

Physiological and Linguistic Influences on the Speech of Rachel Jeantel

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level of Instruction: Intermediate/Advanced

acknowledgements

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“Ain’t no justice. That’s why they got that statue of her and got her blindfolded. Common sense would tell you if anybody need to see, she do. There ain’t no justice.” —Memphis, in August Wilson’s play, *Two Trains Running*, 1992:42.



playwright August Wilson

- Rachel Jeantel, of Sanford Florida (Broward County), was key witness for the prosecution in the trial of George Zimmerman
- February 26, 2012 shooting death of Trayvon Martin, aged 17
- Zimmerman, aged 28, was the self-appointed neighborhood watch coordinator
- Zimmerman claiming self-defense, was acquitted July 13, 2013

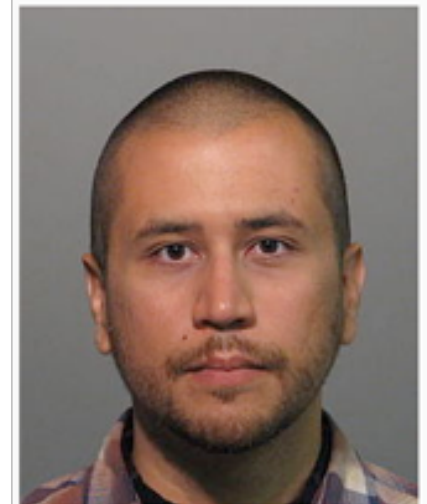
Trayvon Martin



Trayvon Martin in an undated photo



George Zimmerman



Mugshot from Seminole County Sheriff's Office in 2012.

Public Pillorying of Rachel Jeantel

- “She [RJ] is a dullard, an idiot, an individual who can barely speak in coherent sentences” —Jim Heron, Appalachian State
http://www.miamiherald.com/2013/06/26/3471243/alternate_juror_dismissed_in_trayvon.html
- “Sorry, but this is the blather of an idiot” —Thomas Stratford,
http://www.policymic.com/articles/52697/rachel_jeantel_s_language_is_english_it_s_just_not_your_english
- “This lady is a perfect example of uneducated urban ignorance. . . . When she spoke everyone hear, "mumble mumble duhhhh" I'm a miami girl, duhhhhh.” —Sheena Scott,
http://www.miamiherald.com/2013/07/16/3502851/rachel_jeantel_on_cnn_talks_about.html
- “This inarticulate, fat drughead is unemployable and another welfare parasite sucking on the government teat.” —Tom Robinson, LSU. http://www.miamiherald.com/2013/07/16/3502851/rachel_jeantel_on_cnn_talks_about.html

cf. J. Rickford and S. King (2016) “Language and Linguistics on Trial: hearing Rachel Jeantel (and other vernacular speakers) in the courtroom and beyond” *Language* 92(4), 958-988

Wassink, A. B. and Curzan, A. (2004) “Addressing Ideologies Around African American English,” *Journal of English Linguistics*, 32(3)

Research Questions

Research Question 1:

How does Class III malocclusion interact with Jeantel's phonology?

- Focusing on /s/, complete a comparative spectral analysis of segmental productions by Jeantel and dialect-matched peers

Research Question 2:

Does morphological environment condition variable deletion of /s/ (in line with the phonological AAE pattern)?

Does Jeantel show evidence of possible transfer effects from other community languages?

Argument summary: We can account for the audible “distortion” in Jeantel's speech. Systematic deletions are attributable to an AAE phonology with multilectal inputs. These interact with the spectral profile produced by mandibular prognathism.

African-Americans and Multilingual Influence

- Multilectal: speaking more than one language variety (whether multiple dialects of the same language, or multiple dialects and languages).
- She is the child of speakers of Haitian Creole (mother) and Dominican Spanish (father)
- Why continue to focus on Rachel Jeantel?
- Represents a type of African-American speaker who is not well understood in linguistics (little to no basic language research), or the speech and hearing sciences (lack of baselines).

Black Immigrants to the USA

Practitioners in the language and speech sciences do not sufficiently understand linguistic backgrounds or practices of immigrants or their offspring.

New Black citizens: 3.8 million (Sacchetti, 2014)

- doubling of population since 2000
- 8.7% of US Black population are immigrants

1820 - 1970: 2% of US immigrants (Thomas, 2012)

50% of black immigrants to US come from the Caribbean (Fig. 1)

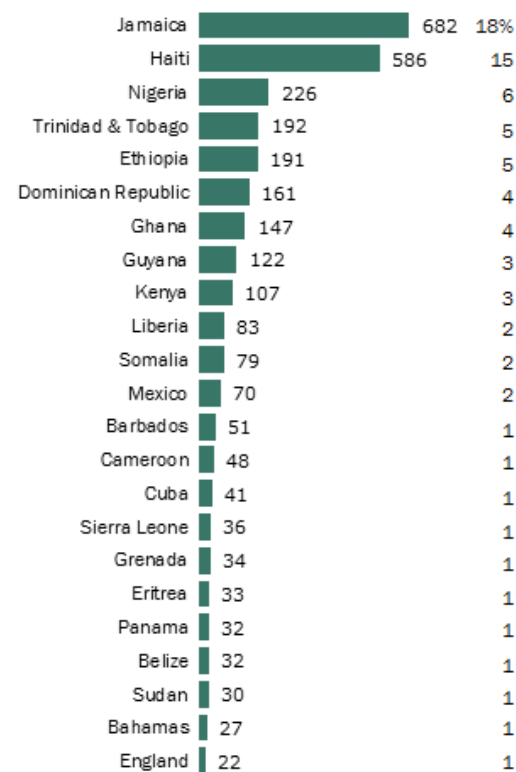
- Haiti is ranked second among birth countries for black immigrants
- Miami metro: 34%
- Washington, D.C.: 15%

