

# (thr)-~~r~~<sup>F1</sup>apping in American English: Articulatory Motivations and Social Factors

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# [ɾ] in English

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Taps are allophones of /t/ and /d/ in American English

Between two vowels where the second is unstressed

*water, data, cheetah, scooter, odor, editor, forty, item, ladle, coding, etc.*

[ɾ] = voiced, alveolar tap

Similar environment, but with a preceding nasal

*winter = winner, panting = panning*

[ɾ̃] = voiced, nasalized, alveolar tap

# [ɹ] in English

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In other varieties, it can also be an allophone of /ɹ/.

Scotland (Stuart-Smith 2008:63-65, Wells 1982:410)

Considerable sociolinguistic variation

However, because [θ] is often deleted, *three* is realized as [ʃɹi:] or [ɹi:]

English Midlands (Clark 2008:173)

Primarily intervocalically (*marry, very, sorry*)

Sometimes in word-initial clusters (*cream, bright, great*)

Maori English (Warren & Bauer 2008:81–82)

Generally does not have /ɹ/, but does after [θ]

# [ɹ] in English

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Is [ɹ] an allophone of /ɹ/ at all American English?

“The tap [ɹ] may have occurred in some older Southern speech after [θ], as in *three*, but the evidence is unclear.” (Thomas 2008:106)

Occasionally heard in the speeches of Dr. Martin Luther King Jr. (Wolfram et al. 2016)

# (thr)-flapping



"Rob," M, 1942, Washington



"Bonnie," F, 1948, Utah

From: [REDACTED]

To: [josephabrahamstanley@gmail.com](mailto:josephabrahamstanley@gmail.com) > [Hide](#) [REDACTED]

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**R sound**  
September 6, 2018 at 9:54 PM  
Found in Inbox

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Meant to tell you, I subbed in 1st grade for a week, and one day a kid looks at me and says, "you say your threes wrong!!!!"

"(thr)-flapping."

/ɹ/ → [r] / θ\_\_

# Hypotheses

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1. For some speakers, [ɾ] is an allophone of /ɹ/ after /θ/, *i.e.* they have (thr)-flapping.
2. This variant is socially conditioned.
3. This variant has articulatory motivations.

# METHODS

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# Infrequent Phonological Processes

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/θɪ/ is pretty rare; maybe 50 words

*anthrax, anthropology, arthritis, brethren, enrhall, lycanthrope, misanthrope, philanthropic, thrash, thread, threat, threatened, three, threshold, thrice, thrift, thrill, thrive, throat, throb, thrombosis, throne, throng, throttle, through(out), throw, thrust, urethra*

A few compounds: *bathrobe, bathroom, birthrate, birthright, forthright*

Uncommon names: *Ethridge, Heathrow, Jethro, Kathryn, Northridge, Thraco, Winthrop, Winthrow*

It doesn't mean it's uninteresting.

/ɛg/ to [eg] has phonological, morphological, and lexical factors (Stanley 2018)

/ɑ|V/ to [ɔ|V] can reveal the underlying mechanisms of merger (Dinkin 2016)

Nonce words show long-distance vowel harmony in Romanian. (Renwick 2012)

It just means alternative methods for data collection and analysis are usually necessary.

# Word Selection

Of the ~50 words  
with /θɪ/, I picked these 11 →

Exclusions:

