

The Influence of /s/ Quality on Judgments of the Sex Typicality of Boys' Speech

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The Biggest Picture View

- Spoken language conveys multiple messages simultaneously (Ladefoged & Broadbent, 1957 inter *alia*)
- Consider this utterance (it's me):



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Regular semantic: the high peak frequency of /s/ differentiates it from the /ʃ/ in the similar-sounding word *shack*

Laryngeal and Vocal-Tract Morphology: the overall scaling of the fundamental and resonant frequencies in the /æ/ tell something about the size of the talker's vocal folds and vocal tract

Pragmatic: the rising-falling-rising pitch glissando conveys the speaker's attitude toward the topic being discussed, and how he intends the utterance to be interpreted relative to the upcoming discourse.

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The Biggest Picture View

- **Social-Indexical**
 - the compact spectrum of /s/ and the dynamics of the formants in /æ/ are consistent with speech that most North Americans would judge to sound gay (Munson, McDonald, Deboe, & White, 2006; Smith, Munson, & Hall, 2008).

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The Biggest Picture View (con't)

- To be a mature, competent speaker of a language, you have to be able to convey each of these of information.
- You also have to be able to and perceive each one of these pieces of information through speech, and accommodate for (presumed) attributes when perceiving other aspects of speech:
 - The vowels that we perceive depend on what they believe in advance the person's dialect to be (Niedzielski, 1999)
 - The fricatives that we perceive depend on whether we think we're listening to a woman or to a man (Munson, 2009; Munson & Kemper, 2010)
- ...and phonetic variation affects the impressions that people form of others.



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Closer to Earth

- Today we focus on one indexical attribute, gender
- Gender differences in production are...
 - Present in vowels, consonants, and higher-level prosodic organization (Childers & Wu, 1991; Munson et al., 2006)
 - Not reducible to anatomic or physiologic differences between the sexes (Fuchs & Toda, 2009)
 - Language- and Dialect-specific (e.g., Stuart-Smith, 2007; Van Bezooijen, 1995)
 - Learned prior to sex differentiation at puberty (Perry et al., 2001)



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Closer to Earth




- How do children learn gendered ways of speaking?
 - Production: What do children do to sound boy-like or girl-like?
 - **'Analysis by synthesis': How do adults perceive gender in children's speech**
 - This helps us refine the acoustic correlates of gender.



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Even Closer...

- American English-speaking adults' ratings of the sex-typicality of men's voices relate to a lot of things, including fine acoustic-phonetic detail in /s/. They are rated as less prototypically male when producing...
 - ...*The variants that gay men produce*, i.e., /s/ with a high peak frequency and a compact spectrum (Munson et al., 2006), as in: 
 - ...*The variants that are part of our largely unattested stereotypes about how gay men speak*, i.e., frontally misarticulated /s/ (Munson & Zimmerman, 2006; Mack & Munson, 2008), as in:  



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Hey, wait a minute!

- Munson and Baylis (2007) found that 3-7 year-old boys who make more speech errors are perceived as sounding *more* boy-like than those who make fewer errors.
 - Perhaps this reveals stereotypes about the rate of speech acquisition in boys and girls
 - The stimuli in that study contained a variety of errors.



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The Purpose of the Current Study

- To examine the influence of /s/ type on ratings of how prototypically male boys' voices sound
- We examine ratings of the sex-typicality of 5- to 13-year-old boys' productions of a variety of /s/-initial words including
 - Natural tokens (with a range of /s/ productions) 🗣️
 - Tokens with the natural /s/ replaced with a frontally misarticulated variant 🗣️
 - Tokens with the natural /s/ replaced with a hyper-correct /s/ 🗣️



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The Purpose of the Current Study

- We hypothesize that the younger talkers will be rated as less prototypically boy-like when their productions contain hyper-correct /s/ than when they have contain a frontal /s/
 - Based on Munson and Baylis (2007)
- We hypothesize that older talkers will be rated as more prototypically boy-like when their productions contain correct /s/ than when they contain incorrect /s/
 - Based on work with adults (i.e., Munson et al., 2006)



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Talkers

- Speech tokens were taken from 34 boys aged 5 to 13
 - Binned into equal-sized older (9-13 years) and younger (5-8 years) groups
- Boys had been recorded as part of a larger study examining the development of gender prototypicality in boys' speech
 - See Crocker & Munson (2006), Munson, Bauer, & Zittnan (2008), Munson & Seppanen (2009, this conference) and Urberg-Carlson and Munson (2008) for more on this larger study.
 - These are available on my web page