Mixed race blacks (African + Hispanic):

- Dominican Republic: 166,000 migrants
- Cuba: 41,000
- Panama: 32,000

Jamaica, Haiti Largest Birth Countries for Black Immigrants in 2013

Population (and %) of foreign-born blacks by birth country in the U.S., in thousands



Note: Foreign-born blacks include single-race blacks and mixed-race blacks, regardless of Hispanic origin.

Source: Pew Research Center tabulations of the 2013 American Community Survey (1% IPUMS)

PEW RESEARCH CENTER

Fig. 1. source: Anderson (2015) PEW Research Center

Extract

- “Underbite” 00:05:53.645

- RJ (only):

The way I speak.

People a lotta people have the same issue I have right now.

Okay...How I could say this?

Ummhhh....

I had this situation since...kindergarten.

You could figure out how I speak.

I have a under bite. For me

No.

A bone. They gotta push back.

And

Yeah.

I gotta have surgery to push it back. And Right now, I don't wanna do it cause it take a year to heal. And then a lotta people have that situation.



amp

Type III Malocclusion: Physiological indicators

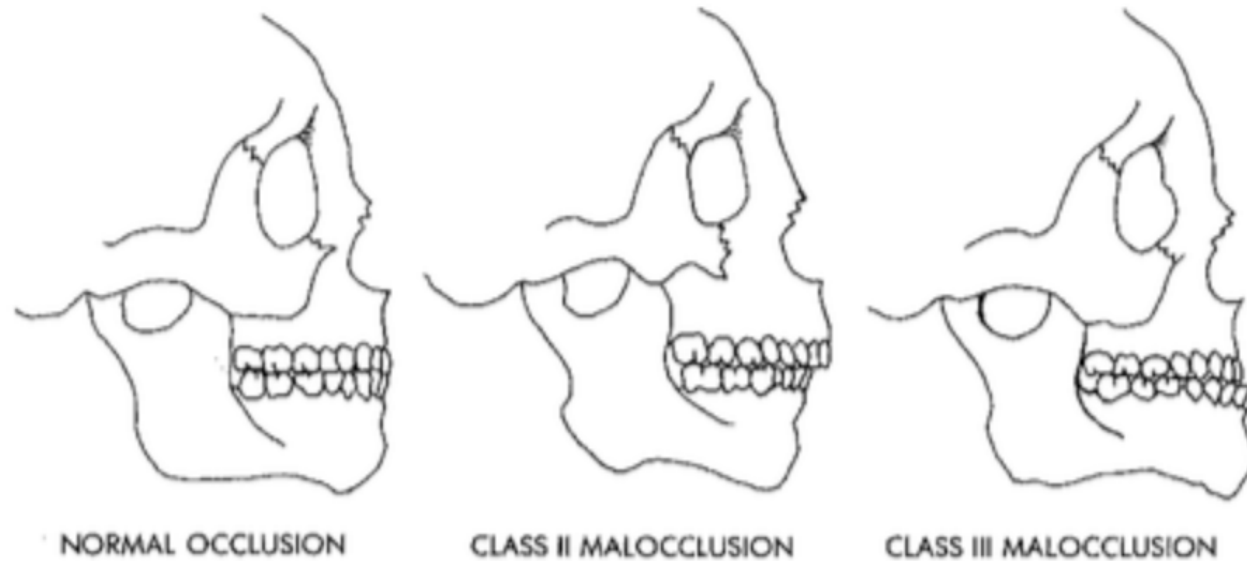
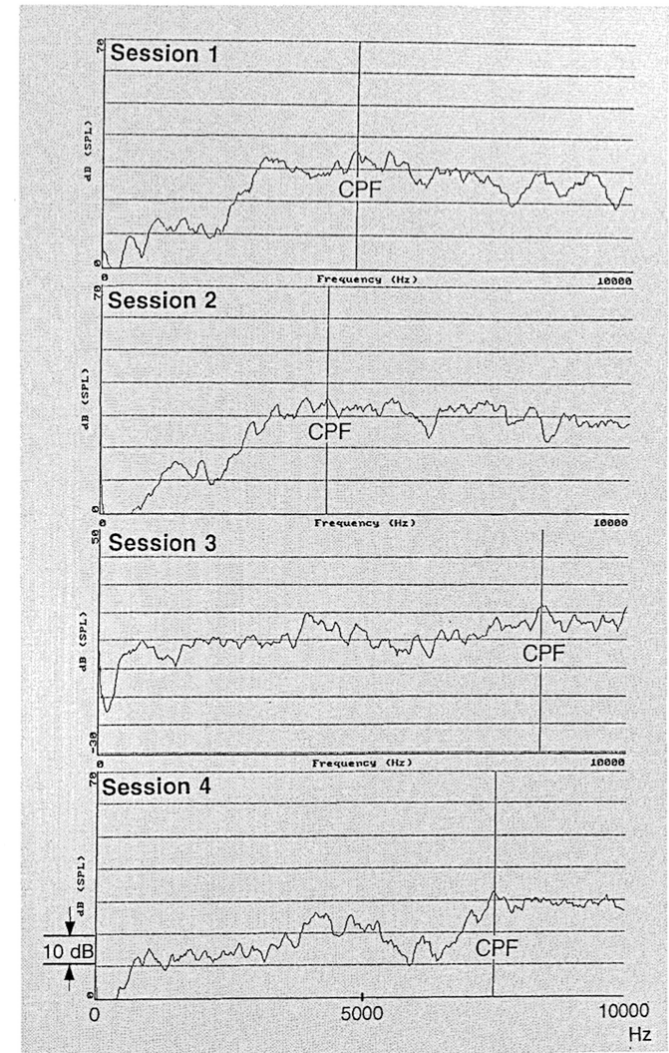