Too much coda: *thrift, throat*

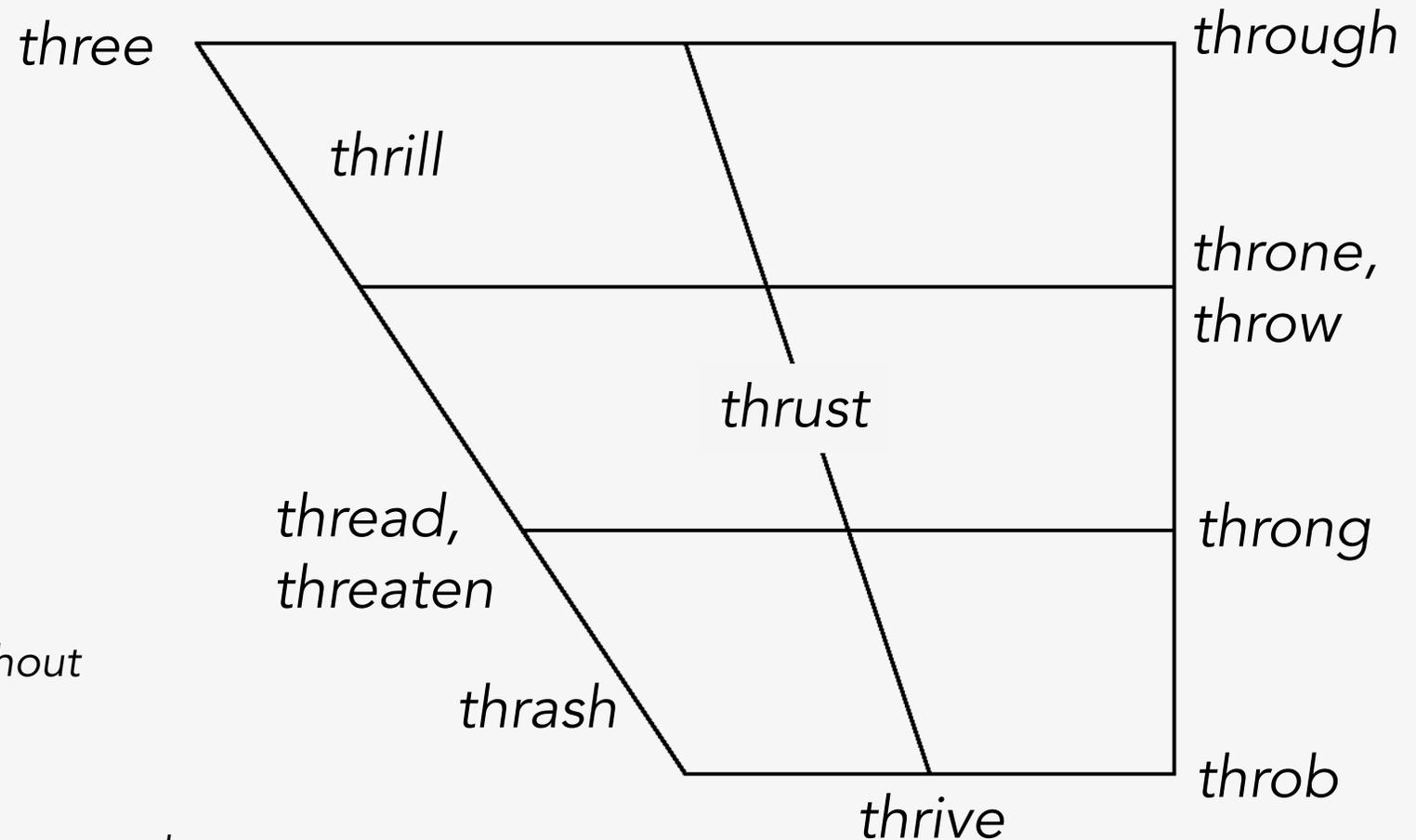
Rare: *thrice, lycanthrope, brethren*

Polysyllabic: *throttle, threshold, throughout*

Word-medial: *arthritis*

Compounds: *bathroom, bathrobe*

Unstressed: *Kathryn, Jethro, anthropology, urethra*



# Data

These words were embedded randomly into relatively long word lists (>150 words).

Washington sample (33 speakers; 155 tokens)

Fieldwork in summer 2016.

5 words: *thrill*, *thread*, *throb*, *throw*, *through*

Utah sample (52 speakers; 540 tokens)

Fieldwork in January 2018.

All 11 words except *throw*



# Analysis

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Flap or no flap?

