

The sociophonetics of coda /t/ in Dublin English

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Abstract

We present an acoustic study of sociophonetic variation in the realization of coda /t/ in Dublin English. Wordlist data from 21 DubE speakers (11f, 10m) from the north, south and south-west of Dublin are analyzed using acoustic profiling. Extensive variation is present, with 13 variants of /t/ observed. A fricated variant [t̪] is the most common realization (45.6% of tokens), followed by the aspirated stop (41.7%). The remaining 12.7% of tokens include pre-glottalized realizations (5.6%), affricates (2.7%) and other less frequently occurring variants (total 4.4%). Some patterns for gender, location and age are evident, with fricated variants being most prevalent for female speakers and speakers from south Dublin and neighbouring Wicklow, with some limited evidence of frication being more prevalent in younger participants.

Index Terms: Dublin English, /t/, sociophonetics, frication

1. Introduction

1.1. /t/ in Dublin English

The variable /t/ in Dublin English (DubE) has been of particular interest among scholars of Irish English (IrE), and is an “immensely variable sound in the accents of English” [1: 728] more generally. A fricated realisation of /t/ (also known as a slit-t), particularly in coda position, has been described as “one of the most conspicuous features” of IrE ([2: 429]; see also [3] and [1]). DubE /t/ is quite heterogenous, however, with varying acoustic categories and places of articulation. These include an aspirated alveolar plosive [t^h] (henceforth aspirated stop), glottalized variants, a full glottal stop [ʔ], a tap [ɾ], a dental stop [t̪], an affricate [tʃ], and a rhotic [ɹ] [see 3: 40-41], and deletion [4: 122]. IrE is also noted to have several other fricative variants aside from fricated /t/, including the less observed glottal fricative [h], the dental fricative, a voiced fricative and a fricative flap [1].

Sociolinguistic factors including age, social class, neighbourhood and gender have all been found to govern /t/ variability in DubE, with the fricated variant [t̪] most common among women and in younger people living on the Northside or Southside of the city [see 5; Fig.1]. All other variants of /t/, especially the aspirated stop and glottalized variants, are more common among males (see [6] on its indexing toughness and masculinity) and in low socio-economic status areas of Dublin, such as the Inner City [5; shown as city centre in Fig.1], or among low income or unemployed speakers [4]. The age effect is likely to reflect the impact of language change, as [4] has shown via a small-scale study of Irish radio shows from 1930-2011 that /t/ has changed from being realised primarily as the

aspirated stop to the fricated variant. Fricated /t/ may thus be a more recent incursion into the variety, indicative of increased endonormativity, with the exonormative target potentially being the aspirated stop from British English.



Figure 1: Map of Dublin. Source: [http://www.raymondhickey.com/index_\(IERC\).html](http://www.raymondhickey.com/index_(IERC).html). Labels 'Northside', 'Southside', 'West', 'Wicklow' and circles on Inner City and Bray and Greystones overlaid by authors.

1.2. Aims and research questions

We investigate sociophonetic variability in coda /t/ in DubE, which has been given limited scholarly attention since [7] and [8], with the exception of [4]. In doing so, we aim to contribute to descriptions of present-day IrE, and to the understanding of /t/ variability in English varieties and IrE more generally [see also 1]. Our broader future aim is to investigate a population of Irish migrants who have moved to Australia (see [9]) and how their production of /t/ may have changed over time. To do so, we first need to establish a baseline of the sociophonetics of /t/ in present-day Irish English.

We pose the following research questions:

1. What patterns of /t/ variability are found in present-day DubE?
2. What effect do extralinguistic (i.e. gender, location, age) factors have on /t/ variability in DubE?

2. Method and materials

The first author, a native speaker of IrE from the west of Ireland, collected the data in 2019 in Dublin with 21 DubE speakers (11 female; 10 male), born and raised in or near the city. It was imperative to collect data from different parts of the city, as previous research indicates the presence of at least three dialects within the city: Northside, Southside and Inner City DubE [4, 5, 10]. Eight participants were from the Southside (SS in the participant codes), eight from the Northside (NS), three from Terenure, to the south-west (W) of the city and two from satellite towns in the neighbouring county of Wicklow (WW; see Table 1). Data on the participants’ residence history, gender (self-reported), and language background was recorded via a demographic questionnaire.

Table 1: Table of participants by place of residence and (self-reported) gender. Note: Wicklow not in metro Dublin, but part of the Dublin commuter belt (see Fig.1).

