



THE UNIVERSITY *of* EDINBURGH
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MA (Hons) Linguistics

**“The thing about [hɪŋ]: Production, perception and
qualitative data from (th):[h] in Edinburgh speech”**

Honours Dissertation

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Sound Files

All the recorded sentences associated with the perception questionnaire section of my experiment can be found at:

<https://soundcloud.com/s1217013/sets/perceptionquestionnaire>

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1. Introduction

This study reports [h] realisations and perceptions of (th) in female speakers from Edinburgh. The notation (th) is used to encapsulate linguistic realisations and sociolinguistic perceptions of /θ/ and its variant forms. My findings come from production data in pairs of speakers in different styles of speech, as well as perceptual data in the guise of grammaticality judgements. The grammaticality judgements are based on a recorded Edinburgh native performing (th):[h]. The participants split into *Communities of Practice*, and at an individual level, produce (th):[h] at differing rates in different interview contexts. This variation also stands in the self-reporting of their (th):[h] production as a result of my perception questionnaire.

Previous descriptive (e.g. Grant, 1913; Macafee, 1983; Jones, 2002) and quantitative research (Stuart-Smith & Timmins, 2006; Clark & Trousdale, 2009; Lawson, 2014) has found (th):[h] to occur almost exclusively in two morphemes, *thing* and *think*. In the ‘working class’ males studied, [h] realisations of these morphemes are often the most common out of [h], [θ] and [f]. However, analysis of (th) variation is geared towards TH-fronting, or (th):[f], so there is a lack of perceptual and ethnographic research on (th):[h]. This study seeks to address that gap.

Section 2 outlines existing research into (th):[h] in Scotland. Section 2.1 introduces descriptive accounts of the [h]-variant and contemporary opinions of its usage. It presents results from later quantitative research on its distribution. Section 2.2 outlines the phenomenon of ‘TH-fronting’, 2.3 relates analyses of (th):[h] as lenition and 2.4 takes into account another area of theoretical phonology – token frequency. Sections 2.5 and 2.6 focus on identity, the make-up of Edinburgh’s population, and what (th):[h] means to a given speaker. Section 3 is the methodology of my research – where I collect conversational, word-list and perception data. Section 4 presents the results of my research. Section 5 compares my findings to those in the current literature, its implications in relation to linguistic theory, indications of further research that could be done into (th):[h], as well as some concluding remarks.

2. Background

2.1 Descriptive and quantitative accounts of (th):[h] in Scotland

One of the earliest attempts to phonetically describe and transcribe English in Scotland appeared in Grant’s (1913) work. He makes no reference to variation in /θ/ either in his description of fricative consonants or three phonetic transcripts (of *thing*(x2) and *something*). It is reasonable to assume

this is not because [h] was not extant as a variant, but that the author considered such forms to be “Scottish dialect and should be avoided” (Grant, 1913: 40). Derisive opinions similar to Grant’s on non-standard speech in Scotland, Glasgow in the following case, prevail into the late 20th Century. Mackie (1978) states that “Edinburghers...are beginning to talk like their Clydeside opposites” (p.16) in that they make “cavalier treatment of *th* in Glasgow’s peculiar dialect” (p.18). The book contains examples of “hink” (for *think*) in popular usage.

There is reason to believe that [h] is a long-standing variant in Edinburgh. Macafee, in her work describing the speech sounds of Glasgow (1983), states that speakers may have “/h/ for /θ/, e.g. *think...something*” and that “these forms are widespread in Central Scotland” (p.33). A similar position is taken by Jones (2002) who reports “substitution of [h] for [θ] in words like ‘nothing and ‘something’” (p.78) in Edinburgh. In opposition, Chirrey (1999) suggests that there is variation in age in (th):[h] use in Edinburgh, noting that (th) is only “very occasionally realised as [h] word-initially by older speakers” (p.438). There is agreement, however, that *think* and *thing* and their derivations and inflections are the morphemes with [h] as a variant. This is often referred to as a ‘localised’ or ‘traditional’ variant (Stuart-Smith & Timmins, 2006; Stuart-Smith et al., 2007; Clark & Trousdale, 2009; Lawson, 2014). It is therefore possible that (th):[h] is a Scots feature.

Quantitative work in the 21st Century by Stuart-Smith and Timmins on ‘working-class’, younger males in Glasgow (2006), and Clark and Trousdale in the West Fife High Pipe Band (WFHPB) corpus (2009) show that [h]-realisations of *thing* and *think* (and their inflections and derivations) are very common. The words attested to have [h] realisations are *thing*, *thingmy*, *thingwy*, *thingummy*, *thingummyjiggy*, *things*, *thingd*, *thingwys*, *think*, *thinks*, *thinking*, *something*, *nothing*, *awhing* (Fife only), *anything*, and *everything*. There are two isolated occurrences of an [h]-realisation in *birthday* (14 total tokens) and *three* (62 total tokens) in Stuart-Smith and Timmins’ data (2006). Tables 1 and 2 below summarise Stuart-Smith and Timmins’ (2006) and Clark and Trousdale’s (2009) data relevant to (th):[h]. Stuart-Smith and Timmins’ data comes from two sets of sociolinguistic interviews, one in 1997 and another in 2003. There is a non-significant fall of 2.4% in the total amount of [h]-realisations in all word-medial /θ/-words from 73.9% to 71.5% between these years. This figure includes those with no attested (th):[h] word-medially, showing how frequently the *thing* compounds occur. The change in rate of (th):[h] production between 1997-2003 shows that it remained stable in diachrony.

Table 1	Stuart-Smith and Timmins – Glasgow			Clark and Trousdale – West Fife		
Word	Frequency	No. [h]	% [h]	Frequency	No. [h]	% [h]
Think*	302	214	71%	1521	843	55%
Thing*	193	139	72%	478	344	72%
Something	197	184	93%	413	120	29%
Nothing	75	61	81%	100	73	73%
Anything	73	61	84%	130	65	50%
Everything	26	25	96%	157	63	40%
<u>Awthing</u> **	0	0	N/A	7	7	100%
Three	62	1	2%	245	0	0%
Birthday	14	1	7%	20	0	0%

**think* and *thing* are inclusive of all inflected forms

Table 2	Stuart-Smith and Timmins & Clark and Trousdale combined		
Word	Frequency	No. [h]	% [h]
Think*	1823	1057	58%
Thing*	671	483	72%
Something	610	304	50%
Nothing	175	134	77%
Anything	203	126	62%
Everything	183	88	45%
<u>Awthing</u> **	7	7	100%
Three	307	1	<1%
Birthday	34	1	3%

***awthing* is a Scots form only attested in Clark and Trousdale's (2009) data with 100% (th):[h] realisations. It has an alternative spelling of *a'thing* (The Scottish National Dictionary, 2005) indicating that it may be a (th) word.

From Tables 1 and 2, all *thing* and *think* forms – including the compounds – are realised the majority of the time with the [h] variant across both datasets. In fact, all of the word-medial (th):[h]-patterning words in Clark and Trousdale's corpus are realised with [θ] less than 10% of the time (2009). The other >90% of realisations of *something*, *everything*, *nothing*, and *anything* are with [h] or "more reduced variants of (th), e.g. [ʔ] and the 'zero' variant (2009:41)". Stuart-Smith and

Timmins (2006) only coded for [θ], [f] and [h]. Word-initial *thing* and *think* forms clearly have [h] as a majority [h]-realisation – 72%. As do word-medial derivations of *thing* where [h]-realisations amount to 89% of the total. The one [h]-realisation, or 3% of all realisations, of *birthday* likely indicates that it was a speech error or an inaccurate transcription.

Whether *three*, and other *thr*- cluster words, have [h] variant forms is a matter of debate. Its phonological environment, word-initial, is in-keeping with [h]-distribution in *think* and *thing*. However, some descriptive accounts and empirical data suggest that it is either rare or not possible. Aitken, in his writings on Scots, reports debuccalisation in “[hri:] for *three*” and its presence of “ancient Scottish origin (1982:39; see also Chirrey, 1999:438)”. This relates to more recent descriptions of [h] as localised and traditional vernacular. However, other descriptive accounts of speech in Scotland’s Central Belt (incorporating Edinburgh and Glasgow) define the realisation of /θ/ in “*three*” in various ways. Robinson (1999), in specific reference to Edinburgh, and Clark and Trousdale (2009) state that [ʃi] is a valid realisation – the palatal fricative [ʃ] has assimilated in place of articulation with the coronal [ɹ]. Wells (1982:410) has a similar analysis with both the palatal [ʃ] and retroflex [ʂ]. He points out that this form is “strongly stigmatised (1982:410)”. Descriptive accounts for the last 50 years (McAllister, 1963; Macafee, 1983; Wells, 1984; Chirrey, 1999) also describe a possible [ɹi] realisation – [ɹ] being a voiceless alveolar approximant. The explanation for this may reside in allophones of /h/ being determined by the phonetic effects of the prosodic environment in which they appear (Pierrehumbert & Talkin, 1992; Ellis & Hardcastle, 2002:377). This is seen elsewhere in English where the /h/ in ‘huge’ (British English - /hjudʒ/) assimilates with the yod ([hɹ]) before the /u/ to be realised as [ɹjudʒ].

Stuart-Smith and Timmins (2006) count one incidence of [h] in *three* in their data (2%), while Clark and Trousdale (2009) count 0 from 245 tokens in their WFHPB corpus (see Tables 1 and 2). This is related to both the descriptive account of [ʃi] being a valid realisation (Clark, 2009; Robinson, 1999), as well as their transcription protocol. Clark counts 23 tokens (9%) of *three* with a [ʃ]-realisation in the WFHPB data (*personal communication*). Clark and Trousdale consider “the pre-onset /r/ context to be a different context of variation (2009:39)”. This is an insightful analysis which explains the much lower frequency with which (th):[h]/[ʃ]/[ɹ] occurs in this pattern. It also takes into account the much lower word frequency of *three* (307 – both corpora) in comparison to *thing* (671) and *think* (1,823).

2.2 'TH-fronting'

Another 'non-standard' /θ/-strategy attested in Scottish speakers is TH-fronting, or (th):[f]. The phenomenon is widespread across many British dialects, especially among 'working class' younger males (Kerswill, 2003). It is possible that (th):[h] is at an interface with TH-fronting. Stuart-Smith and Timmins (2006; *see also* Stuart-Smith et al., 2007) observed a significant rise in (th):[f] tokens in all word-positions between their 1997 and 2003 corpora – 8% (p.174). They also state, however, that "TH-fronting is constrained by...distribution of the existing [frequent] variant [h]" (p.179). TH-fronting is well-studied in Central Scotland. There has been research undertaken in a multitude of approaches: Frequency-motivated change (Clark and Trousdale, 2009), the influence of the media (Stuart-Smith et al., 2007), social networks and identity (Lawson, 2014), and a cross-dialectal study between London and Edinburgh (Schleef & Ramsammy, 2013). According to ethnographic data from Glasgow, 'TH-fronting' signals an identity of 'toughness' (Lawson, 2014). From these studies, it is apparent that [f] is supplanting [θ] – but not [h] – in contexts including the phonological environment (Stuart-Smith & Timmins, 2006), lexical frequency (p.179), or morphological complexity (Schleef & Ramsammy, 2013).