I heard lots of realizations besides [θɹ] and [θɹ̩].

(Intervocalic) [ɹ] is quite variable

The only (somewhat) consistent acoustic correlate is a drop in F3 and F4 (Espy-Wilson 2004; Warner & Tucker 2017)

Each word was impressionistically coded as “flap” or “no flap.” (cf. Eddington & Elzinga 2008)

This admittedly glosses over other realizations—I’ll save those for future research.

Statistical tests: chi-squared tests and generalized linear mixed-effects models.

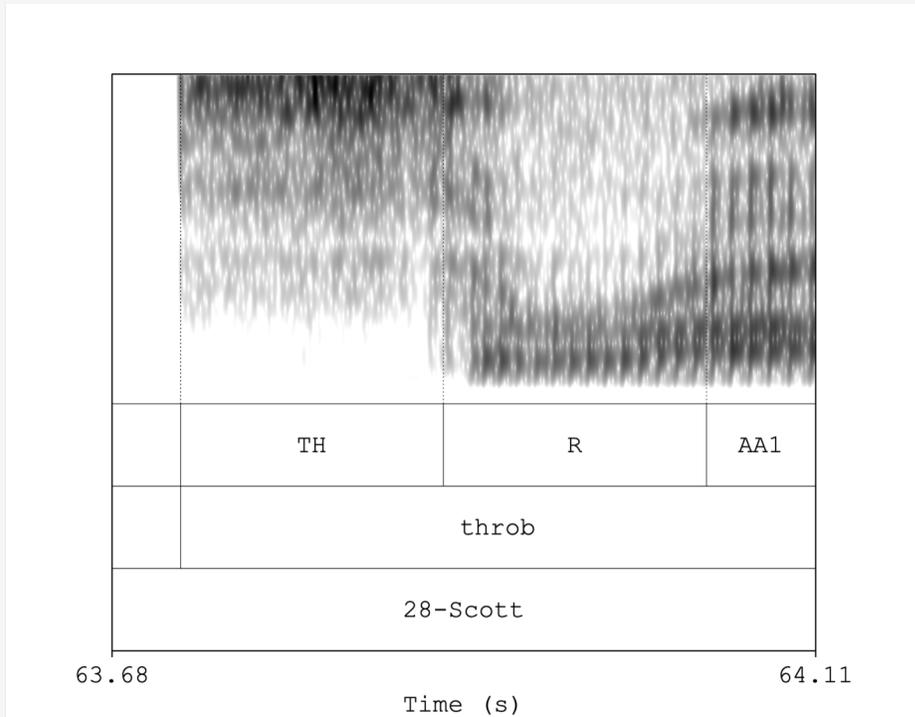
Used the lme4 package in R. (Bates *et al.* 2015)

# RESULTS

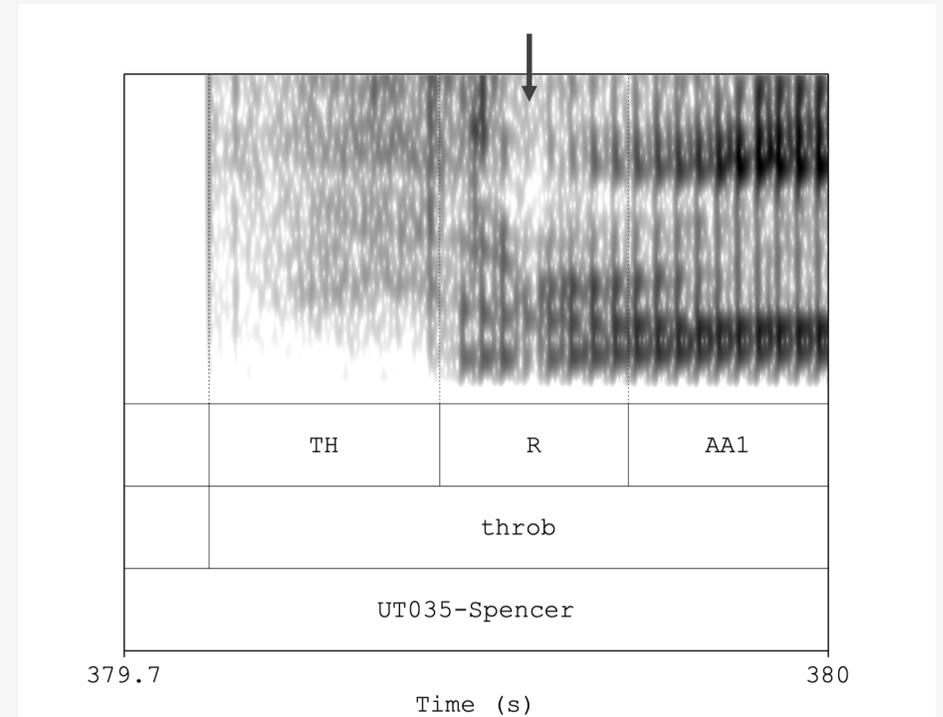
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# Results

