A [ʃ]triking change in Manchester English

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**WHAT IS S-RETRACTION?**

_S-retraction:_ a process which turns /s/ into a more [ʃ]-like sound

- attested in /stu/ clusters in various positions:
  - word-initially: e.g. [ʃ]treet
  - word-medially: e.g. di[ʃ]trict
  - word-finally: e.g. cla[ʃ] trip

**[ʃ]**

_it was [s]trict but...**
What is *s*-retraction?  

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![Example speech bubble with [ʃ] and [s]](image)
WHAT IS S-RETRACTION?

2019 Individual differences and sound change actuation: evidence from imitation and perception of English /str/
2019 Large-scale acoustic analysis of dialectal and social factors in English /s/-retraction.
2019 Associating the origin and spread of sound change using agent-based modelling applied to /s/-retraction in English.
2019 Sound change and coarticulatory variability involving English /ʃ/.
2019 Listeners' social attributes influence sensitivity to coarticulation in the perception of sibilants in nonce words.
2018 Back to Bins- a mixed-methods reevaluation of categorization in sociophonetics.
2018 Revealing covert articulation in s-retraction
2018 A midsagittal ultrasound tongue imaging study to investigate the degree of /s/-retraction in /stu/ onset clusters in British English
2017 Social and Structural Constraints on a Phonetically-Motivated Change in Progress: (str) Retraction in Raleigh, NC
2017 In situ perspectives on retraction – Austinites on Troublemaker Shtreet
2016 Sibilants and ethnic diversity: A sociophonetic study of palatalized /s/ in STR clusters among Hispanic, White, and African-American speakers of Texas and Pittsburgh English
2016 The phonetic origins of s-retraction: Acoustic and perceptual evidence from Australian English
2016 An Apparent Time Study of (str) Retraction and /j/u/ - /dʒ/ Affrication in Raleigh, NC English
2016 Phonological and prosodic conditioning of /s/-retraction in American English
2015 Shtreets of Philadelphia: An Acoustic Study of /str/-retraction in a Naturalistic Speech Corpus
2013 STR-palatalisation in Edinburgh accent: A sociophonetic study of a sound change in progress
2011 Variability in American English s-retraction suggests a solution to the actuation problem
2011 Acoustic analysis of a sound change in progress: The consonant cluster /stu/ in English
2010 Variability and homogeneity in American English /ʃ/ allophony and /s/ retraction
2009 Street or shtreet? Investigating (str-) palatalisation in Colchester English
2007 Getting [ʃ]tronger Every Day?: More on Urbanization and the Socio-geographic Diffusion of (str) in Columbus, OH
2003 /s/-retraction in the ViC corpus
2000 /str/ → /ʃtr/: Assimilation at a distance?
1995 A case of distant assimilation: /str/ → /ʃtr/
GEOGRAPHIC SPREAD

Durian (2007):
- Colombus, OH
Gylfadottir (2015):
• Philadelphia, PA
Wilbanks (2017):
• Raleigh, NC
Rutter (2011):
- Louisiana
Phillips (2001):
- Georgia
Shapiro (1995):
- Queens, NY
- Washington DC
- California
- Birmingham, AL
Baker et al. (2011):
- Wisconsin
- Washington
- Arizona
- South Dakota
Altendorf (2003):
• Estuary English
Bass (2009):
• Colchester
Sollgan (2013):
• Edinburgh
This study: Manchester English
Two competing accounts:

- /s/ retracts far less in /st/ clusters, e.g. *steep* (Shapiro 1995)
- /t/ is always affricated when /s/ is retracted in /stu/ (Lawrence 2000)

Coarticulatory bias towards retraction in other /scu/ clusters (Baker et al. 2011)

- Pre-/s/ affrication of /t/ is widespread in varieties of English (Cruttenden 2014:189-92)

- Inter-speaker variation in the extent of this phonetic bias “suggests a solution to the actuation problem” (Baker et al. 2011)
**Phonetic motivations**

Two competing accounts:

/ʃ tɹ iː t /  
/ʃ tʃɹ iː t /

“It may prove difficult to tease apart the effects of contact with affricated /t/ and variably-articulated /ɹ/ [...]' and isolate a single underlying cause...”

Wilbanks (2017: 302)

We can gain insight into this unresolved issue by looking at British English:

- /stʃ/ - e.g. stupid, student - affrication but no rhotic

Which of the two competing accounts finds the most empirical support in BrE?
Methodology
DATA COLLECTION

• Sociolinguistic interviews with 131 speakers born and raised in Greater Manchester
  ‣ ESRC funded project on Manchester English – interviews conducted by local fieldworkers and students

• Birth years spanning almost a century, from 1907 to 2001

• Socioeconomic status determined based on occupation (3 levels: working class, middle class, upper middle class) and education (see Baranowski & Turton 2018)

• ~85,000 tokens of sibilants across all environments, measured using Centre of Gravity (Jongman et al. 2000)
**DATA PROCESSING AND ANALYSIS**

**Cleaning:**
- Downsampled to 22kHz
- High-pass filtered at 750Hz
- Removed tokens where spectral peak or CoG < 2400Hz
- Removed outliers (1.5*IQR)

**Analysis:**
- Mixed-effects linear regression using `lme4` (Bates et al. 2011)
- Random intercept of word and random by-speaker slope of cluster type

**Processing:**
- Normalised into z-scores
- **Word frequency** counts taken from SUBTLEX-UK corpus (van Heuven 2014)
- Extracted duration of each sibilant
- **Position** in word and phrase (initial vs. medial)
- Extracted following vowel (to investigate effect of rounding)
RESULTS
**All Onset Types**