Fig. 2. Normal and deviant forms of dental occlusions (closures). source: Hegde, M. N. (2001) *Introduction to Communication Disorders*, 3rd ed.

- low, flaccid tongue posture (Guay et al. 1978)
- articulatory placement is affected: linguo-alveolar valve necessary for sibilant production is not effectively produced (/s/ is particularly affected, well-studied phoneme)
- tongue front is raised into contact with the occlusal edges of the maxillary (upper teeth), not alveolar arch

Type III Malocclusion: Acoustic correlates

- Production of /s/
- Wakumoto et al. (1996): pre- and postoperative spectral envelope characteristics for 3 patients with Type III Malocclusion (only 1 of these acoustically analyzed)
- 6 “words:” *a sue, a see, a saw, a circus, a seesaw, a castle*
- Findings: spectral envelopes showed a concentration of energy (Central Peak Frequency) around 5 kHz pre-operatively (increasing to over 7 kHz post-operatively)
- other acoustic research: Vowels /i, a, u/- Bowers et al. (1985); Japanese /s/- Yamamoto et al. (1991)



source: Wakumoto et al. (1996)

Predictions

- RJ: Spectral envelope of /s/ will be similar to that observed for preoperative osteotomy patients (by Wakumoto et al. 1996)
- Namely: central spectral peak frequency around 5 kHz (in word-initial positions)

RQ 1

Materials

Table 1. Recording Metadata

	ID	Source	Demographic Profile
Subject	RJ	PM-interview-RJ-only.wav interview date: 7/15/2013 interview details: CNN TV interview, Piers Morgan (host) total running time: 45 min. word count: 829 /s/ token count: 145 other interlocutors: Juror B-37	female, age 19 Loc. of Birth: Miami, FL Lg. Influences: AAE, Haitian Creole, Dominican Spanish
Controls	M1	maa00120.wav (owner: A. Hyatt) interview date: 12/19/16 interview details: group sociolinguistic interview total running time: 48:51 minutes word count (M1 only): 281 /s/ token count: 52 other interlocutors (material deleted): AH	female, age 27 Loc. of Birth: Miami, FL Ling. Influences: AAE
	M2	maa00140.wav (owner: A. Hyatt) interview date: 12/20/16 interview details: dyadic sociolinguistic interview total running time: 20 minutes word count (M2 only): 1597 /s/ token count: 292 other interlocutors (material deleted): AH, Mother	female, age 40 Loc. Of Birth: Miami, FL Ling. Influences: AAE

Audio corpus: Considerations

- Conversational data: not citation style
- Different recording formats (CNN interview sampling rate cannot be known for certain, degraded quality of M1)
- Expect greater within-speaker variability: duration, voicing into closure
- Removed tokens with: overtalking, disfluency, uncertain or coarticulated /s/ realization (e.g., “just shake” [dʒiʃeɪkʰ])

Center of gravity analysis

Data extraction:

- Audio transcribed in ELAN (4.9)
- Acoustic segmentation (Praat 5.4) accomplished by hand using waveform and spectrogram
 - 10kHz frequency range, 70dB dynamic range, 5ms analysis window

Measures:

- fricative duration (for onset-offset benchmarks)
 - FFT power spectra computed for each fricative, averaged
 - Center of Gravity: a measure of the average frequency of the entire spectrum (Forrest et al. 1988; Zsiga 1993; Jongman et al. 2000; Gordon et al. 2002)
 - COG Standard Deviation
 - Skew
 - Kurtosis
-
- Applied 6dB/octave pre-emphasis filter above 80Hz
 - coded for word-position, phonological and morphological environment

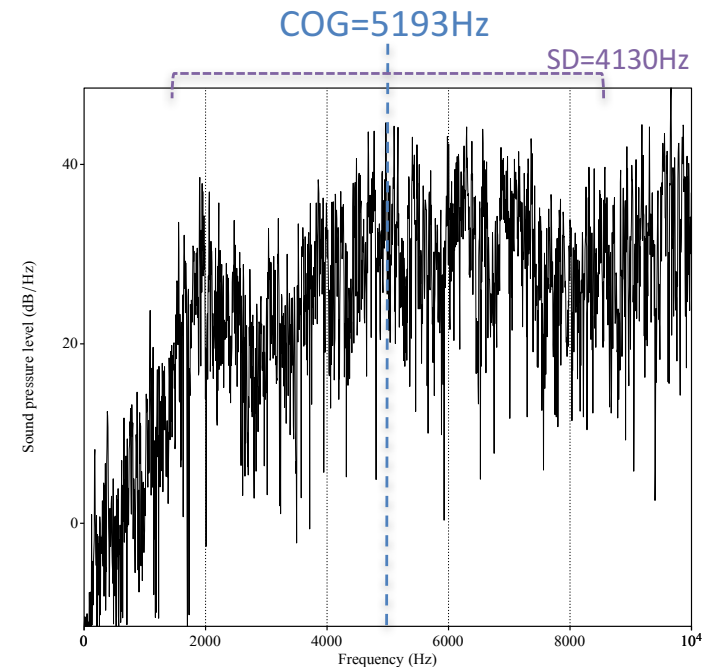


Fig. 3. Spectral envelope calculated from FFT for speaker RJ, token “see” (130 ms)