Many acoustic correlates have been used to measure the acoustic differences between fricatives in English and in cross-linguistic variation. Jongman et al. (2000) found that there are only minimal differences between [f, v] and [θ, ð] in average noise duration (3ms), noise amplitude (0.7dB), and spectral peak location (7,503Hz and 7,678Hz) in English. In Toda, a Dravidian language, Gordon et al. (2002) found that [f] and [θ] have only minimal differences in average centre of gravity (4,268Hz and 4,111Hz) and similar spectral characteristics. They found variation in average duration measurements between males and females, but only at segmental transitions. In contrast with the minimal differences found in the studies outlined above, differences between interdental fricatives and sibilants are far more profound (Jongman et al., 2000; Gordon et al., 2002).

As for [h], the differences are yet greater according to Jongman and colleagues (2000). They consider this segment as the voiceless counterpart to a vowel segment (p.195). The transcription of *thr*-segments as [ɹ̥ɹ-] is supported by this viewpoint – the voiceless [h] has assimilated in place of articulation with the following [ɹ], also yielding a percept of post-alveolar frication [ɹ̥]. Turk et al. have a similar view. They suggest that [f] and [θ] both have weak frication at low amplitudes, and that [h] is "notoriously difficult to identify (2006:14)". It takes on characteristics of surrounding segments and does not have clear points of onset and release.

Figure 1 below shows three spectrograms and spectra of an Edinburgh-born speaker pronouncing *thing* (left column) with [θ], [f] and [h] realisations, and *anything* (right column) with [θ], [f] and [h] realisations:

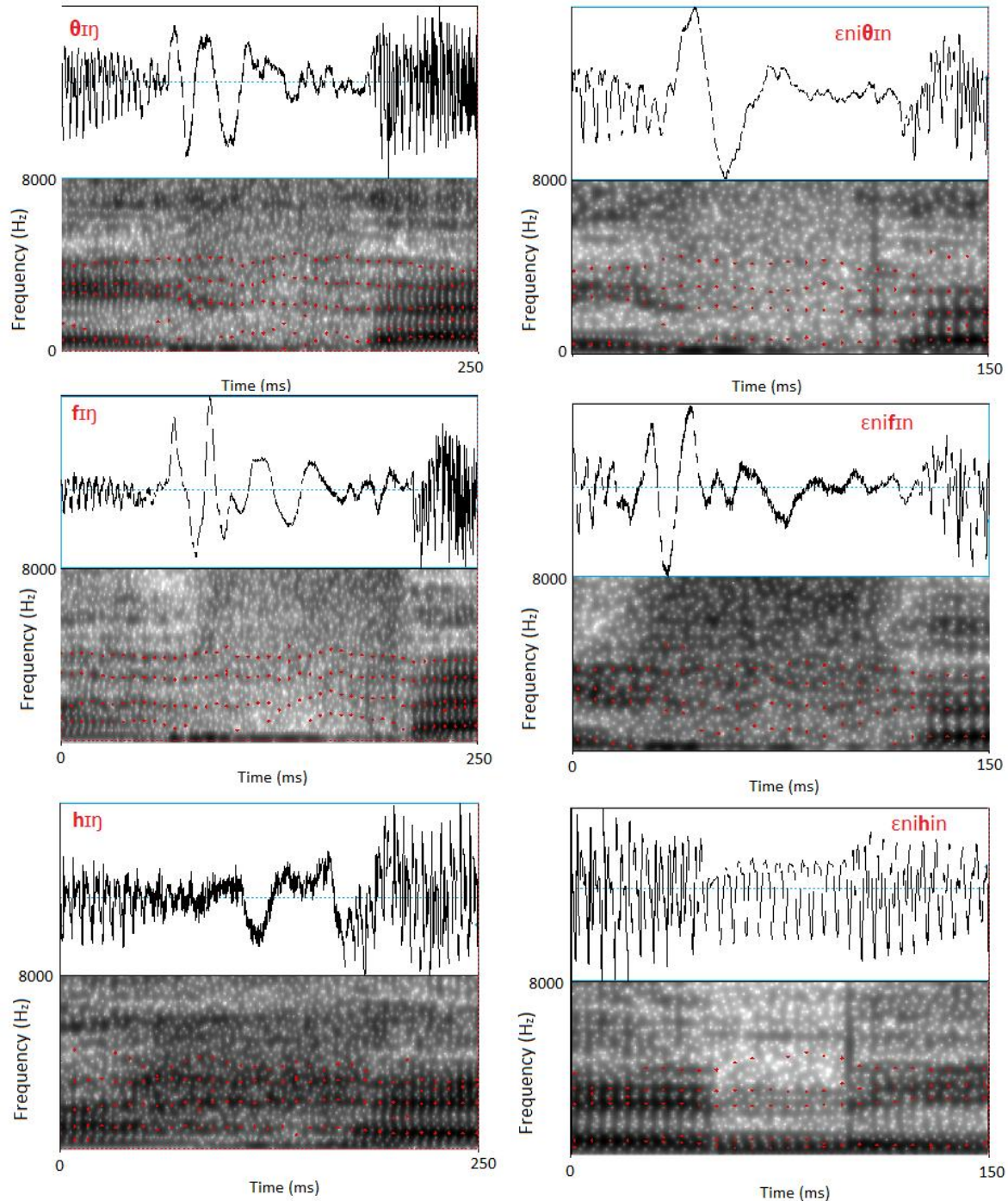


Figure 1: Spectra (top half) and spectrograms (bottom half) of fricative segments, word labelled in red text. The red dots indicate the formant tracks (F1-4). The spectrograms were generated in Praat (Boersma & Weernink, 2007).

Note the similarities in the top two rows of spectra and spectrograms. The [θ] and [f] segments both have similar waveforms and display frication noise at similar frequencies. This is in contrast with [hɪŋ] (bottom left) which has higher intensity frication at lower frequencies (darker colour on spectrogram), as well as a clearer continuation of formants F1, F2 and F3. The ‘vowel-like’ nature of [h] (Turk et al., 2006) is even clearer in [ɛniɦɪn] (bottom right). The [h]’s wave periodicity is vowel-like in its regularity, though the amplitude is smaller – indicating less intensity. The paler colour in the spectrogram also contributes to the analysis of this segment having less intensity than the surrounding vowels.

2.3 Lenition and Debuccalisation

The phonological change, either in synchrony or diachrony, where the voiceless dental fricative [θ] changes to the voiceless glottal fricative [h] can be described as ‘debuccalisation’. Debuccalisation is usually seen as a lenition process (Lass, 1984). [θ]→[h], in an analysis accepting lenition, would be described as a ‘weakening’, ‘sonorisation’, or ‘opening’ (Lass, 1984; Honeybone, 2012). In [θ]→[h] debuccalisation, the segment weakens in the guise of the loss of its oral specification, while the laryngeal specification remains the same – voiceless (McCarthy, 1988). Lass’ lenition trajectory (1984) schematises lenition processes. Within this trajectory (see Figure 2), the [θ] in Scottish speech would be in position 3a, and the ‘debuccalised’ [h] in position 2a.

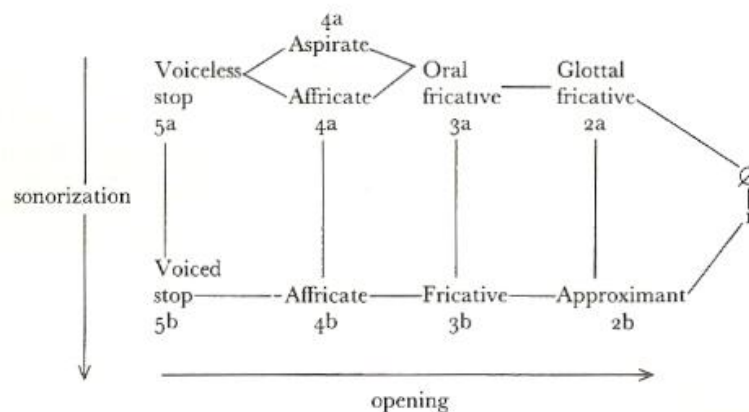


Figure 2: Lass’ lenition trajectory (1984:178). Sound change following either arrow (‘sonorisation’ or ‘opening’) counts as a lenition process here.

From the morphemes attested to have (th):[h] variants in Central Scotland, it is clear that there is not a straightforward debuccalisation change occurring. There is a restriction to the morphemes *thing* and *think*, rather than a complete sound change of [θ]. Ségéral and Scheer (2008) also observe that lenition in English often occurs in syllable codas, or word-finally where there is a single

obstruent in the coda. The attested (th):[h] forms in Scotland occur word-initially (e.g. *thinking*, *things*) and word-medial, syllable-initial position (e.g. *nothing*, *something*) which may also be intervocalic (e.g. *anything*, *everything*). These are not well-attested positions for lenition, particularly word-initially (Ségéral & Scheer, 2008; Honeybone, 2012). However, as Stuart-Smith and Timmins (2006) point out: There is “a general phonotactic restriction on /h/ word finally in most accents of English” (p.178), which includes all of Scotland (Wells, 1982:412). Lenition does not have clear phonological correlates which makes its precise nature difficult to define. From case-to-case it may be metrical, prosodic, segmental or a combination of these factors (Bye & de Lacy, 2008). The indication that (th):[h] in Central Scotland does not follow the general predictions and observations of lenition (or debuccalisation) suggests that there may be other factors influencing this phonological alternation.

2.4 Frequency and Theoretical Phonology

There is a wide range of standpoints relating to the role of token frequency in phonological change. One proponent of frequency-motivated change is Bybee (2001) whose theory suggests that the highest frequency words propagate change. Pierrehumbert (2002) has a stronger claim: She states that the rate of phonological change is greater in higher frequency words (p.118) and this leads to gradient change over time. As observed in Stuart-Smith and Timmins’ (2006) and Clark and Trousdale’s (2009) data, the most frequently occurring (th) words – the morphemes *thing* and *think* – undergo the change [θ]→[h], but there is no evidence of any other lexical item undergoing the same change. Moreover, Stuart-Smith and Timmins’ (2006) finding that the alternation is stable in diachrony may indicate that Bybee (2001) and Pierrehumbert’s (2002) theories are tailored to ‘changes-in-progress’ (for this variant, see Clark, 2014) like TH-fronting.