- Hierarchy of retraction contexts as attested elsewhere (e.g. Baker et al. 2011)

- /ʌ/ causes some **low-level retraction** even in the absence of affrication, e.g. /spɹ/, /skɹ/

- First quantitative evidence of **retraction** in /stj/ - e.g. student, stupid etc.
All onset types

• Hierarchy of retraction contexts as attested elsewhere (e.g. Baker et al. 2011)

• /u/ causes some low-level retraction even in the absence of affrication, e.g. /sp guarding/, /sk guarding/

• First quantitative evidence of retraction in /stj/ - e.g. student, stupid etc.
ALL ONSET TYPES

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• Hierarchical cluster analysis - objectively groups speakers based on distribution of CoG values across environments
Cluster analysis

Group #1 - no pattern of retraction
Group #2 - emerging pattern of retraction

Cluster Analysis

Group #1

Group #2

Group #3

Normalised center of gravity

Normalised center of gravity

Cluster analysis

Group #3 - /st\text{u}/ and /st\text{j}/ approaching /ʃ/
Normalised center of gravity

Average date of birth:

1937
1976
1991

Cluster analysis
APPARENT TIME CHANGE #1

- /stə/ and /stj/ changing in parallel
- Suggests a single underlying cause

Graph showing the normalised center of gravity over time, with a focus on the changing patterns of /s/, /ʃ/, /stj/, and /stə/ sounds.
APPARENT TIME CHANGE #2

- Pre-vocalic /s/ and /ʃ/ also correlate with date of birth
- Wider fricative space for younger speakers
  - apparent time change?
  - age-graded variation?

see Fruehwald (2017) - Generations, lifespans, and the zeitgeist
What’s a 27 year-old doing in group #1?
Socioeconomic status

- Based on occupation - found to be best measure of social class in this community (Baranowski & Turton 2018)
  - Suggestion that highest social class is conservative (but $p = 0.18$)
- Education tells a similar story, and significant difference between highest and lowest group (but lots of missing data)
- Calls for complementary work on indexical meaning of /s/-retraction (see e.g. Phillips & Resnick 2019)
SOCIAL EVALUATION?

• To what extent are speakers aware of this variation? Is it subject to metalinguistic commentary? If so, how is it evaluated?

  my pet peeve is “shtreet” (street). I’ve noticed recently that a lot of speakers are adding these sounds.

  People that pronounce it SHtreet. There is no h in the word street.

  It makes me apoplectic when the “st” sound gets an “h” added to it like: shtreet, or shtrong or shtraight! Those are not proper words people! Even announcers do it! Stop! Just STOP!
Other factors

- Other significant predictors from the model:
  - **gender**: male speakers lagging behind female speakers ($\beta = 0.233$, $p = 0.01$)
  - **position**: retraction more advanced in word-medial position ($\beta = -0.169$, $p = 0.002$)
  - **frequency**: higher frequency words leading ($\beta = -0.068$, $p = 0.028$)
  - **duration**: longer sibilants less retracted ($\beta = 0.121$, $p < 0.001$)

(not sig: social class, vowel, cluster type)
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Evidence of s-retraction before an affricate, even in the absence of /ʃ/ or /j/.

Also applies across word boundaries (but to a lesser extent, see Zsiga 1995).
Evidence of s-retraction before an affricate, even in the absence of /ɹ/ or /j/

Also applies across word boundaries (but to a lesser extent)
/stʃ/ (e.g. exchange) also involved in apparent-time change
/stʃ/ (e.g. *exchange*) also involved in apparent-time change.
/stʃ/ (e.g. exchange) also involved in apparent-time change
/stʃ/ (e.g. *exchange*) also involved in apparent-time change
DISCUSSION
The case for non-local assimilation:

- Baker et al. (2011) on long-distance lingual relationship between /s/ and /ʃ/
- Phonotactic restriction against [sʃ], suggesting again that there’s something more phonetically natural about [ʃʃ]
- Evidence of local process of /sj/ → [ʃ] (see Zsiga 1995 on press vs. press you vs. pressure)
- So there’s a clear phonetic motivation as to why /r/ and /j/ could directly cause an /s/ to take on a hushier realisation
• The case for local assimilation:
  ‣ affrication occurs in both environments (Nichols & Bailey 2018; see also Magloughlin & Wilbanks 2016)
  ‣ affrication as a single underlying cause is the more parsimonious explanation
  ‣ evidence that /s/ retracts before an affricate even in the absence of /ɹ/ and /j/
    ‣ both word-internally (e.g. exchange) and across word boundaries (e.g. nice chap)
  ‣ lack of retraction in other (non-affricating) clusters with /ɹ/ and /j/, i.e. /spɹ, skɹ, spj, skj/
CONCLUSIONS
CONCLUSIONS

• First robust evidence of community-level change in BrEng /stɹ/
  ‣ regular coarticular sound change: led by young women, and more advanced in high frequency words and (possibly) working class speech

• New insight into the mechanisms of /s/-retraction:
  ‣ first quantitative investigation of retraction in /stj/, which is changing in parallel with /stɹ/
  ‣ although /ɹ/ and /j/ may have some direct effect on /s/, this is unlikely to be enough to act as the initiation of this change

• The solution to the actuation problem proposed by Baker et al. (2011) – which relies on covert articulatory variation in /ɹ/ – has not been able to account for this particular instance of /s/-retraction

• Future: fine-grained phonetic realisation of /tɹ/ and /tʃ/ affrication and their change over time (covariation between /tɹ/-affrication, /tʃ/-coalescence, and /s/-retraction?)
Thank you!

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