Results 1

Table 2. By-speaker measures of spectral shape (word-positions pooled).

Speaker	Average COG (Hz)	(std dev)	SKEWNESS	KURTOSIS	n
M1	8246.97	4409.34	0.39	1.37	292
M2	8449.29	3442.39	0.00	1.62	52
RJ	5020.28	3278.80	1.50	6.55	144

Table 3. By-speaker measures of spectral shape (partitioned by word-position, morphological environments conditioning deletion have been omitted).

Spkr	Initial (“see, said”)		Medial (“person”)		Final (“errands”, “converse”)		ROWTOT
	Avg. COG	n	Avg. COG	n	Avg. COG	n	
M1	8318.12	71	8398.21	35	8521.89	81	187
M2	7614.56	10	8835.84	7	8426.98	9	26
RJ	5100.30	30	5224.56	19	5093.34	37	86

Results 1

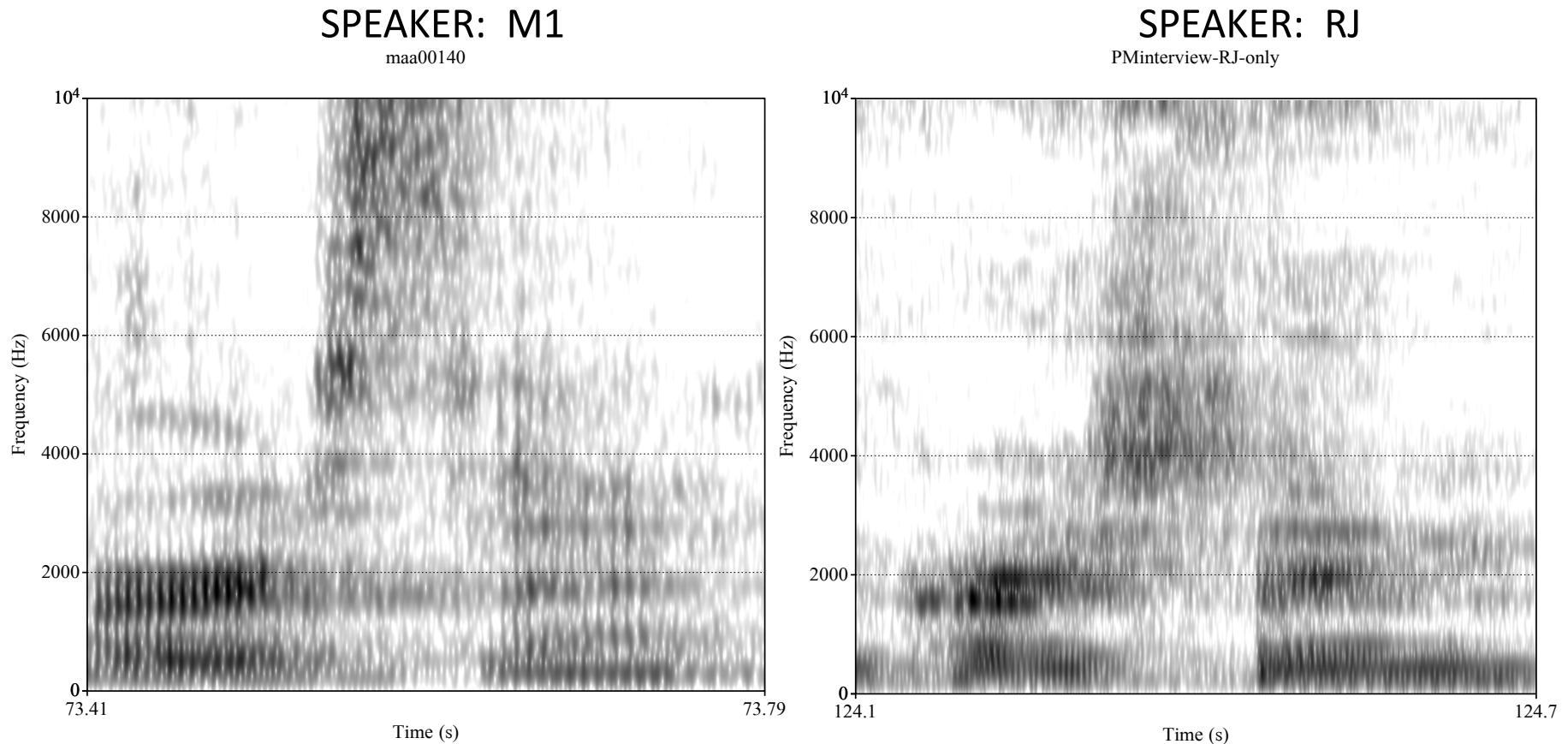


Fig. 4. Word-medial /s/ in “person” for M1 (left), RJ (right).