	Female	Male	Total
Northside (NS)	4	4	8
Southside (SS)	7	1	8
West (W)	-	3	3
Wicklow (WW)	-	2	2
Total	11	10	21

Five of the Northsiders were recorded in their own homes or in the home of a neighbour and the remaining 16 participants were recorded on a Southside university campus. They were recruited through a local research assistant based at the university, and through snowballing the first author’s personal networks. Participants were students ($n=16$) or professionals ($n=5$), with a mean age of 26 (range: 18-57; $SD=10$). Age at the time of recording is also represented in the participant codes in the format ParticipantNumber_Location_Gender_Age (see section 3.1.1).

Participants were asked to read aloud a wordlist of 60 real words with varying lexical frequency with three consecutive repetitions (e.g. *hat hat hat*). They were requested to take a short pause between repetitions and between wordlist items. They also completed other tasks not reported on here, such as a sociolinguistic interview, a nonce word learning task, and a social network and community orientation task. We draw on 17 /hV(r)t/ items from the wordlist with differing preceding vowel environments (*bite, boat, boot, bought, bout, hat, hate, heart, heat, het, hit, hot, hurt, hut, let, put, that*), resulting in 1,133 tokens (54 per speaker; one token excluded due to ambiguity). We note that *hot* appeared erroneously a second time in the printed wordlist, leading to six *hot* tokens per speaker.

Sound files were uploaded to *Webmaus* [11] with the corresponding wordlist text file for autosegmentation, and then exported into *Praat* textgrids [12]. Each token was subject to an auditory and visual analysis (acoustic profiling; see [13]), with the corresponding spectrogram inspected in *Praat*. Coding, conducted by author 1 and a subset checked by author 2, was bottom-up and data-driven, with 13 categories established and operationalized (Table 2) with the aid of the definitions in [1, 14].

Table 2: Categories of /t/ found in the dataset, with corresponding definitions and distributions. Percentages rounded to one decimal place.

Category	Definition	%
Fricated [t]	A fully fricated variant, described as “identical to the underlying [t] in everything but its closure, and it can thus be labelled as a voiceless apico-alveolar fricative” [1: 730]	45.6%
Fricated +voiced	As above, with some evidence of voicing, not necessarily throughout	
Fricated +stop	Fricative quality, followed by stop characteristics	
Aspirated stop [tʰ]	A period of closure followed by aspiration (h-like release)	41.7%
Aspirated stop +dental [tʰ]	As above, with dental stopping	
Pre-glottalized	Stops with glottal activity and unreleased supralaryngeal closure	5.6%
Affricate(d) [tʃ]	/t/ closure followed by /s/-like release (not aspirated), no burst-like characteristics	7.1%
Affricate +aspirated stop	Affricate quality, followed by stop characteristics and aspiration	
Dental fricative [θ]	A full fricative that is dental in nature	
Glottal stop	Evidence of complete glottal closure, with no apparent supralaryngeal closure characteristics	
Ejective	Typically a period of (glottal) closure followed by release of the supralaryngeal gesture, evident as a period of ‘silence’, with a second release coinciding with glottal opening	
Ejective +affricate	Evidence of both laryngeal and supralaryngeal closure and ‘spikes’ in the spectrum which correlate with burst intensity (the ejective), followed by /s/-like characteristics	
Ejective +dental	Ejective characteristics, with evidence of dental closure	

3. Results

The majority of tokens, over 87%, were either fricated [t] or aspirated stop [tʰ], including related categories of fricated+voiced, fricated+stop, and aspirated stop+dental (Table 2). Other categories included a pre-glottalized variant, an affricate [tʃ] and a related affricate+aspirated stop variant, and a glottal stop. There were also ejective variants and related categories of ejective affricate and ejective dental.

Table 3: List of wordlist items and distribution across /t/ categories, ordered by frequency of frication. Percentages rounded to one decimal place. ‘Other’ category includes the seven last categories listed in Table 2.

	Fricated (%)	Aspirated stop (%)	Pre-glottalized (%)	Other (%)
<i>bought</i>	61.9	28.6	4.8	4.8
<i>bout</i>	57.1	28.6	9.5	4.8
<i>put</i>	55.6	28.6	4.8	11.1
<i>boat</i>	52.4	36.5	6.3	4.8
<i>hat</i>	52.4	28.6	11.1	7.9
<i>heat</i>	50.8	39.7	3.2	6.3
<i>hot</i>	50.8	34.1	4.8	10.3
<i>that</i>	47.6	42.9	4.8	4.8
<i>boot</i>	46.0	44.4	6.3	3.2
<i>bite</i>	44.4	44.4	4.8	6.3
<i>hate</i>	44.4	41.3	4.8	9.5
<i>hut</i>	42.9	38.1	4.8	14.3
<i>hit</i>	38.1	46.0	7.9	7.9
<i>heart</i>	35.5	61.3	0.0	3.2
<i>let</i>	33.3	52.4	4.8	9.5
<i>het</i>	28.6	61.9	4.8	4.8
<i>hurt</i>	28.6	58.7	7.9	4.8