Bermúdez-Otero and his colleagues (2016) tested theories of frequency-motivated change with data from ‘/t/-glottaling’ in Manchester. This case is similar to (th):[h] in that it is also a case of debuccalisation, and – in word final position at least – the [t]→[ʔ] change is stable (Bermúdez-Otero et al., 2016) amongst Manchester speakers. Their findings suggest that, instead of gradient change led by the most frequent tokens, lower and higher frequency tokens are increasingly glottaled at the same rate in parallel. This analysis does not seem to fit current data for (th):[h] either. Only the highest frequency (th) tokens in two morphemes exhibit an alternation involving [h]. This range of different findings matches Labov’s standpoint. From extensive data in his ‘Atlas of North American English’ (Labov et al., 2008), token frequency only significantly correlates with some of the phonological changes that he describes. He suggests that other factors must be analysed in order to

explain phonological change – particularly social factors (Labov, 2006: 511 *in* Clark & Trousdale, 2009).

2.5 Identity in Edinburgh

One measure of social variation in a particular geographical area is the make-up of its population. In terms of demographics, data from the UK-wide 2011 census (National Records of Scotland, 2011) shows that Edinburgh differs from Scotland as a whole in a variety of indicators.

Table 4 shows the degree of ‘Scottish’ identity reported in the city of Edinburgh, as well as Scotland as a whole:

Table 4 – figures are a proportion of the area’s population	Edinburgh	Scotland
“Any Scottish identity”	70.5%	82.6%
Speaker of Scots	21.3%	30.1%

Indicators purporting to Scottish identity are around 10% lower in Edinburgh than Scotland. Table 5 shows figures which reflect the social make-up in terms of indicators often used by sociolinguists (*c.f.* Labov, 1966; Milroy & Gordon, 2003:40-42) to delineate social class. This includes the division of professions into ‘working-class’ and ‘middle-class’ professions, where ‘middle-class’ (‘white-collar’ Labov’s work) in the 2011 census roughly translates to ‘professional occupations’. Another indicator of social status is the proportion of the population with a university-level qualification (*c.f.* Labov, 1966)

Table 5 – figures are a proportion of the area’s population	Edinburgh	Scotland
Professional Occupations	50.2%	37.8%
University-level qualification	41.4%	26.1%

Again, both of the figures traditionally purporting to ‘middle-class’ identification are around 15% higher in Edinburgh than the national average.

2.5.1 Identity and Predictive Power

These figures from census data provide a basis for making predictions about language use there. The indicators in Tables 3 and 4 in particular are of direct relevance to predictions that can be made about the patterning of (th):[h]. As noted, many scholars refer to the [h] variant as ‘traditional vernacular’ (Aitken, 1982; Stuart-Smith et al., 2007; Lawson, 2014). This may signify that the amount the proportion of (th) realised as [h] may be lower in Edinburgh compared to other areas of Scotland, due to the 8.8% lower proportion of the population who report as Scots speakers.

The [h]-variant is also seen as indexing ‘working-class’ identity (Stuart-Smith et al., 2007; Macaulay, 2014). Lawson (2014) states that, by extension, indexing of ‘working-class’ also indexes “notions of ‘roughness’ and ‘toughness’” (p.86). From Table 5, both indices of ‘middle-class’ are 15% above the national average. This suggests that Edinburgh has a much larger ‘middle-class’ population, and it is expected that a smaller proportion of the population is likely to use the [h]-variant.

It is important to remember that linguistic variation is more multi-faceted than grouping of speakers by social status, age, or gender among many other variables. Cheshire (1997) points out that non-standard variants can differ in usage compared to other non-standard variants within the same dialect. She states that social networks, groups of speakers in a similar ‘Community of Practice’ (henceforth CofP) (Eckert & McConnell-Ginet, 1992), often vary in their production of certain variants in order to identify themselves as members of a certain group. This variation is missed by Labovian sociolinguistics – where socioeconomic indicators stratify speakers along lines which may appear artificial (Milroy & Gordon, 2003:41). Milroy states that the remedy to this is to “plot *individual* speakers’ language *multidimensionally*” (Milroy, 1987:115), and to pay particular attention to the CofP.

2.6 Ethnographic investigations of (th)

Lawson’s work on (th) has a strong focus on the CofPs of ‘working-class’ adolescent males (2009; 2014). This is known as the ‘Third-Wave’ approach to variationist sociolinguistic research (Lawson, 2014), where the study of paralinguistic features and indexes of group membership are seen with the same importance as tokens of language production. Lawson (2009) takes a ‘bottom-up’ approach (p.74). He teases apart three CofPs from a Glasgow high school: ‘Neds’ – associated with ‘roughness’ and violence, ‘Sports’, and ‘Alternative’ – outside the mainstream of schoolyard popularity. Each of these three groups produced (th) in markedly different ways. Table 6 shows the rate of (th):[h] word-initially and word-medially in the attested *thing* and *think* morphemes:

Table 6	Ned CofP	Sports CofP	Alternative CofP
Initial (th):[h]	100%	85%	26%
Medial (th):[h]*	100%	98%	53%

* I interpreted (th):[h] from Lawson's data as [h], [ʔ], or zero tokens (*c.f* Robinson, 2005; Clark, 2009:126).

Lawson (2009; 2014) describes the Ned CofP's categorical usage of (th):[h], particularly word-initially, as matching that group's dynamic. He suggests that "[h] is an important way of indexing Glaswegian-ness" (Lawson, 2014:88) and this – in turn – has implications of a 'tough', 'hard-man' identity (p.86). A connection with 'Glaswegian' identity is backed up by the notion of [h] deriving from traditional vernacular (Aitken, 1982; Stuart-Smith et al., 2007). This contrasts with the low-usage (26%) of word-initial (th):[h] in the Alternative CofP. Lawson states that this group orientates itself away from the Ned CofP and towards the 'establishment' – the school. The 'rejection' of the [h] variant and higher usage of the [θ] variant indexes their allegiance to the establishment, as well as notions of the 'middle-class' or 'poshness' (Lawson, 2014:88). The idea of standard tokens having negative connotations of 'poshness' among adolescents is backed up in Stuart-Smith and her colleagues' work (2007). They state that [x] in *loch* and (th):[θ] in TH-fronting contexts are avoided by groups which construct "specific, locally situated identities" (Stuart-Smith et al., 2007:255; Lawson, 2014) that are generally anti-establishment or anti 'middle-class'.

Clark and Trousdale's (2009) WFHPB data on (th) is also considered part of the 'Third Wave' (Macaulay, 2014). This particular pipe band is a CofP which incorporates males and females, but is fairly socioeconomically homogenous (Clark, 2014). The corpus was made up of friendship groups within that CofP (Clark & Trousdale, 2009:37; Clark, 2014) which reflect the social networks within. Many of Clark's participants stated that the usage of non-standard variants (including (th):[f,h]) in their speech was an indicator of 'talking rough' (2009:155). This follows on from Lawson's (2014) findings that the [h]-variant has anti-establishment connotations.

Both of these studies found interesting variation in the groups that produce (th):[h]. They also demonstrate that it is important to look beyond labels of 'social class', age, and gender. By descriptive (*e.g.* Wells, 1982) and pre-'Third Wave' quantitative studies (Stuart-Smith and Timmins, 2006), (th):[h] was already recognised as an index of 'working-class', traditional Scottish speech. Ethnographic studies (Clark, 2009; Lawson, 2009) show that its use is more nuanced, that this variant is used to reflect certain aspects of group membership (Lawson, 2014).

2.7 Research Questions

This investigation centres itself around two research questions:

- 1) What is the patterning of (th):[h] in Edinburgh speech?
- 2) How do Edinburgh natives perceive (th):[h]?

The first question sets out to plug the gap of quantitative data on the rate of (th):[h] in Edinburgh, since Schlee and Ramsammy's study (2013) focused on TH-fronting in the city and only presented data for (th):[θ,f]. The second question seeks to question what exactly (th):[h] indexes in a given speaker in Edinburgh, and whether they regard it as a local variant.

2.7.1 Predictions

Based on the data and descriptive accounts outlined in this section, a few predictions can be made about the presence and distribution of (th):[h] in Edinburgh. I predict that, because (th):[h] is quantitatively widespread in West Fife (Clark & Trousdale, 2009) and Glasgow (Stuart-Smith & Timmins, 2006) – particularly among 'working-class' CofPs (Lawson, 2014), it will also be widespread in the Edinburgh 'working class'. This is because of its cultural (*e.g.* Mackie, 1978; Robinson & Crawford, 1999) and geographical proximity to other regions in Central Scotland, the presence of (th):[h] in descriptive accounts (*e.g.* Macafee, 1983; Jones, 2002), and the identification of (th):[h] as 'traditional *Scottish* vernacular' (Aitken, 1982; Lawson, 2014).

The indications made by the census data (see Section 2.5), that Edinburgh's population shows signs of being predominantly 'middle-class', has a variety of implications: Edinburgh speakers may use (th):[h] less frequently, due to its indexing of 'working-class' (Macaulay, 2014). Additionally, speakers might not perceive (th):[h] to belong to the vernacular of a 'middle-class' city. I expect that the speakers who use (th):[h] will be those with a more 'anti-establishment', anti-'middle-class', or anti-'posh' identity (*c.f.* Stuart-Smith et al., 2007; Lawson, 2014).

The perception of non-standard variants, I predict, will follow the judgements found in the WFHPB corpus (Clark, 2009) – that using (th):[h] is a characteristic of 'talking rough'. I anticipate that (th):[h] will be readily identifiable to Edinburgh speakers in the limited contexts in which it occurs, due to the very high token frequency of *thing* and *think* (Stuart-Smith & Timmins, 2006) in speech.

3. Methodology

In order to answer my research questions, data was collected in Edinburgh under interview conditions.

3.1 Participants

Data were collected from six females aged 20 and 21 years old, at a variety of classroom locations around Edinburgh. None of these speakers have auditory or speech impairments. All six participants are from traditionally 'working-class' areas of Edinburgh (*c.f.* Robinson & Crawford, 1999) in the north (around Granton) and east (around Craigmillar) of the city. This is shown in the map in Figure 3 below, where darker pink shading indicates a greater level of socio-economic deprivation in a given ward (SIMD, 2012).