Conclusion: Consistent, clear evidence of acoustic correlates of RJ’s Type III mandibular prognathism.

Predictions

Morphological environment conditions variable deletion of /s/ (in line with the phonological AAE pattern).

Jeantel shows evidence of possible transfer effects from Dominican Spanish or Haitian Creole, vis-a-vis higher deletion rates in word-final environments.

RQ 2

Variable linguistic context

Sociolinguistic theoretical and analytic construct:

- Target linguistic structures, distinguishing between the contexts in which variation is possible, and impossible.
- If there is an environment in which one variant occurs categorically, we exclude those from the analysis (no variation may be observed).
- Word-initial-/s/ useful as COG baseline (physiology is key predictor of spectral shape), but this is not an environment in which dialect-related variability is to be expected. Therefore, focus of analysis is on morphological environments, and two phonological ones (word-medially and –finally) in which linguistic variation is possible.

Dominican Spanish

Table 4. Consonantal inventory of Dominican Spanish.
 ([]=major allophones)

	Bilabial	Labio-Dental	Alveolar	Palatal	Velar
stop	p b [β]		t d		k g [χ]
affricate				tʃ	
fricative		f [ɸ]	s -ø-		x [h,ħ]
nasal	m		n	ɲ	ŋ
approximant			l	j	
semivowel	w				
trill/tap			r [ʁ,χ]		

source: Bullock & Toribio (2008, 2009)

- Strong phonological rule. Post-vocalic deletion of /s/ is found in all dialects, in both word- medial and word-final positions (Bullock, et al. 2014):
 - e.g., word-finally, plurals: [aitiano:] *Haitianos* “Haitians”
 - e.g., stem-internally, word-medial: [gu:ta] *gusta* “like, please”

Haitian Creole

Table 5. Consonantal inventory of Haitian Creole.

	Bilabial	Labio-Dental	Alveo-dental	Alveo-palatal	Palatal	Velar
stop	p		t			k
	b		d			g
affricate				tʃ		
				dʒ		
fricative		f	s	ʃ		
		v	z	ʒ		ɣ
nasal	m		n		ɲ	ŋ
approximant			l			
semivowel	w				j ~j̃	ɣ

source: Lefebvre 1998, p. 398-402.

- /s/ appears in all positions in the word, including word-finally (although rare):
e.g., [sis] *sis* “six” [dus] *dous* “do”
- For most lexical items, vowel insertion is observed in word-initial and word-final sC clusters:
e.g., [espo] *espò* “sport” [kwase] *kwa* ~ *kwas-e* “cross, to cross”
e.g., [byase] *bra* ~ *bras-e* “arm, to mix” (Tinelli, 1981:105)

Environments associated with variable realization of /s/ (African-American English)

(1) verbal /-s/ “loves, creeps”

- variable deletion of inflectional suffix with 3rd person simple present tense verbs, regardless of grammatical person and number of subject.

e.g., *He know \emptyset the first guy* (GYE/062/361) [Poplack and Tagliamonte (2001)]

(2) possessive /-s/ “mother’s, Billy’s”

- 3rd person singular masculine genitive pronoun; genitive marker -s
e.g., *His mother \emptyset birthday* (RJ/462.972)

(3) plural-NP /-s/ “records, years”

- full nouns
- e.g., *It’s a lotta birthdays up in there* (RJ/465.264)

Other forms of /s/ Coded

PHONOLOGICAL:

PHON-INITIAL in nouns, adjectives, adverbs

son, since

PHON-MEDIAL in nouns, adjectives, adverbs

person
dissappointment

PHON-FINAL monomorphemic forms

yes

B.S.

PHON-FINAL-
CLUSTER monomorphemic (in stem)
conditioning environment for deletion (all
English varieties)

just

past

fist

PHON-OTHER intensifiers, discourse markers

So...

WAS:

1, 2, 3RD Person past form of to-be

I was

You was

He/She/It was

They was

COP:

equative constructions

is, that's, it's

Expletive it

It's a lotta stress

Results 2

Table 6. Morphological environments favoring deletion (top table), phonological environments (bottom).

Spkr	Verbal -s			Possessive -s			Plural -s			%DEL
	% del	% pres	n	% del	% pres	n	% del	% pres	n	
M1	0%	100%	3	0	100	1	2	98	41	1/45 (2%)
M2	-	-	nd	50	50	2	0	100	10	1/12 (8%)
RJ	33	67	9	43	57	7	22	78	9	8/25 (32%)

	Medial -s			Final -s		
	% del	% pres	n	% del	% pres	n
M1	0	100	35	2	98	81
M2	0	100	7	0	100	9
RJ	0	100	19	6	94	36

Table 7. Logistic Regression for DELETION. Two predictors: Group (2 levels=Subject, Control) and Morphological environment (7 levels); response: Present (deleted, present)

	Df	Deviance	Resid. Df	Resid. Dev	Pr(>Chi)
NULL			484	160.35	
Group	1	16.883	483	143.47	3.977e-05 ***
Morphology_BASIC	6	22.310	477	121.16	0.001064 **