3.1.1. The fricated variant

Overall, 45.6% of the data were fricated [t̪], constituting the largest category (see Fig. 2 for an example). The word *bought* was most likely to be fricated (61.9% of the time), and *het* the least likely (28.6%; see Table 3). Other lexical items with high (52%+) rates of frication were *bout*, *put*, *boat* and *hat*. Three younger speakers, 062_SS_F_21, 064_SS_F_21 and 071_WW_M_27, had a 100% frication rate for all 54 of their tokens. The average frication rate per speaker was 45.5%, but four speakers had no fricated variants, e.g., 065_W_M_19 with 94% pre-glottalization, and 074_NS_M_18 with 66.6% aspirated stop and the remainder affricate variants. The grammatical word *that* was fricated 47.6% of the time (see [1] for a comparison of frication in lexical and grammatical words in IrE).

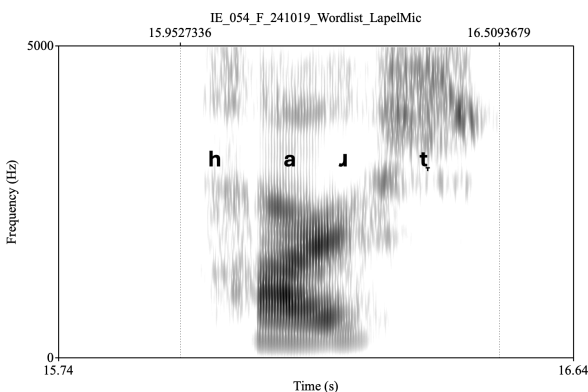


Figure 2: Production of “heart” by speaker 054_SS_F_21, where /t/ is fully fricated (no evidence of closure).

While lexical frequency may play some role in the degree of frication observed, it would likely be a weak link. For example, the least frequent word in the data, according to frequency

measures in the Oxford English Dictionary, is *het*, and this also has the least frication, while the most frequent word in the database (grammatical *that*) ranks in the middle of our observations for frication. The word which has the most frication is *bought*, and this has a relatively high lexical frequency (5th highest in the data set). However, *bout* has the second highest amount of frication, but it is also second lowest in terms of lexical frequency. It may instead be that phonetic context promotes frication more than lexical frequency, as the first four highly ranked words in terms of frication begin with labial consonants followed by rounded vowels (*bought*, *bout*, *put*, *boat*), and words with close front unrounded vowels have less frication overall (such as *hit*, *let*, *het*).

3.1.2. The aspirated stop variant

The next most common category was the aspirated stop, at 41.7% (Table 2). *Het* was most likely to have the aspirated stop (61.9%) and *hat* one of the least likely (28.6%; Table 3). Other words with high (52%+) rates of aspirated stop were *let*, and the two words containing /t/ following a rhotic, *heart*, and *hurt*. Two older speakers had a 100% rate of aspirated stops: 069F_SS_45 and 070F_NS_57.

3.1.3. Other variants

The remaining 12.7% of variants in the dataset were distributed among eight categories, including pre-glottalized (5.6%) and affricate (2.7%). Both of these categories were restricted to a few speakers, with just four speakers using affricate variants, the most common of which were *let* and *hut* (both at 9.5% of variants), and three speakers using pre-glottalized or glottal stop variants, the most common of which were *hat* (11.1%) and *bout* (9.5%). There were at least two pre-glottalized variants for each lexical item across the dataset except for *heart* (Table 3).

3.1.4. Extralinguistic factors influencing /t/ frication

As well as investigating the distributions of /t/ variants, we also examined the effect of three extralinguistic factors on rates of frication: gender, location and age.

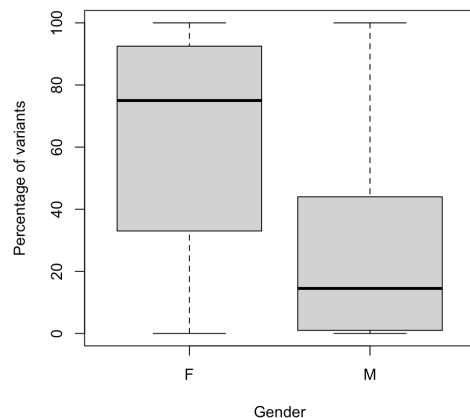


Figure 3: Variation in /t/ frication by gender.