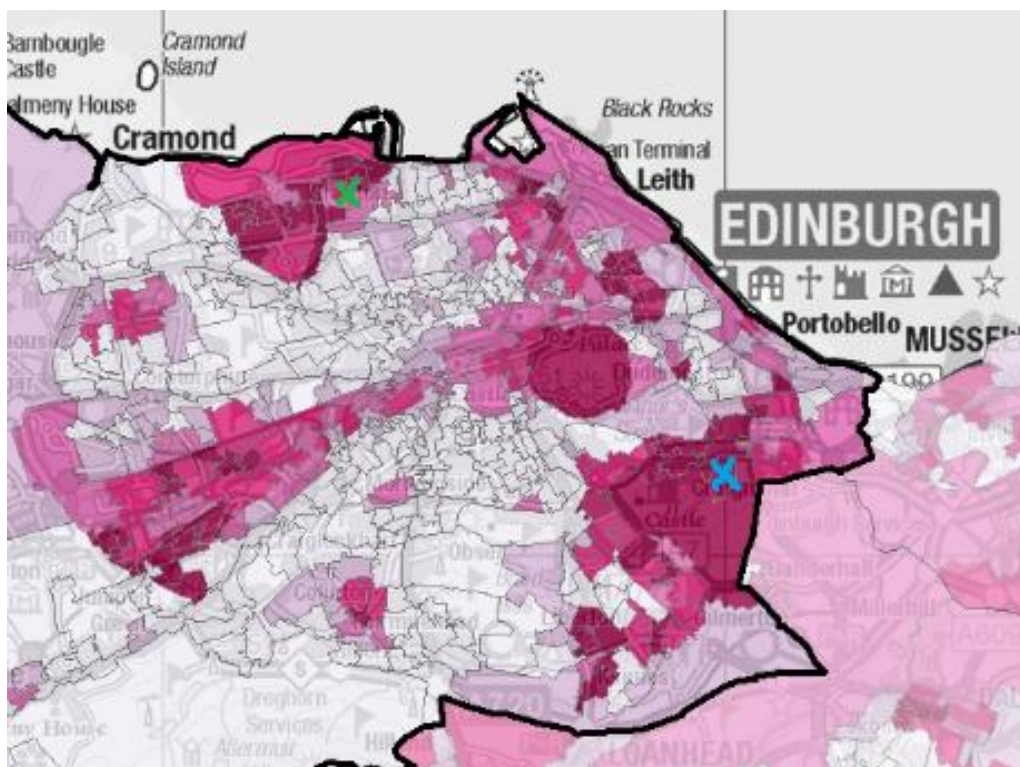


Figure 3: Map of urban Edinburgh superimposed with data indicating the most deprived areas of the city. Deep pink = 20% most deprived areas. The green 'x' locates Granton and the blue 'x' locates Craigmillar. (Adapted from: SIMD, 2012)

The participants were interviewed in self-selected pairs in an attempt to elicit as natural speech as possible. This method was also chosen to avoid accommodation effects (Giles & Powesland, 1975, 1997) of the interviewer's Standard Southern British English (SSBE) speech as much as possible.

The ‘Snowball’ method of recruitment was used to find pairs of participants. This works by the social contacts of each pair possibly being recruited and, in turn, their own social contacts as well (this method is described in greater detail by Milroy and Gordon (2003)). This form of quota sampling was chosen to ensure that there are an adequate number of participants available from similar socio-economic backgrounds. Watt, Llamas and Johnson (2014) used this method in their work on the Scottish/English border which yielded interesting sociolinguistic data as well as their data on the variation of postvocalic /r/. The randomness within the sampling process has been sacrificed, but this means that more independent variables can be tested (Thomas, 2011:12).

At least one member of each pair was a social contact of my own, and many of the participants have social connections with one another. This shows a relative degree of success in the sampling process, and is shown in the social network diagram below in Figure 4:

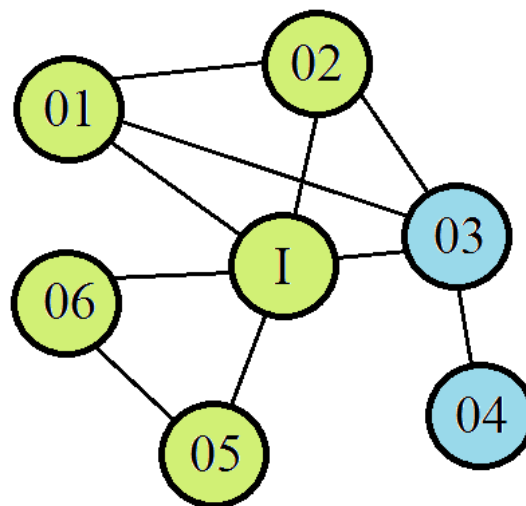


Figure 4: Social network diagram of myself (I) and participants 01-06. The shading of each circle represents a CofP: Blue – Edinburgh College, Green – University of Edinburgh.

Figure 4 shows the recruitment locations of my participants. These were the University of Edinburgh in the city centre and Edinburgh College in Brunstane, on the eastern edge of the city. This roughly divides participants 01, 02, 05 and 06, and participants 03 and 04 into two CofPs – ‘university’ and ‘college’. There are five miles of geographical distance between them. Comparing CofPs allows for further areas of ethnographic investigation (c.f. Eckert & McConnell-Ginet, 1992; Mendoza-Denton, 2008; Lawson, 2014).

3.2 Materials

Following Labov's seminal work on the varying degrees of *attention paid to speech* (1972), there were various elicitation techniques used on the participants. Firstly, the participants were presented with a questionnaire. This contains questions pertaining to their own identity and speech. Next, the participants are encouraged to converse freely around four broad topics. These involve issues related to speech and identity in Scotland, as well as other Scottish social issues important to the conversational pair. This allows for metalinguistic analyses of Edinburgh's speech as a whole, before the interview becomes more focused on (th):h. All (th) tokens spoken here were included in a corpus of natural speech from all participants.

The second half of the experiment involves the elicitation and perception of /θ/ and its variants. Firstly, each participant read 44 words. The given conversational partner was asked to leave the room while the other reads the list in order to reduce effects of accommodation between the dyad, or having access to the word-list before its recitation. Next, each participant heard 15 sentences in a perception questionnaire which all have a (th):[h] realisation. The voice they heard was a 21 year old female speaker native to Edinburgh.

3.2.1 Questionnaire

The questionnaire was formatted to yield yes/no binary responses from the participants. There is opportunity to give additional information where it might be necessary for additional qualitative analyses. The questions are as follows in Figure 5:

Figure 5: The four questions presented to participants

- 1) Would you say that you are from Edinburgh?
- 2) Have you ever lived outside of Edinburgh for longer than five years?
- 3) Would you say you speak with an Edinburgh accent?
- 4) Do you consider yourself a speaker of Scots?

While these questions ensure the correct participants have been recruited, they also seek to discover how strong a sense of 'Edinburgh' identity exists there. It was necessary to include question 4 about Scots because, as noted earlier, [h] is often seen as a traditional Scots vernacular form.

More natural conversation follows the questionnaire. The conversational pairs were steered towards four broad topics by the interviewer. This section should last approximately ten minutes, as many accounts state that speakers settle into a more natural style after five or so minutes (Buchstaller et

al., 2013). This method was also chosen because of recent assessments of variationist elicitation techniques. Boyd and colleagues (2015) conclude that self-recording is the most effective, as there is the lowest level of interference from non-participants. Macauley (2014) shares this viewpoint, when referring to the two corpora collected for Stuart-Smith and Timmins' work (2006). He states that without an investigator present, "a quality of speech much superior [is collected] to that generally obtained in interviews" (Macauley, 2014:22). As this is not feasible in guided conversation, the dyads converse freely on the four topics outlined below in Figure 6.

Figure 6: Guided conversation topics

- 1) What major issues does Scotland face at the moment?
- 2) What does it mean to be someone from Edinburgh? What sets people from Edinburgh apart from everyone else?
- 3) Is there a specific Edinburgh accent? In what ways do people from Edinburgh speak differently from others in Scotland? Are there several ways of speaking in Edinburgh?
- 4) Has Edinburgh speech changed in any way during your lifetime?

These topics were chosen to elicit a qualitative perspective from the participants on the linguistic landscape in Edinburgh. The forms participants produce themselves will be tested quantitatively. Seeking this type of analysis is typical of a 'Third-wave' approach to interspeaker variation. It drew inspiration from Schilling-Estes' (2004) work on different ethnic communities in North Carolina. Her insights into the participants' perception of local language usage were strongly predicated on the topics discussed during her sociolinguistic interviews. Topics 2-4, in particular, give scope for speakers to demonstrate forms particular to Edinburgh – as well as their perceptions of them.

3.2.2 Word list and perception questionnaire

The choice of (th) words for both the word list and the recorded words presented to the participants during the perception test are based on a similar rationale. I devised five patterns (th) words can follow. It includes whether the word has an attested [h] variant ("a") or does not ("b") in Stuart-Smith and Timmins' (2006 – Glasgow) or Clark and Trousdale's (2009 – Fife) data. The words are also divided into the position (th) occurs in the word – initial ("1"), medial ("2"), or final ("3"). These categories are clarified in Table 7 below:

Attestation	Position		
	Initial	Medial	Final
Attested	1a	2a	N/A
Unattested	1b	2b	3

Table 7: Word patterns based on [h]'s occurrence

The 44 words in the word list comprised of four words from each category (1a-3) introduced above, as well as 24 distractor words. These distractor words contained at least one fricative. The motivation for this part of the survey was to ensure the collection of (th) tokens from a wide variety of words. In particular, these word lists may include certain tokens which are infrequent and may not occur in a short period of natural speech (Boyd et al., 2015). The words, belonging to each category and the distractors, were chosen quasi-randomly from the Scottish Corpus of Text and Speech (SCOTS) (Kay et al., 2003). The only constraint on frequency in the distractor words was at least one occurrence in the SCOTS corpus. It is not possible to match frequency distribution between pattern 1a and 2a words with pattern 1b, 2b, and 3. This is because of the phenomenon where the highest frequency words seem to be the only ones which undergo (th):[h]. The word list is shown in full below in Table 8, the 'pattern' of (th) words is shown in brackets. The participants were presented with each word in a randomised order, where the words appear on a screen one-by-one. They remain on the screen for two seconds each, and the participants were instructed to read the word aloud as soon as they saw it.

Table 8 – Word List	Think (1a)	Things (1a)	Thingy (1a)	Thinking (1a)	Everything (2a)	Anything (2a)	Something (2a)
Nothing (2a)	Thick (1b)	Theme (1b)	Thanked (1b)	Three (1b)	Athlete (2b)	Plaything (2b)	see-through (2b)
Ethics (2b)	Birthday (2b)	Maths (3)	Worth (3)	South (3)	Both (3)	Loch	December
August	West	Retch	Handy	Hanging	Witch	Ahead	Eleven
Zebra	Celebration	Farm	March	Therefore	Aimless	Street	Alive
Outside	Laugh	Vision	Varsity				

During the perception questionnaire, the participants were asked to perform a 'grammaticality judgement task'. 15 sentences were recorded by a speaker native to Edinburgh. All of the sentences' (th) words were realised with [h], regardless of their attestation in previous data. This stage of the experiment is similar to the Northern English and Scots, Phonology and Syntax (NESPS) project

(Buchstaller et al., 2013:95) where participants read sentences written with non-standard variants. By using recordings in my experiment, the risk of varying orthographic interpretation was mitigated.

Unlike the word list, the number of sentences from each category is not balanced. This is because of the desire to test similar prosodic environments with near minimal pairs to the previously-attested *thing* and *think* morphemes. A full list of the recorded sentences is shown in Figure 7 below. The sentences were presented in a randomised order.

- 1a They sell nice **things**
- 1b They sell nice **thongs**
- 1a You were **thinking** all day long
- 1b You were **thinning** all the paint
- 1b You were **thanking** all the parents
- 1a The wire **things**
- 1b The wire **thins**
- 1b You have to go **through** it
- 1b I'll have **three** of them
- 2a **Something** gentle
- 1b Some **thin** gentleman
- 2a Is there **anything** ready?
- 1b Is there any **thin** red ribbon?
- 3 They've lost **faith**
- 3 It's **north** of here

Figure 7: The 15 recorded sentences. The pattern of each sentence is labelled – prosodically-paired sentences are listed concurrently.