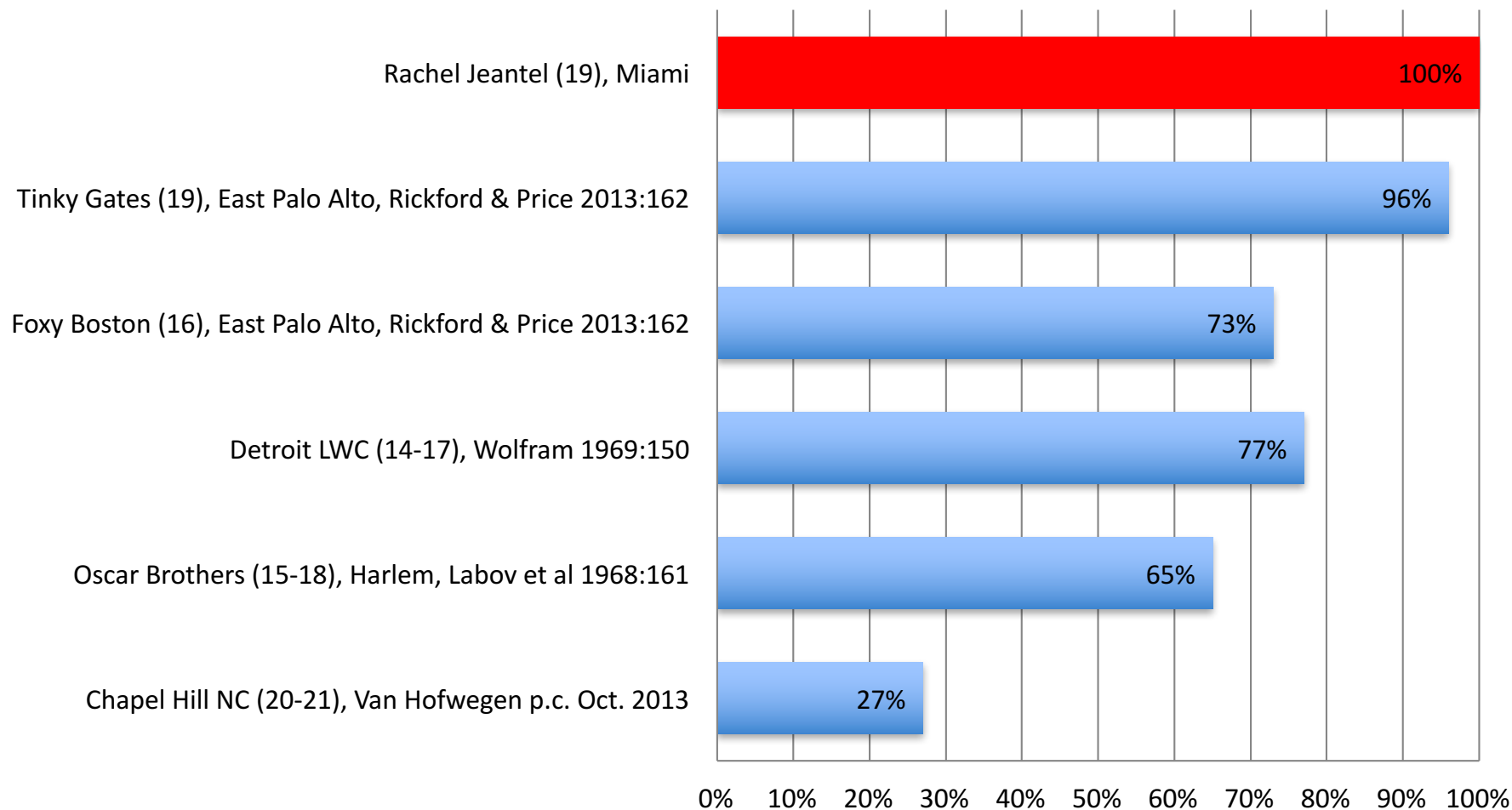
---Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Table 8. Linear mixed effects model for CENTER OF GRAVITY. Fixed effects for Group and Morphological Environment, with random effect for Speaker

	Df	AIC	BIC	logLik	deviance	Chisq	Chi Df	Pr(>Chisq)
null.cog.model	9	8937.6	8975.2	-4459.8	8919.6			
cog.model	10	8924.9	8966.8	-4452.5	8904.9	14.671	1	0.000128 ***