121 of 695 tokens (17.4%) were flapped: some people had them and others didn't.



"Scott," M, 1987, Washington  
0% flapped



"Spencer," M, 1991, Utah  
100% flapped



# Articulatory motivations

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The tongue tip is involved in [θ], (retroflex) [ɻ], and [ɹ].

Has to move from interdental to curled past the alveolar ridge.

So, the transition between [θ] and [ɻ] is not clean.

There is a period of r-colored, voiceless frication. (Olive, Greenwood, & Coleman 1993:290–291)

Reason for a flap: tongue tip makes brief contact on the way.

Perhaps this “accidental” gesture was phonologized by some speakers.

What to call this?

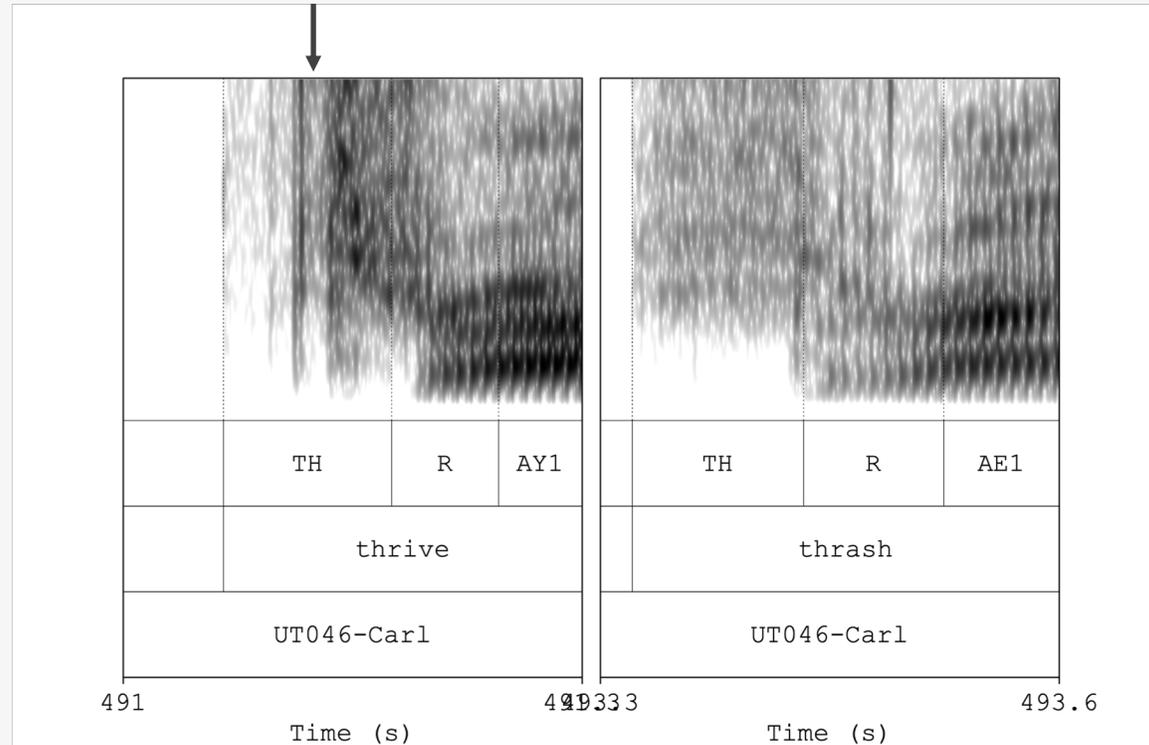
Up-and-down motion: “tap” (Ladefoged & Johnson 2015:186–187)