After hearing three repetitions, each participant will judge the grammaticality of the highlighted word – with a (th):[h] realisation – on a three-point scale. Scales of this type, where there is a distinct ‘neutral’ midpoint score, have previously been effective in measuring perception data in Scottish dialectology (Tichenor, 2012; Buchstaller et al., 2013). The options presented to the participants are shown in Figure 8:

- 1 – [word], with this pronunciation, is normal for me.
- 2 – I am familiar with [word] being pronounced like this, but I wouldn't do it very often.
- 3 – I would never pronounce [word] like this.
- 1 ----- 2 ----- 3

Figure 8: The three-point scale provided after every recorded sentence

The materials are presented in this order because the variable I am testing, (th):[h], becomes increasingly apparent to the participant throughout the interview.

3.3 Procedure

The recordings took place in various classroom locations in Edinburgh. Quiet locations were chosen to prevent background noise disrupting the audibility of tokens. The interviews were recorded with a Marantz Professional PMD661 solid-state recorder and its internal microphone at a sampling rate of 48kHz and 16-bit amplitude resolution. The example sentences were recorded on the same device, but with headset microphone. This ensured that the sound quality was clearer for presentation in the perception questionnaire, and that the quality of the spectrograms in Figure 2 was better.

3.4 Data Analysis

In all speech styles, every (th) token produced was recorded in the data in accordance with Labov's *principle of accountability* (1972). To examine the (th)-variants produced in natural conversation, I performed a first-pass of each conversation to find all (th) tokens. I then made an auditory judgement of each token and whether each was produced with [θ], [f] or [h]. I used Robinson's (2005) definition of [h], where she "collapsed [h] and zero" into one category (Clark, 2009:126). I also included [ʔ] in this category. In order to perform statistical tests, I collapsed [θ] and [f] into one category 'oral', leaving [h] as the 'non-oral' category. This is similar to Schlee and Ramsammy (2013), who omitted all [h] tokens in their work in order to perform statistical tests on TH-fronting. These categories were used to transcribe tokens from both the conversations and word lists.

From the word list, there were 126 (th) tokens (21 from each participant). A total of 18:10 of conversation was recorded in three interviews. The mean interview length was 6:03. In this duration, a corpus of 70 (th) tokens was created. Each participant produced between 6-24 (th) tokens and a breakdown of this will be included in the results. As for perceptual data, a total of 90 grammaticality judgements (15 from each participant) were recorded.

In order to perform statistical tests on the perception data, I conflated judgement scores 1 and 2. Scores of 1 and 2 indicate that a (th):[h] variant is familiar to the participant, if not used by themselves. This is in contrast to a score of 3 which indicates that (th):[h] is ungrammatical in a given word.

The relatively small sample size of six participants allows me to perform interspeaker analyses on both production and perception of (th):[h]. It also allows me to focus on qualitative factors, such as metalinguistic comments made by the participants about speech in Edinburgh (*e.g.* Eckert & McConnell-Ginet, 1992; Clark, 2009). The demarcation of speakers into the two CofPs (see Figure 4) may provide further areas of comparison on an interspeaker level.

4. Results

In this section, I present findings on the six participants' self-identification, followed by production data from word list-style speech. Next, I present more 'natural' production data from the 18 minutes of conversation, followed by perception data from the perception questionnaire.

4.1 Questionnaire and self-identification

The first three questions in the questionnaire section unanimously received the same responses. All six participants stated that: 'yes' they were from Edinburgh, 'no' they had not lived away from Edinburgh for a period of five years or longer, and 'yes' they speak with an 'Edinburgh accent'. There was variation in the answers for the final question, however. Participants 01, 02, 03 and 04 all identified as speakers of Scots. Participants 05 and 06, as a conversational pair, and a part of the 'university' CofP, did not identify as Scots speakers. Scots speakers therefore represent two-thirds of participants, which is triple the average for Edinburgh residents (see section 2.5).

4.2 Production in the word list

Of the elicited 126 (th) tokens in word list-style, 125 (99.2%) were produced with the [θ] variant. One (0.8%) token was produced with a [h] variant in the unattested, pattern 3 word 'maths', produced by participant 04. It is unclear whether this was a speech error, word-final lenition, assimilation with the following [s], or (th):[h].

The word 'loch' was included in the word list. As mentioned by Stuart-Smith and colleagues (2007), it has [x] and [k] as two variants which index 'middle-class' (p.253; Lawson, 2014:88) and 'anti-establishment' respectively. It is related to (th):[h], as [x]-production is indicative of Scottish vernacular (Stuart-Smith et al., 2007). The production of 'loch' in the word-list data is interesting: Participants 03 and 04, from the 'college' CofP, produced [k] whereas the other participants from the 'university' CofP produced [x].

4.3 Production in conversation

Between word list and conversation speech-styles, I performed a χ^2 -test and found there to be a significantly higher rate of (th):[h] in conversational speech ($p=0.03$, $N=192$). However, the proportion of [h] tokens in both styles is relatively low. (th):[h] represent 0.8% of the tokens in the word list and 5.7% of the tokens in conversation, 6.8% if (th) is restricted to *thing* and *think* morphemes. A comparison between speech styles is shown in Table 9 below:

Table 9: no. (th):[h] tokens	Oral	[h]
Word List	125	1
Conversation	66	4

A corpus of all recorded (th) tokens produced in conversation is shown in Table 10. It contains 70 tokens in total. The ‘pattern’, the (th) word position and attestation of a [h] variant, as described in Table 7, is included.

Table 10: Conversation Corpus			Oral		Non-Oral
Word	Pattern	Freq.	[f]	[θ]	[h]
Think	1a	41	1	36	4
Thing	1a	6		6	
Things	1a	6		6	
Anything	2a	4		4	
Something	2a	4		3	
Thinking	1a	2		2	
Author	2b	1		1	
Both	3	1	1		
Everything	2a	1		1	
Forth	3	1		1	
Thought	1b	1		1	
Thunder	1b	1	1		
Wealth	3	1		1	
TOTAL		70	4	62	4

The corpus data show that *think* is the only word produced with (th):[h] by any of the participants. Not only is this word attested to have a [h] variant, it occurs with by far the highest token frequency – 58.6% of all (th) tokens. The contexts where (th):[h] realisations of *think* occurred were all after

first person pronouns: ‘I think’ (x3) and ‘we think’. All of the non-attested (patterns 1b, 2b and 3) (th):[h] tokens occur as *hapax legomena*, with only one realisation each in the corpus. As seen in ‘TH-fronting’ data, (th):[f] is unconstrained by morpheme and word-position. It appears here in *think*, word-initially (*thunder*), and word-finally (*both*).

4.3.1 Interspeaker conversation analysis

There is variation in the rate of (th) variant production between participants, as well as between the two CofPs. Participants 03 and 04, from the ‘college’ CofP, are the only two participants who exhibit (th):[h] in conversation, but do at different rates to one another. Table 11 shows the number of (th) tokens each participant produced, as well as the rate at which they produced each (th) variant.

Table 11	Oral		Non-Oral	TOTAL
Participant	[f]	[θ]	[h]	
01	1	10		11
02	1	6		7
03		13	2	15
04	2	3	2	7
05		6		6
06		24		24
All Participants	4	62	4	70

Figure 9 is the graphical representation of the information in Table 11, showing the proportion of each variant produced from all six participants’ (th) tokens. The total amongst all participants is also shown.

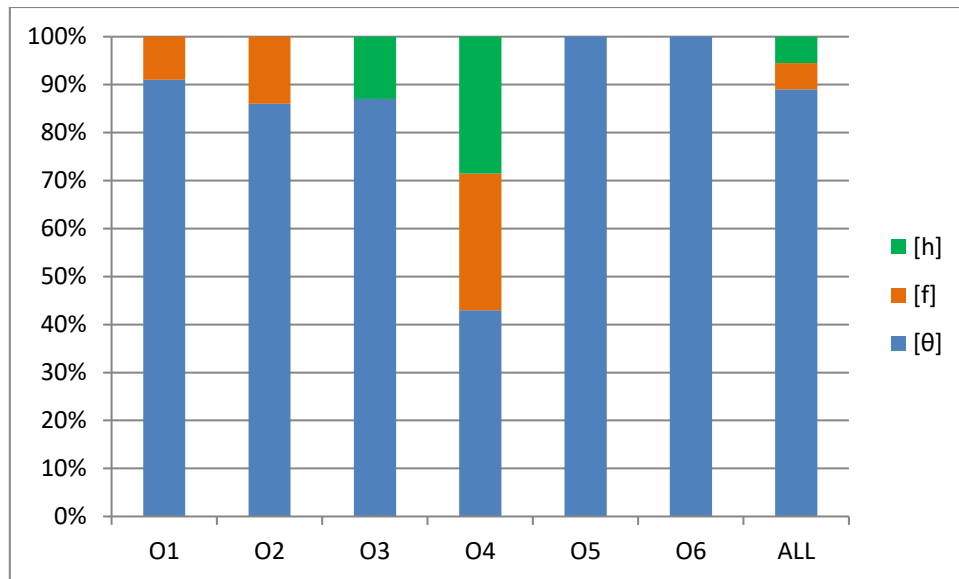


Figure 9: Each participant's (th) variant production expressed proportionally. The proportion amongst all participants shown. Each variant is shaded a different colour, as shown in legend.

Figure 10 is in the same format as Figure 9, but only includes the 64 attested (th):[h] words from the corpus – described in Table 7 as pattern '1a' and '2a'.

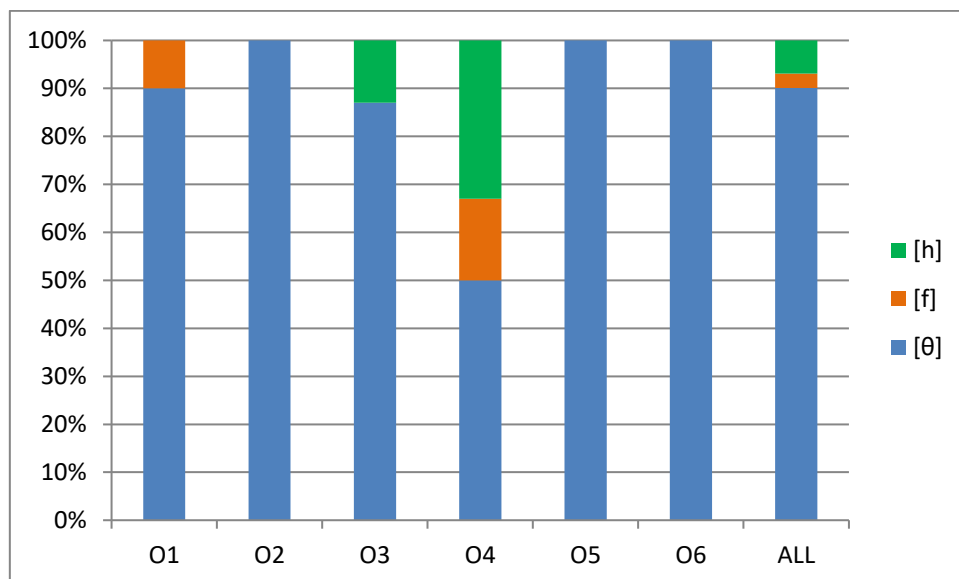


Figure 10: Each participant's (th) production expressed proportionally. Only the attested (th) *thing* and *think* morphemes shown. Each variant is shaded a different colour, as shown in legend.