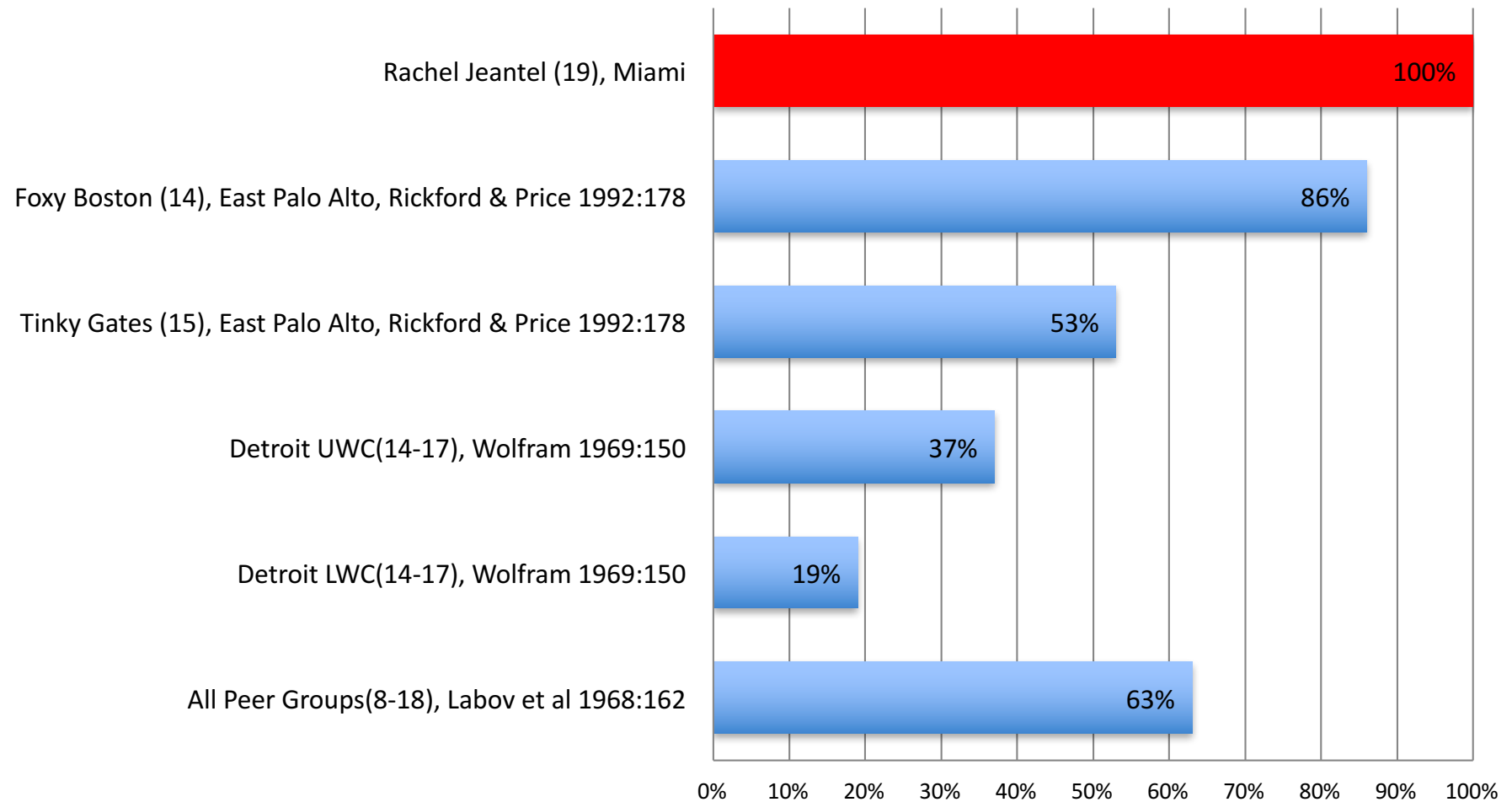
---Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

RJ's zero verbal –s deletion rate compared with Af. Ams. in other studies



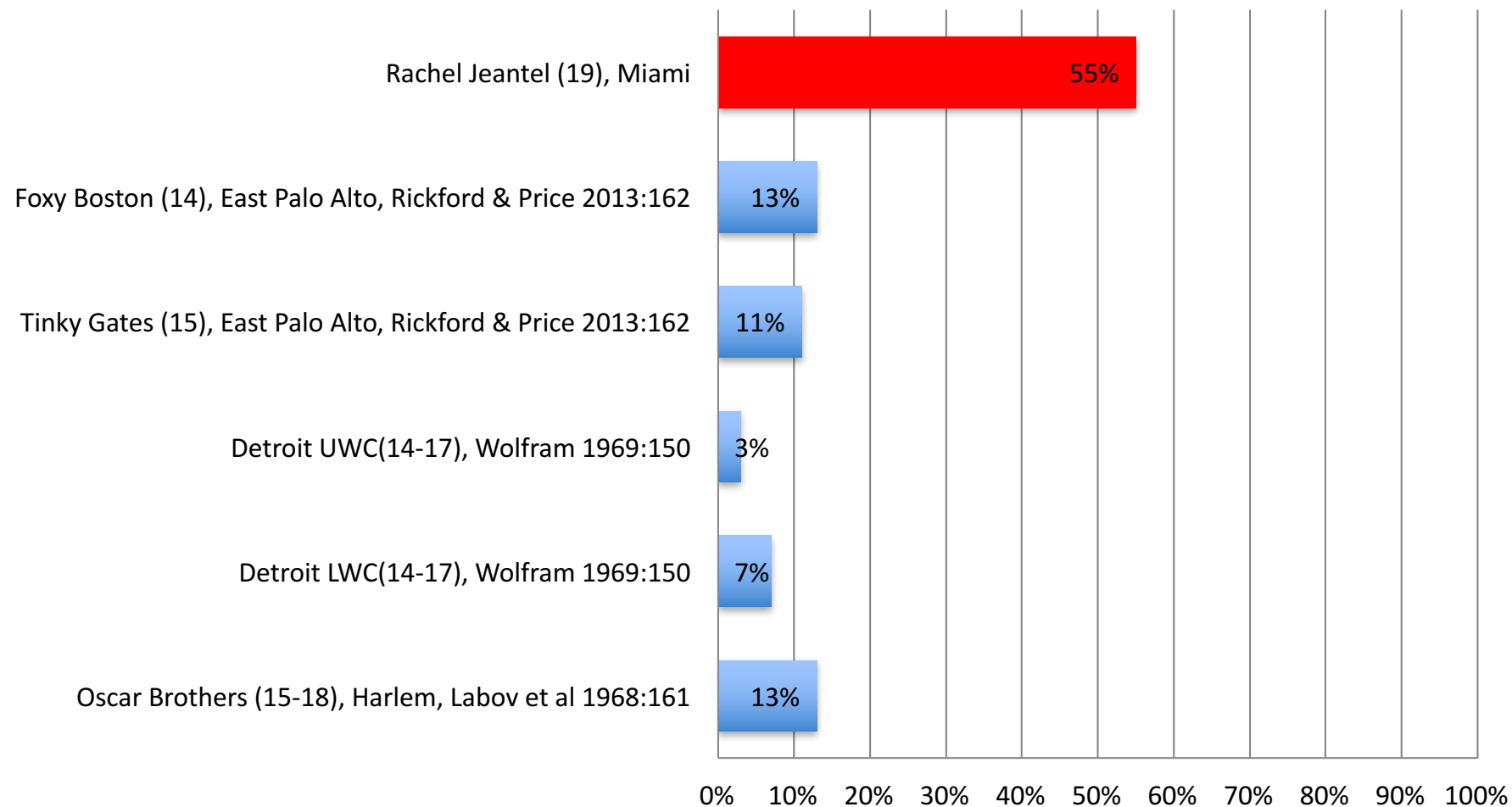
source: Rickford and King (2014)