Back-to-front motion: “flap” (ibid.)

Front-to-back motion: ???

# What words have (thr)-flapping?

There was intra-speaker variation, so which words had more flapping?



"Carl," M, 1974, Utah  
45% flapped



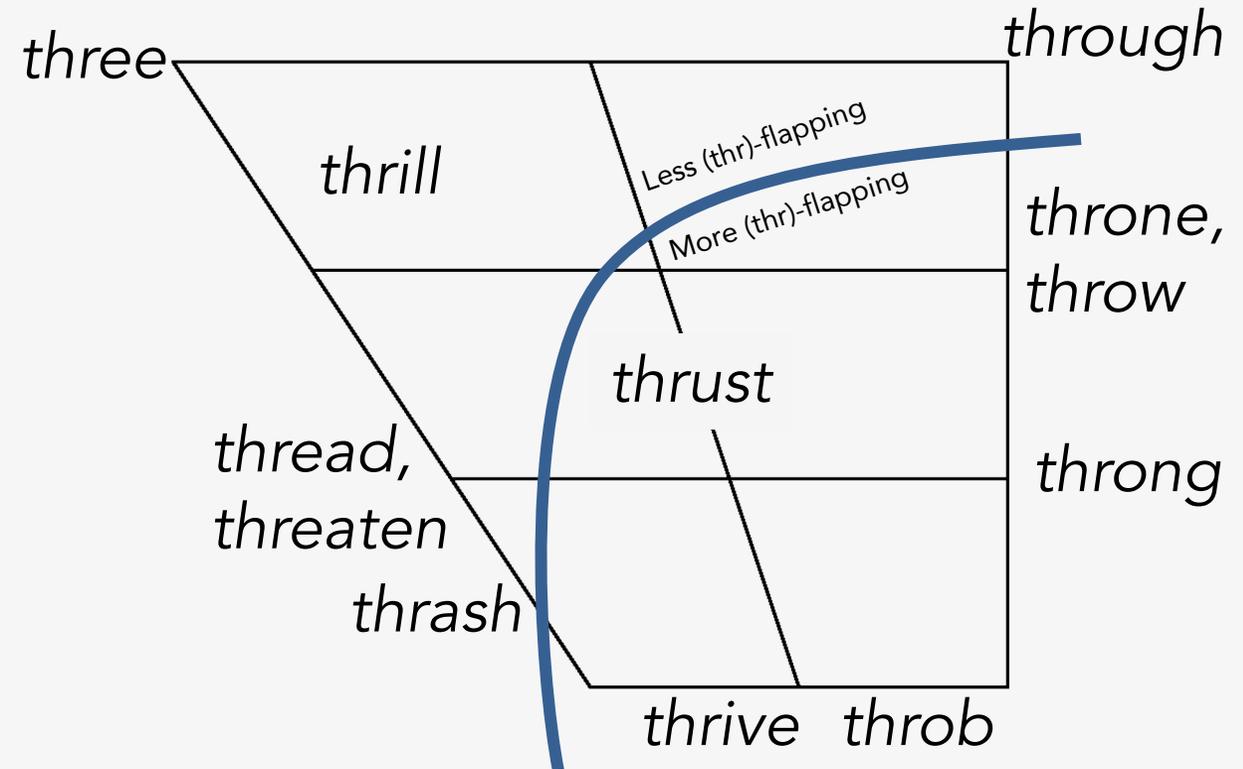
# Following vowel

However, not all words were equally likely to be flapped.

