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
  - word-medially
  - word-finally

  e.g. [ʃ]treet
  e.g. di[ʃ]trict
  e.g. cla[ʃ] trip

  it was [s]trict but...
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like a — a [ʃ]tray
hair on my — my clothing
**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 A corpus and articulatory study of covert articulatory variation and its phonological consequences in Raleigh, NC English  
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 /tʃ/ - /dʃ/ Affrication in Raleigh, NC English  
2016 Phonological and prosodic conditioning of /s/-retraction in American English  
2015 Shstreets 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 shstreet? 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/
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
GEOGRAPHIC SPREAD

Bass (2009):
  • Colchester
Sollgan (2013):
• Edinburgh
GEOGRAPHIC SPREAD

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 /sCt/ clusters (Baker et al. 2011)
- Pre-/t/ 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)
Two competing accounts:

/ʃtʃiːt/  /ʃʃiːt/

“It may prove difficult to tease apart the effects of contact with affricated /t/ and variably-articulated /ʃ/ […] 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)
- /ᵅ/ causes some low-level retraction even in the absence of affrication, e.g. /spᵅ/, /skᵅ/
- 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)

- \(/\dot{u}/\) causes some low-level retraction even in the absence of affrication, e.g. /sp\(\dot{r}/, /sk\(\dot{r}/

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• /u/ 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)
- /ʃ/ causes some low-level retraction even in the absence of affrication, e.g. /spʃ/, /skʃ/
- First quantitative evidence of retraction in /stʃ/ - e.g. student, stupid etc.
Hierarchical cluster analysis - objectively groups speakers based on distribution of CoG values across environments
CLUSTER ANALYSIS

Group #1 - no pattern of retraction
CLUSTER ANALYSIS

Group #2 - emerging pattern of retraction
Cluster analysis

Group #3 - /stɪ/ and /stj/ approaching /ʃ/
Cluster analysis

Average date of birth:

1937
Group #1

1976
Group #2

1991
Group #3

Normalised center of gravity

Average date of birth:

1937
1976
1991

Group #1
Group #2
Group #3

/s/ /sp/ /sk/ /st/ /sp

ʃ/

/s/ /sp/ /sk/ /st/ /sp

ʃ/

/s/ /sp/ /sk/ /st/ /sp

ʃ/
**APPARENT TIME CHANGE #1**

- /stɪ/ and /stj/ changing in parallel
- Suggests a single underlying cause
**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?

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**Diagram:**

- X-axis: Date of birth
- Y-axis: Normalised center of gravity
- Lines and markers indicating data points

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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 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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OTHER ENVIRONMENTS

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).
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Also applies across word boundaries (but to a lesser extent)
/stʃ/ (e.g. exchange) also involved in apparent-time change
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\[ \rho = -0.42, p < 0.01 \]
/stʃ/ (e.g. exchange) also involved in apparent-time change
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 [ʃ]
- 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

• First robust evidence of community-level change in BrEng /stʌ/
  ‣ 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 /stʌ/
  ‣ although /ʌ/ 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 /ʌ/ – has not been able to account for this particular instance of /s/-retraction

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

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