As is clear from the green shading of the bars in Figures 9 and 10, participants O3 and O4 produce [h] variants in their conversation, and the other four participants from the 'university' CofP do not. The difference is significant, shown by performing a χ^2 -test where $p=0.002$ ($N=70$). I then performed

another χ^2 -test of non-oral vs. oral (th) production, but this time grouping participants into those who do, or do not, identify as Scots speakers. The difference was not significant ($p=0.07$, $N=70$).

4.4 Perception of (th):[h]

Having six participants and 15 recorded sentences divided into four patterns (1a, 2a, 1b, 3) means a detailed analysis can be achieved. First, I present all six participants' grammaticality judgements for each recorded sentence, divided along the lines of pattern of word-position and attestation. Then, I present each participant's proportion of judgements for each (th) pattern.

4.4.1 Word-position and attestation analysis

For pattern 1a (initial-attested (th):[h]), the vast majority (88.9%) of judgements suggest that (th):[h] realisations are acceptable in these sentences. This includes ratings 1 and 2 which state that (th):[h] is either recognised or produced by the participant. Each participant's judgement for each 1a-pattern sentence is shown in Figure 11 below, as well as the average number of each grammatically judgement-score across all 1a-pattern sentences.

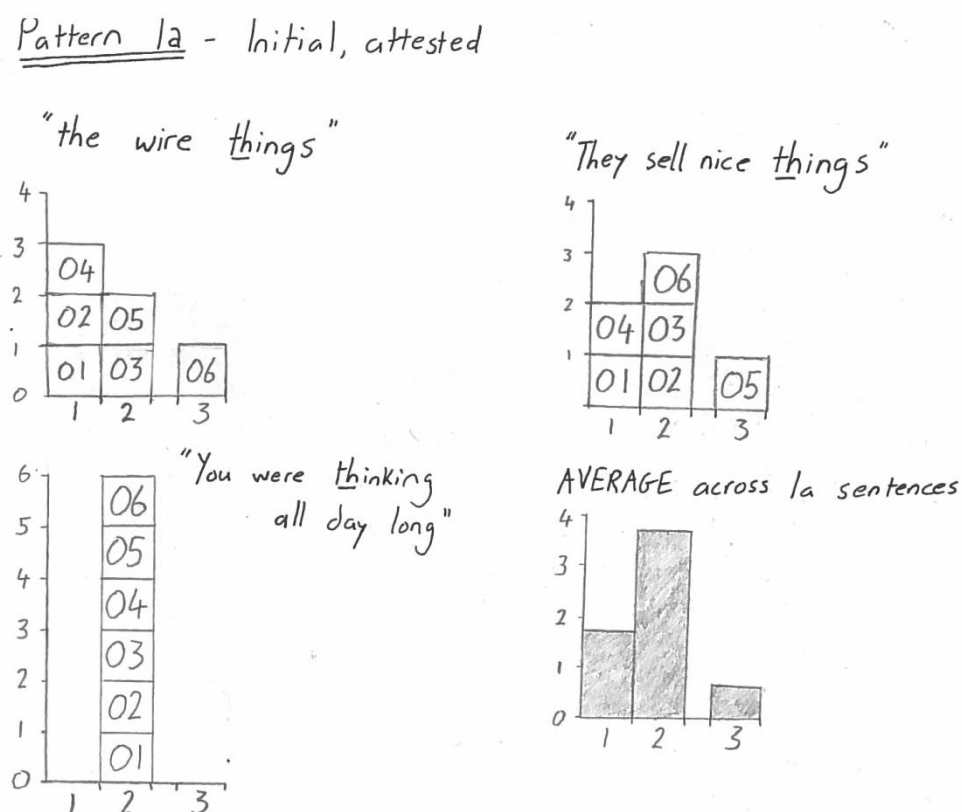


Figure 11: Grammaticality judgements for each 1a sentence (x-axis) for each participant (labelled on the bars), as well as an average value. Numbers on the bars refer to individual participants.

Figure 12 shows the ratings that each participant gave for 1b (initial-unattested) sentences. Figure 13 (directly below Figure 12) shows the 1b-pattern sentences which are *thr*- clusters, as well as averages across all participants for all the 1b-pattern sentences.

Pattern 1b - Initial, unattested

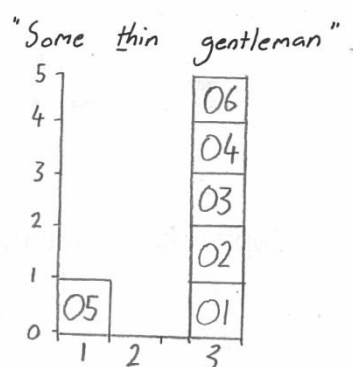
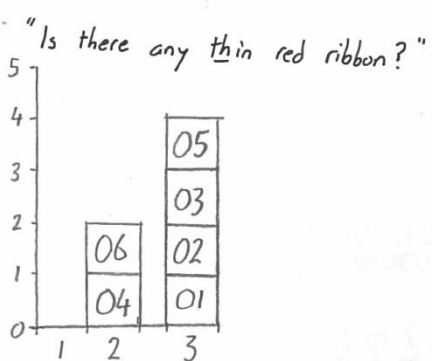
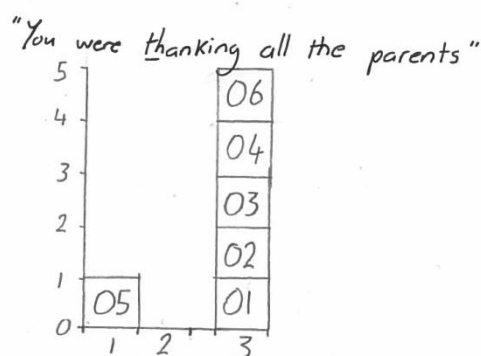
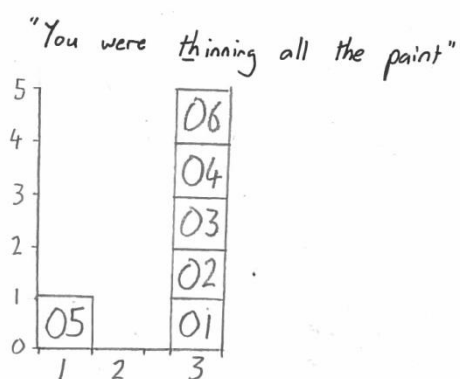
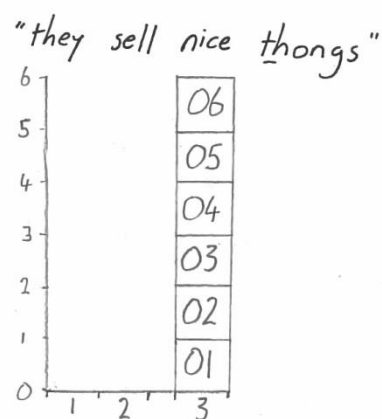
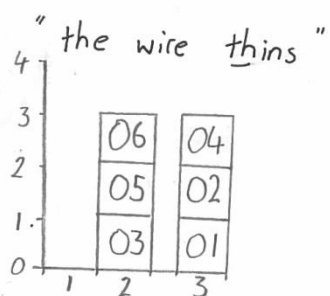
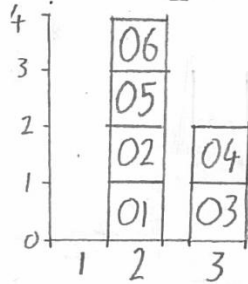


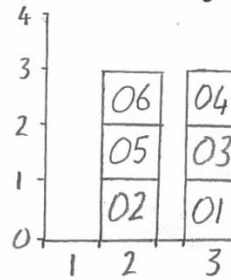
Figure 12: Grammaticality judgements for 1b sentences (x-axis) for each participant (labelled on the bars).

Pattern 1b - Initial, unattested (thr- clusters)

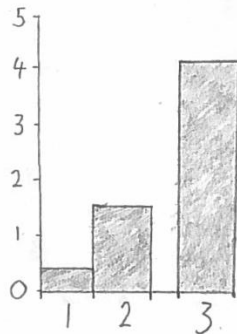
"I'll have three of them"



"You have to go through it"



AVERAGE across 1b sentences
(incl. thr- clusters)



AVERAGE across 1b sentences
(without thr- clusters)

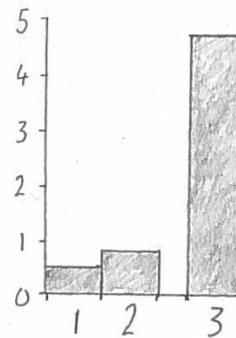


Figure 13: Grammaticality judgements for 1b sentences (x-axis) which are *thr*-clusters, as well as averages for 1b sentences – including (left) and excluding (right) *thr*-clusters.

It is possible to compare 1a and 1b sentences by looking at the distribution of grammaticality judgements in each recorded sentence, as well as the average value across all participants. Note the much higher level of '3' judgements in 1b-pattern sentences, indicating the ungrammaticality of unattested (th):[h]. In order to perform a χ^2 -test, I plotted grammaticality judgments '1/2' and '3' against 'initial-attested' and 'initial-unattested'. This is shown in Table 12 below.

Table 12 - χ^2	1-Realised/2-Recognised by participant	3 -Ungrammatical
1a – Initial, attested	16 (88.9%)	2 (11.1%)
1b – Initial, unattested	15 (31.3%)	33 (68.7%)

The difference in distribution among responses was robustly significant ($p < 0.000$, $N = 66$,) and yet more robust when *thr*- clusters were omitted from the statistical test ($p < 0.000$, $N = 54$).

Figure 14 shows the distribution of grammaticality judgements for pattern 2a words (medial-attested). Like 1a pattern, the majority of grammaticality judgements (91.7%) suggest that (th):[h] is used or recognised in these words.