RJ's zero possessive –s deletion rate compared with Af. Ams. in other studies



source: Rickford and King (2014)

RJ's zero plural –s deletion rate compared with Af. Ams. in other studies



source: Rickford and King (2014)

Conclusion

1. Jeantel shows a pattern of *systematic* deletion of /s/ which operates independently of the malocclusion. Both linguistic and physiological factors must be taken into account to explain the spectral patterns associated with her speech production profile.
2. COG is not the same in each position in the word. Further research is needed to better understand why.
3. African-American English is not monolithic. Multilectal speakers such as Jeantel have distinctive patterns.
 - deletion rates exceed those of Mid-Atlantic AAE.
 - It appears that Jeantel deletes at higher rates in those environments where Dominican Spanish also deletes (word-finally, in plurals). Possibly language transfer.

Justice for (other) Jeantels?

What would justice look like?

- **Linguists:** better understanding of the speech of both monolectal and multilectal black speakers (a significant, but understudied population within the US)
 - AAE is not monolithic
 - Social dialects of AAE (Weldon, in press; Troutman, 2016)
 - Language attitude research (addressing linguistic profiling, cf. Baugh et al. 2010)
- **Linguists:** better understanding of non-English language varieties that black immigrant communities command, transfer effects from these
- **Linguists + Speech and Hearing scientists:** better understanding of the interaction between linguistic and clinical factors

Argument (repeated): We can account for the audible “distortion” in Jeantel’s speech. Systematic deletions are attributable to an AAE phonology with multilectal inputs. These interact with the spectral profile produced by mandibular prognathism.

- American Speech-Language and Hearing Association (1993):

“A speaker of any language or dialect may exhibit a language disorder unrelated to his or her use of the native dialect. An essential step toward making accurate assessments of communication disorders is to distinguish between those aspects of linguistic variation that represent regular patterns in **the speaker's dialect** and those that represent true disorders in speech and language (p. 2).”



Thank you!

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Abstract

Rachel Jeantel served as the key witness for the prosecution in the well publicized July 2013 trial of George Zimmerman, who was acquitted of charges of manslaughter after the death of Jeantel's friend, Trayvon Martin. Although she herself was not on trial, media coverage was highly critical of Jeantel's testimony. The scrutiny to which she was exposed constituted a public "trial of opinion" that continued well into 2015. The intelligibility of Jeantel's speech was questioned, as was her ability to "code switch" adjust her speech patterns to accommodate her audience. None of these claims were supported by actual linguistic analysis.

The purpose of this project was to perform a linguistic analysis of the features of Rachel Jeantel's speech in order to evaluate claims about intelligibility made in media coverage during the trial. In addition to her status as a speaker of a Floridian variety of African American English (AAE), Jeantel's linguistic inputs are varied: her status as the child of speakers of Haitian Creole (French based) and Dominican Spanish means that she also has possible transfer effects from these languages. For example, her speech shows instantiations of the well studied feature of Dominican Spanish called "*zero /s/*": *deletion of /s/ following vowels*, e.g., "Haitianos" realized as "Haitiano". In her teens, Jeantel had also been diagnosed with Class III Malocclusion (underbite). This project also explored the possible effects that her underbite may have had on her speech, and how these interact with the linguistic features also investigated.

The study included an acoustic analysis of Jeantel's full vowel system, and key consonants known to be affected by Class III Malocclusion using data drawn from her courtroom testimony and a subsequent CNN interview with Piers Morgan.

The scrutiny to which Jeantel was subjected highlights the many ways in which language, race, and class become intermixed in present day American culture. Clinicians continue to need baselines for the speech of speakers from underrepresented dialects. We hope that by providing a detailed analysis of Jeantel's speech, we can help inform this conversation. Multilectal African Americans from immigrant households are common in populations throughout the US, yet remain understudied. A second goal of the larger project is to begin to address the need for understanding the linguistic systems of multilectal African Americans.