Among Utahns, the /θɹ/ followed by non-high, non-front vowels were flapped more often.

No coarticulation from vowels on /r/ or from /r/ on [θ]. (Olive, Greenwood, & Coleman 1993)

However, intervocalic taps after high front vowels are longer because they “overshoot the target”. (Zue & Laferriere 1979:1045)



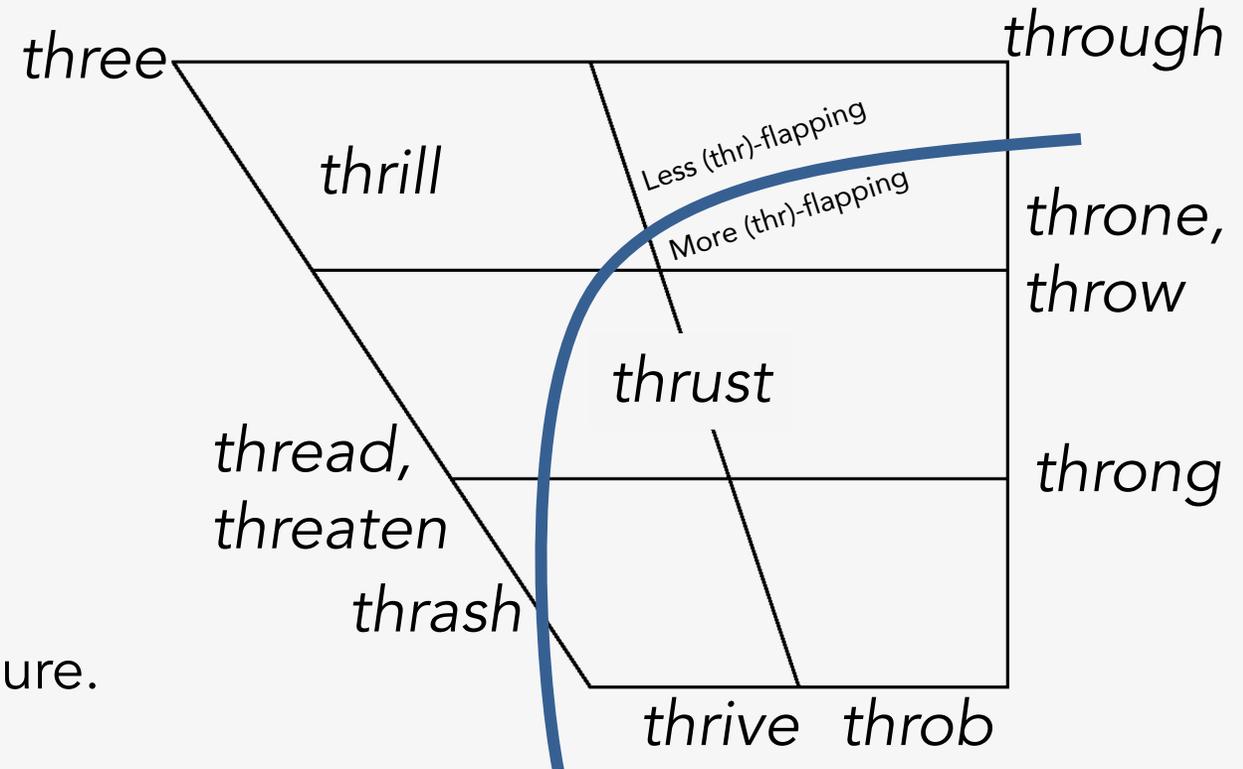
# Following vowel

My hypotheses:

- A. Full retroflexion is not achieved when going from interdental to retroflexed back to a higher/fronter position.
- B. Tongue is pulled backward as the jaw lowers for backer vowels, further encouraging contact with the alveolar ridge.