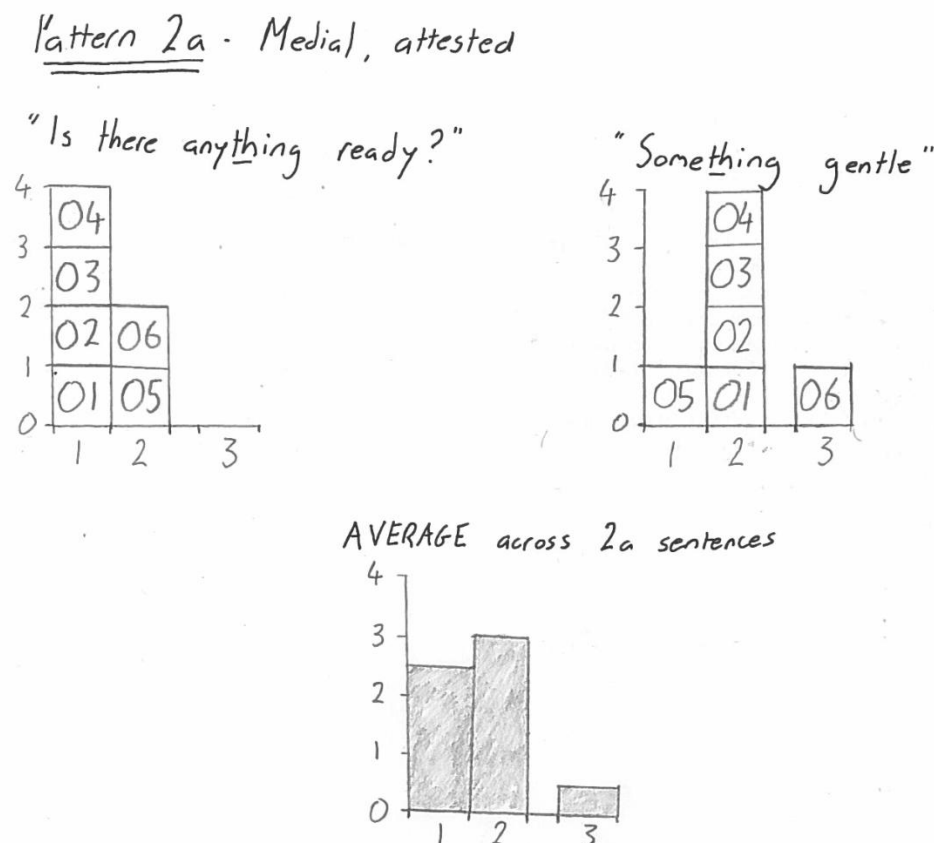


Figure 14: Grammaticality judgements for each 2a sentence (x-axis) for each participant (labelled on the bars), as well as an average value.

In order to perform a comparative statistical test on word-medial (th), I compared the two 2a sentences' grammaticality judgements with their two near-homophonous 1b counterpart sentences:

'Is there anything ready?' & 'Is there any thin red ribbon?'

'Something gentle' & 'Some thin gentleman'

The distribution of grammaticality judgements is shown in Table 13 below.

Table 13 - χ^2	1-Realised/2-Recognised by participant	3 -Ungrammatical
2a – Medial, attested	11 (91.7%)	1 (8.3%)
Counterpart 1b sentences	3 (25.0%)	9 (75.0%)

The difference in grammaticality judgements was again significant ($p=0.001$, $N=24$).

Figure 15 shows the distribution of grammaticality judgements for pattern 3 words (final, unattested). The results for this pattern are somewhat unexpected. More responses indicate that word-final (th):[h] are acceptable word-finally (58.3%), even though it is not attested in previous data.

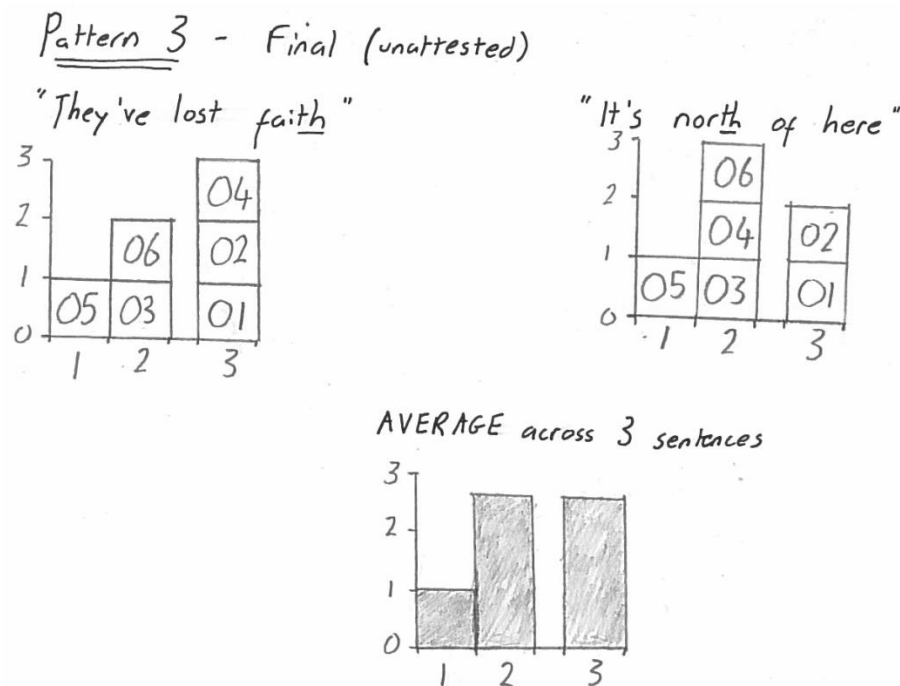


Figure 15: Grammaticality judgements for each 3 sentence (x-axis) for each participant (labelled on the bars), as well as an average value.

I performed a χ^2 -test on all 90 responses, dividing again along the lines of attestation and grammaticality judgement-score. The raw figures are given in Table 14:

Table 14 - χ^2	1-Realised/2-Recognised by participant	3 -Ungrammatical
Pattern 1a, 2a	27 (90.0%)	3 (10.0%)
Pattern 1b, 3	22 (36.7%)	38 (63.3%)

The difference in grammaticality judgements are, again, robustly statistically significant ($p < 0.000$, N=90).

4.4.2 Interspeaker perceptual analysis

Similarly to Table 14, I compared each participant's individual grammaticality judgement scores with the patterns of attestation in (th) sentences. I have also plotted each participant's grammaticality judgements as a graph, in order that a visual comparison may be made. These graphs are shown in Figure 16 overleaf.

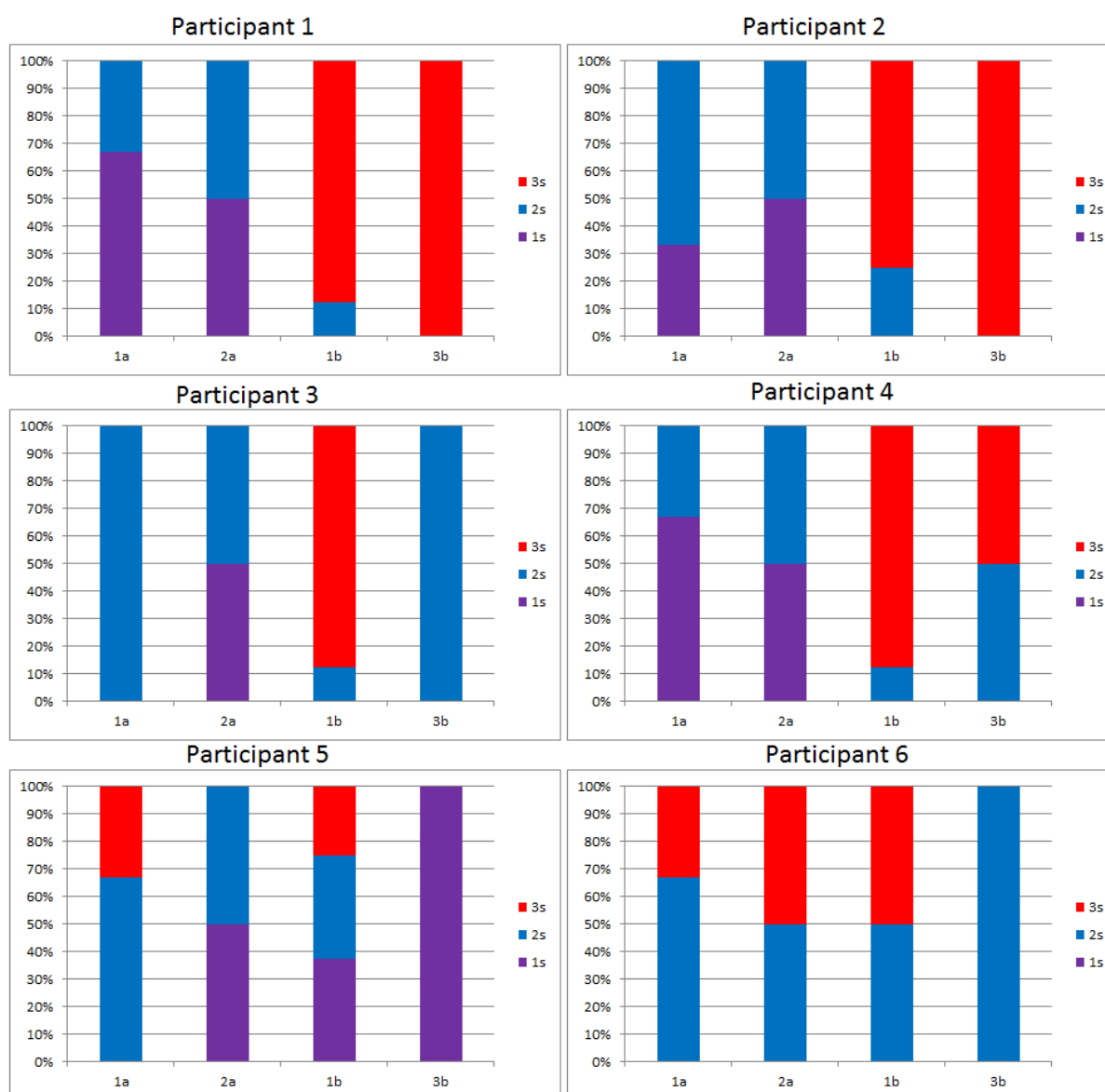


Figure 16: Each participant's grammaticality judgements, given as proportional data. X-axis – (th):[h] pattern (1a:initial-attested, 2a:medial, attested, 1b:initial, unattested, 3:final, unattested). Shading – grammaticality judgement score as indicated in the figure legend.

Participants 01-04 accurately judge attested patterns 1a and 2a to be possible in every grammaticality judgement. They also only judge unattested patterns (1b and 3) to be '3-ungrammatical' – note the absence of red shading in patterns 1a and 2a. The distribution of grammaticality judgements for Participants 05 and 06 are completely different. A higher proportion of attested (th):[h] are deemed ungrammatical by Participant 06. This is similar to Participant 05, whose judgements indicate that she normally produces (th) word-finally as [h]. No other participant gives a grammaticality judgement score of '1' to 1b or 3 pattern sentences.

