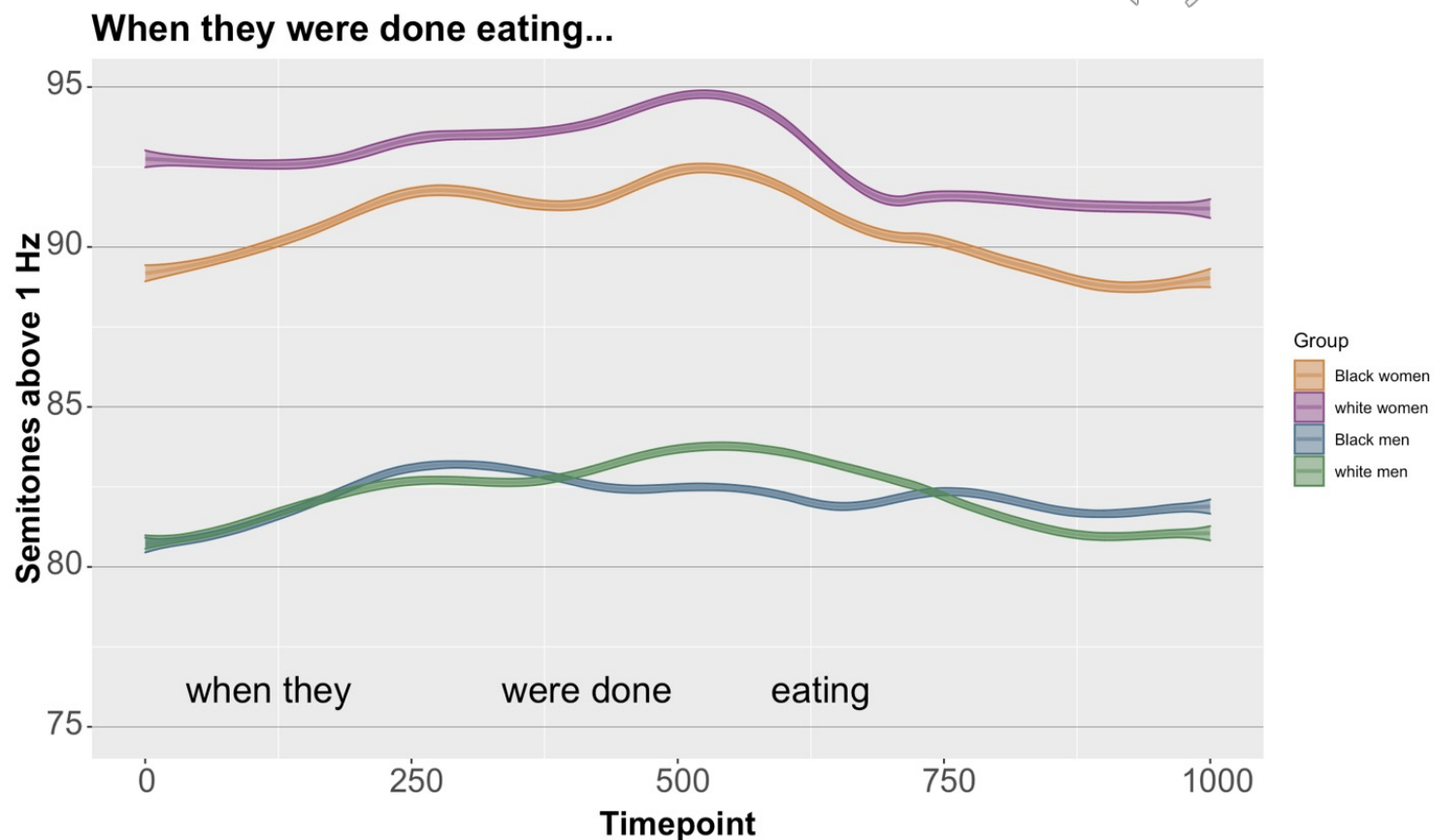


... often stop by to chat while their children...



- Black women display a greater tendency to use falling or less pronounced rising melodies at phrase boundaries than the other groups.

SSANOVA analysis: Double Peaks



- We also observe instances where black speakers use double peaks in shorter phrases where white speakers use only one peak. (McLarty 2018)

Summary: SSANOVA analysis

- Men overlap significantly whereas women do not
- These SSANOVA patterns further support findings that have been reported in earlier studies using different methodologies

Pitch as a stylistic resource

- Black men and white men do not significantly differ in pitch level or range, and show a great deal of overlap in implementation
- Reading task may trigger convergence towards a 'standard', moderate pitch, modeled by white men
- Results for Black women suggest convergence towards white women is not triggered
- Alternatively, target of pitch convergence may *also* be the level modeled by white men

Pitch & Black womanhood

- Unlike Black and white men, Black women exhibit consistently lower pitch than white women
- Non-participation in a white feminine model of pitch
- Co-occurrence with (e.g. prosodic) features of AAE may not read as sufficiently 'standard'
- General non-association between AAE and hegemonic white femininity
- Complex interplay between ethnicity, gender, and style

Thank you!

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