Without articulatory data, I can't know for sure.

Also, speakers without [ɹ] may have "bunched" [ɹ].



# Who has (thr)-flapping?

Test for social factors overall: age and sex

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glmer(thr ~ age + sex + state + (1|speaker) + (1|word))
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Neither age nor sex were significant predictors.

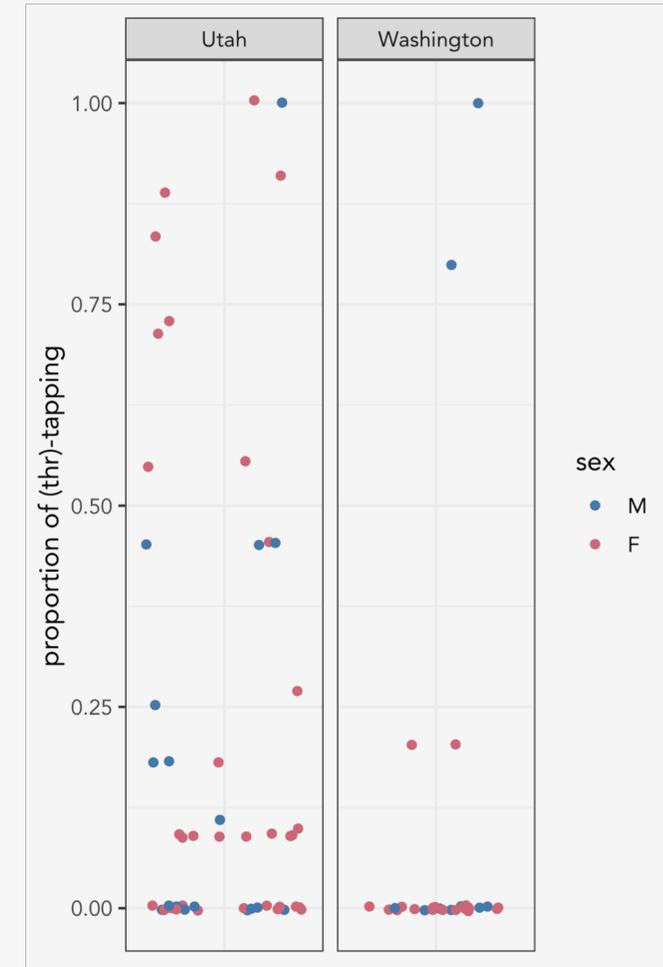
There is probably no change in time.

State of origin was significant!

Utahns were ~14 times more likely to flap than Washington.

Washington: 11/125 (9%)      Utah: 110/550 (20%)

Results of a chi-squared test:  $\chi^2(1) = 13.8, p < 0.001$



# Why Utah and not Washington?

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Articulatory factors can't be the only explanation. (If so, everyone would have the same patterns.)

Utah English has some other hyperarticulated consonants:

*mountain, satin, mitten* often realized as [t<sup>h</sup>ɪn] instead of [ʔɪ] (Stanley & Vanderniet 2018)

[ŋ] often realized as [ŋk] or [ŋg] (Di Paolo & Johnson 2018)

These realizations might be from a public speaking register, a more carefully enunciated speaking style common in Mormon worship services. (Di Paolo & Johnson 2018)

Perhaps, (thr)-flapping is thought to be more a articulated variant.

Without data on perception and attitudes, I can't know for sure.

# Conclusions

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## Drawbacks and limitations

This was a relatively small dataset on relatively few words.

I used perception rather than production.

There are other variants: what are their patterns?

## Lingering questions:

Do these phonological patterns apply to nonce words?

What acoustic measurements should be used and what would they say?

Do other regions have this?

What can ultrasound or MRI tell us about articulatory factors?

Is (thr)-flapping perceived as more articulate?

Bottom line: (thr)-flapping definitely exists!

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