I performed the same χ^2 -test as I did in Table 14, but this time for each participant. Again, I compared word-position and attestation against grammaticality judgement. The p values for each participant are given in Table 15 below, alongside some identity information:

Table 15 – χ^2			
Participant	p value (N-15)	CofP	Scots speaker?
01	0.001	University	Yes
02	0.003	University	Yes
03	0.01	College	Yes
04	0.003	College	Yes
05	1	University	No
06	1	University	No

It is possible that Participant 05 and 06's grammaticality judgements could have been made at random, as they were both at chance frequency while Participant's 01-04 were all significant. These findings are juxtaposed with the fact that Participants 05 and 06 are the only two participants to not identify as Scots speakers. This is important due to the nature of (th):[h] as a Scots vernacular variant (Aitken, 1982; Lawson, 2014), and differences in the social indices between Scots [h] and [x] (Stuart-Smith et al., 2007).

There are examples which give an indication of chance frequency grammaticality judgements for Participant 05 and 06. The bottom two graphs in Figure 12 show Participant 05 deeming 'some *thin* gentleman' ungrammatical and 'is there *anything* ready' as a form that she produces. Participant 06's scores displayed in Figure 16 show a markedly different distribution to Participants 01-04, where there is an almost 50%/50% split between scores of 2 and 3 for all attestation and word-position patterns.

5. Discussion

In relation to the Research Questions posed in section 2.7, the results of this study show a variable nature in the use, and the perception of the use, of (th):[h] in Edinburgh speech. Production-rates of (th):[h] are low in the data and restricted to the ‘college’ CofP, while the Scots-speaking participants readily observe the usage of (th):[h] in Edinburgh.

5.1 Patterning

Comparing the results across different stages of the interview – word list reading, conversations, and the perception of (th):[h] shows signs of style-shifting. Style-shifting is the notion that a speaker produces different variants dependent on their audience (Bell, 1984, 1997). The significantly higher rate of (th):[h] between reading and conversation shows that the reader is paying more close attention to their own speech (Labov, 1972), and is aware of the presence of the interviewer recording their speech (Bell, 1984, 1997). The ‘most-standard’ variant [θ] is produced in all but one of the 126 word list tokens, and this is unsurprising. Stuart-Smith points out that Scottish Standard English (SSE) is the language of literacy in Scotland (2003:113). [θ] is the only valid (th) variant in SSE, so producing ‘non-standard’ variants in carefully-monitored speech is unlikely. As for variance in [x]-production in *loch* in the word list, both [x] and [k] are valid realisations in the SSE inventory. However, a discussion of what (th) and (x) may socially index are included later.

Even though the rate of (th):[h] was significantly higher in conversation, only 6.3% of relevant (th) tokens were realised with a [h]-variant, and (th):[h] was only observed in the two participants from the ‘college’ CofP. This figure is relatively low compared with previous reports of (th):[h] rates in Fife (Clark & Trousdale, 2009) and across all CofPs in Lawson’s (2009; 2014) Glasgow study, where the lowest rate of (th):[h] was amongst the ‘Alternative’ CofP (26% initial, 53% medial). It also paints a different picture to the results of the perception questionnaire, where all but one participant purported to be producers of (th):[h] in various contexts. One explanation, similar to Bell’s idea of *audience*, is the accommodation (*c.f.* Giles & Powesland, 1975, 1997) of the interviewer’s SSBE speech, which I predicted may occur. As the interviewer, I played the role of ‘auditor’ in Bell’s paradigm, who is “known and ratified” (1984, 1997) by the speakers.

The nature of the conversations may have also played a role in the rate of (th):[h] observed. On average, the conversations were 6:03 long and conducted by an SSBE interviewer. Clark’s (2009) WFHPB corpus and Lawson’s (2014) interviews were both conducted by Scottish English/Scots-speaking interviewers, and involved extended contact periods with the speakers and CofPs.

Moreover, as pointed out by Buchstaller and colleagues (2013), short interviews of around five minutes may not be long enough to elicit natural speech (see also Boyd et al., 2015).

The low rate of (th):[h] production could be attributable to code-switching. All four Scots speakers accurately identified [h]-ful tokens in the perception questionnaire, and stated that they produced at least one (th):[h] example themselves. In fact, all four state that *any[h]ing* (sentence 3) was possible in their idiolect. This may be indicative of code-switching, which Milroy and Gordon state is in the same domain as style-shifting (2003:205). While these Scots speakers report fairly common usage of (th):[h], the rate of (th):[h] is low in the presence of an SSBE interviewer. (th):[h] is not possible in SSBE, so speakers may be less likely to produce it.

5.2 Perception

The patterns found in the data, as well as accounts for some variation, do not answer fully the question of why speakers produce (th):[h] at differing rates and in different contexts. Analyses of audience design or code-switching/style-shifting on a possible SSE-Scots continuum (c.f. Aitken, 1984) do not explain the interspeaker or CofP differences in the production and perception data.

5.2.1 “We’re the posh ones”

The conversation section of the interviews yielded interesting, and often similar, metalinguistic comments on the participants’ city. Four participants (01, 02, 03, 05) identified speech in Edinburgh as “posh”, and another four described this “posh”, ‘middle/upper-class’ speech as sounding “English”. Figure 17 below includes some comments which encapsulate those judgements:

03: *“upper class people...almost sound English”*

06: Edinburgh speech as *“kinda posh Scottish, or rougher English”*

01: *“almost English because it’s so well-spoken”*

Figure 17: Participants’ comments on Edinburgh speech

This type of comment is not new, nor is it restricted to Edinburgh. Aitken (1984) reported descriptions of ‘middle-class’ boroughs of Glasgow and Edinburgh as “talking posh”. In specific relation to (th):[h], Lawson reports one of his Glasgow speakers saying “only posh people say *think* (with [θ]) (Lawson, 2014:88)”. There seems to be a solidarity in identity across all speakers that Edinburgh speech is “posher” than other parts of Scotland, but “rougher” (Participants 01, 02, 06) than speech in England – most likely SSBE and RP. Abrams and Hogg (1987) found solidarity in comparisons between three dialects: Glasgow, Dundee and RP. They found that English accents are

perceived negatively in Scotland, especially RP. Watson and Clark's (2015) work on real-time attitudinal data showed that the SSBE speaker from Cambridge, coincidentally being the same origin as the interviewer in this study, was the only speaker judged as "posh" above a neutral level. This was in comparison to other speakers from Northern England, Wales, and Ireland.

5.2.2 Identity Constructs

Though the 'college' CofP is small, its characteristics are more easily defined than the 'university' CofP. My results show that this is the only CofP with (th):[h] production in interviews. Comments made during the conversation can help demonstrate what [h]-fulness indexes, explain variation between each member of the CofP, and define a group dynamic. The college, and Participants 03 and 04 who attend it, are located on the eastern edge of the city. On top of being one of the most deprived areas of Edinburgh (Figure 3; SIMD, 2012), Participant 04 makes the observation that in Edinburgh:

04: *"All the most poverished (sic.) areas...always on the outskirts"*

Juxtaposed with this are the topics discussed during each conversation in response to the topic "What major issues does face Scotland at the moment?" The 'university' CofP pairs both discussed issues relating to the political establishment, Scottish Independence, while the 'college' CofP discussed poverty, low wages and unemployment. The 'college' CofP's topics are more closely associated with the 'working-class', and are more hostile to the idea of the 'establishment'.

Bucholtz and Hall's sociocultural approach (2005:585-6) ties all of these factors together. Participants 03 and 04's membership of the 'college' CofP and self-labelling as 'working-class'

03: *"I've grown up in quite a poverty-ridden area"*

identifies them as part of a 'macro' group. In this group, indices of 'working-class' and 'anti-establishment' are possibly exuded through (th):[h], as it is only this CofP that produces it in conversation. Bucholtz and Hall call this a "linguistic resource...indexically produc[ing] identity (2005:607)".

The difference between [h]-fulness in *thing* and *think* morphemes (03 – 13%, 04 – 33%) and grammaticality judgement scores between all participants (each participant gives between 0-3 grammaticality judgement scores of '1') can be defined as identity on an individual level. The

sociocultural model broadly defines identity as the ‘self’ and ‘other’, which allows for individual differences in indexicality. Participant 04 states, in this vein, that:

04: “*we both stay in the east, but [our accents are]...completely different*”

This suggests that CofP and geographical location, like style and context, are not sufficient to describe the variation in (th):[h] alone.

Mendoza-Denton points out that a linguistically-constructed identity must be faithful across a full repertoire of variant forms (2008). This data can only exhibit partial examples of this, whereby (th):[h] production is coupled with realisations of [k] in word list *loch* among the ‘college’ CofP participants. In previous studies, these variants of (th) and (x) have been shown to index ‘working-class’ ‘anti-establishment’ (Stuart-Smith et al., 2007:255; Lawson, 2014), as well as not being SSE forms. Instead of code-switching with Scots to index an ‘anti-establishment’ stance, it may be forms which are considered innovations of urban speech in Scotland “for which the terms ‘Scots’ and ‘[SSE]’ hardly seem appropriate (Maguire et al., 2010:76)”. More examples of innovative phonology, syntax and semantics for similar effects are noted in Stuart-Smith’s work (Stuart-Smith, 2003; Stuart-Smith et al., 2007).

5.3 Linguistic considerations

The most commonly-occurring (th) word *think* was the only word with (th):[h] production in my 70 word corpus. However, based on the perceptual grammaticality judgements, participants accepted or produced (th):[h] word medially in *anything* or *something* the highest proportion of the time (91.7% of judgement scores 1 or 2). Clark and Trousdale suggest that lexicalisation of *-thing* compounds might be a motivating factor in [θ] debuccalising to [h] (2009:40). This would mean that (th):[h] in the word-medial *-thing* compounds would be a change in progress (p.41), and therefore a different type of alternation to (th):[h] word-initially in *thing* and *think*. Judging by the significant results across the perception of all word-positions and attestation patterns in Tables 12-14, it would be difficult to explain (th):[h] as two different phenomena.

6. Concluding remarks

My findings match those in previous quantitative studies that (th):[h] is again restricted to *thing* and *think* morphemes, which are also the most-frequently occurring in speech. They are also the only

morphemes to be significantly recognised as grammatical with [h]-ful realisations among Scots speakers.

By taking an ethnographic approach, I share analyses from Stuart-Smith and colleagues (2007) and Lawson (2014) that non-standard (th) production indexes a locally-situated identity against the grain of the 'establishment'. However, as (th):[h] has long been a part of the Scots vernacular – and that Bucholtz and Hall's sociocultural approach combines the individual, their CofP, and their environment in a state of flux (2005) – the indices of this variant are contextually dependent on a multi-faceted sense of identity.

Further research would benefit from the combination of non-standard phonological variants in analysis, such as /r/-pharyngealisation and /l/-vocalisation, which are prevalent in Scotland's Central Belt (Macauley, 2014). Though my adaptation of Buchstaller and colleague's perception questionnaire (2013) to include recorded speech as stimuli was successful in collecting significant data, using recently-innovated methods might yield a more-detailed account of speaker's perceptions of (th). Watson and Clark's real-time attitudinal ratings (2015) of dialect allow multiple variants to be tested, and first impressions to be compared with lasting perceptions.

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