Fig. 3 shows that female IrE speakers had significantly more fricated variants (mean=61.6%) as compared to men (27.8%)

(one-way ANOVA ($F(1)=4.42$, $p<0.05$), although with considerable interspeaker variation. Male speakers, on the other hand, were more likely to use aspirated stops (48% of their data versus 36% for females) and the more marginal variants reported in Table 2, including affricates. The pre-glottalized tokens (Table 2) were produced exclusively by the males.

Fig. 4 shows that speakers in the West have the lowest frication rates (mean 21%) and the highest rates are among Wicklow (61.1%) and Southside speakers (55.3%), again with considerable interspeaker variation. A regression analysis found no significant differences by location, but we note that the numbers of participants in the West ($n=3$) and Wicklow ($n=2$) are comparatively few. We note that all of our participants in the West and Wicklow were male (Table 2), so this needs to be considered when interpreting the gender differences in Fig. 3.

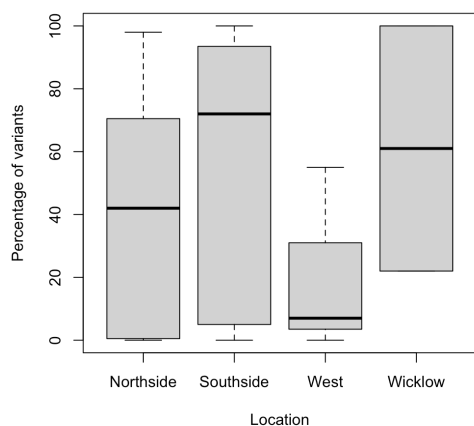


Figure 4: Variation in /t/ frication by location.

A Pearson correlation analysis showed that age and frication were weakly negatively correlated ($r(19) = -0.2$, $p=0.37$, i.e. younger participants have somewhat but not notably higher frication rates), while noting that our sample is skewed towards younger participants.

4. Discussion

Our findings reveal 13 categories of /t/ across 1,133 tokens, with the majority of tokens being either the fricated or aspirated stop variants. We find alignment with [1] that fricated variants are particularly common in IrE pre-pausal contexts, or at the ends of prosodic phrases, noting that our participants took a pause between each of their three repetitions of the tokens. We found a voiced fricated variant, as documented for the first time in [1], but no examples of the glottal fricative [h], noting that [h] may be restricted to particular lexical items in IrE, such as *Saturday* [1] or *scarlet* [4]. We also found three categories of ejective, with ejectives being noted in [1] but not in [4]. This could be related to the effect of the wordlist task, but ejectives have also been observed in Australian English, where the patterning is sociophonetic rather than task driven [14]. Furthermore, previous work on IrE may have collapsed categories, with e.g. [4] reporting just one fricated category (compared to three in the present study) across a similar number of speakers and tokens.

As regards the sociophonetic patterning of /t/, our findings align with [4] whereby fricated variants appear to be the new endonormative standard among young Dubliners, with this phenomenon being particularly widespread in the Northside and Southside/Wicklow communities, rather than other areas such as the West (see also [5] for lack of frication in Inner City speakers). We have also shown that certain prevocalic environments appear to favour frication, including the monophthong *bought* and the diphthong *bout*, which warrant further investigation and may possibly be due to vowel type. Other lexical items, such as *het*, were favoured with the aspirated stop variant, suggesting a word frequency effect (*het* is a comparatively rare word, potentially eliciting careful production), noting that it also patterned differently to *let*, which had a lower rate of aspirated stop (Table 3).

5. Conclusion and future outlook

Our future research aims to investigate the role of voice quality, particularly creak in the pre-glottalized variants [see 1, 14], as well as word frequency effects, and the same participants' spontaneous speech [see 1]. We also plan to compare with a sample of Irish migrants in Australia to see whether their patterning of /t/ is similar to what is represented here, or whether it changes after extended exposure to Australian English (see [9]), which typically has lower levels of frication (with particular acoustic characteristics [15]) and higher levels of aspirated stop and glottal stop [14]. This is particularly worthy of a comparative investigation since previous authors have speculated that the presence of fricated /t/ in Australian English may be linked to an Irish origin [16]. Finally, further investigation over a larger dataset is required to tease apart any direct interactions between stop categories, lexical frequency and phonetic context.

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