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Listeners

- Listeners heard 204 stimuli (2 words {sock, sun} x 34 children x 3 types) as in a larger experiment on the perception of sex typicality in boys' speech
 - 1 *positively a female*
 - 2 *appeared to be a female*
 - 3 *unsure; may have been a female*
 - 4 *unsure; may have been a male*
 - 5 *appeared to be a male*
 - 6 *positively a male*
- After each production, they rated them on a six-point scale taken from Perry, Ohde, & Ashmead (2001)
- Listeners were naïve to the purposes of the study



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Analysis

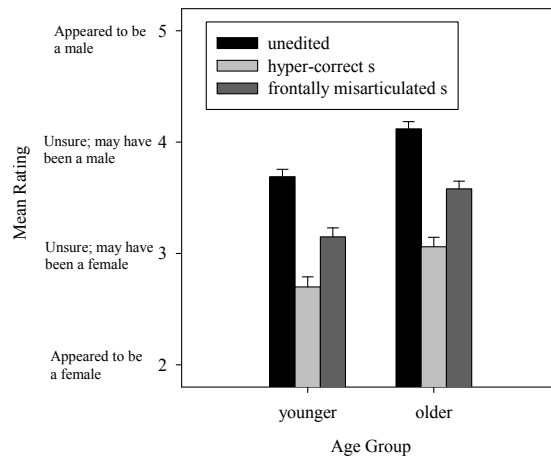
- Ratings were averaged separately for younger and older boys' unedited, hyper-correct /s/, and frontal /s/ tokens. These were submitted to a two-factor within-subjects ANOVA
- Older boys were rated as more boy-like than younger ones ($F[1,37] = 106.8, p < 0.001, \eta^2_{\text{partial}} = 0.74$)
- /s/ type affected ratings significantly ($F[2,74] = 87.4, p < 0.001, \eta^2_{\text{partial}} = 0.70$)
- ...But they didn't interact.
- And the influence of /s/ type was in the unexpected direction.



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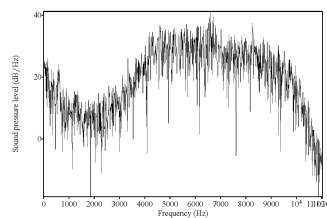
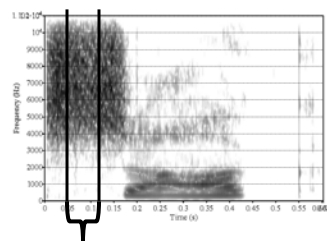
Mean Ratings



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A little bit more about the natural tokens

- The analysis of the unedited tokens treats them as a 'fixed effect' in the ANOVA, when in fact they are a random effect
 - Everyone had a different /s/
- We did a set of regression analyses relating gender-typicality ratings to measures of the fricative and the vocalic portions of the stimuli



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The results

- Characteristics of the fricatives predicted ratings; characteristics of the vowels did not.
- Tokens were rated as less boy-like if they had a less spectral spread (consistent with a less-dentalized production) and a lower concentration of energy.

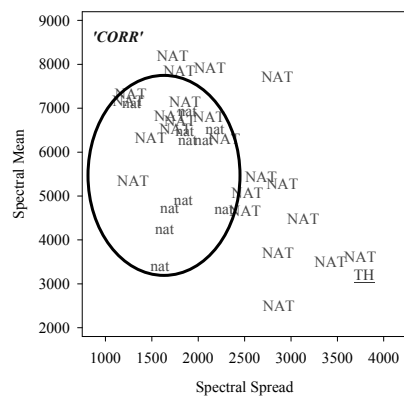


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Surprise...or not?

- The tokens with the 'correct' /s/ were rated as less prototypically male than those with the frontally misarticulated /s/, and both were less prototypically male than the natural tokens.
- The frontal and hyper-correct variants are far away from the cluster of fricatives associated with boy-like speech.



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Tying it Up

- Adults rate speech tokens with instances of /s/ that are both more frontal and lower in peak frequency as less prototypically boy-like than those that are neither particularly high in frequency nor particularly frontal.
- The characteristics of /s/ influence judgments far beyond the characteristics of the vowels in the same words.



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Tying it Up

- A clinical implication: the hyper-correct /s/ is very close to what clinicians model when they model a 'correct' /s/ to children who are producing a frontal misarticulation.
- If these clinician models resemble the high peak-frequency /s/ that is judged to sound less-masculine, then we are training children to project a persona that they might not want to project
 - And we can't be too surprised if they resist learning it.



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