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Interspeaker variation among Shetland Islanders as the long term outcome of dialectally varied input:

speech production evidence for fine-grained linguistic plasticity

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  This WP-2 version includes corrected graphs and should be cited in preference to the published version appearing in those proceedings – see the note in the text about the corrections.

- The major publications on this Shetlandic dataset are [2], and Marie Cluness's undergraduate project, available at QMUC.

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Interspeaker variation among Shetland Islanders as the long term outcome of dialectally varied input: speech production evidence for fine-grained linguistic plasticity

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Abstract

The English stop voicing contrast is examined in both word-initial position (via VOT) and word-final position (via the duration of the preceding vowel) in young adult speakers born and brought up in the Shetland Isles. The subjects' parents were either also from Shetland, from elsewhere in Scotland, or England. All have identical phonemic stop systems, unambiguously so in initial position. The quasi-phonemic role in Scottish English of vowel duration in signalling the suffixual vs. tautomorphemic word final /d/ instead of the /t/-/d/ contrast (the Scottish Vowel Length Rule) renders final position more complex. There are fine-grained interspeaker differences covering a wide area of the phonetic space, exemplifying the potential for phonologically-relevant variation. The targets may be speaker-specific responses to input, especially mismatches between the dialect of their parents and the wider community.

1. Introduction

The linguistic systems of native speakers are learnt on the basis of experience, filtered by functional or innate competence. *Every* speech community has interspeaker variation at every level: in learners and in their input-givers; and in the core of the community and towards its peripheries. Only some aspects of variation are of interest for theories of phonological contrast and phonetic implementation even though they can be useful indexically, because some indexical variation is due to cognitive or physiological differences between speakers. But since each individual has a unique interlocutor network, some indexical differences arise from ingrained accommodation to familiar or typical interlocutors. Linguistic experiences in adulthood can also skew or modify systems, because speakers can be expected to make functionally-oriented compromises, both in novel situations of contact and through mastery of local (sociolinguistic) systems which provide normative solutions for how to interact with speakers differing in age, sex, social network, or stylistically etc. Age variation brings the issue of language change into the mix.

So, subtle differences in pronunciation targets between speakers can easily be found [1], but it is when they are *systematic* that they take on linguistic significance. Such differences may be due to arbitrary differences in the systemization of the same input, or may be responses to variations in input which speakers have received during their lifetime; in particular to formative childhood interactions with caregivers and peers. Different children in the same speech community, however narrowly-defined, will have different experiences, i.e. different input, but it is not clear to what extent their linguistic system is plastic enough to encode those subtle input differences, let alone whether they persist and can be amended over long timescales, such as into adulthood.

Interspeaker variation in production can provide a partial insight into the nature of individual plasticity: we need to quantify differences between speakers and look for gradient and categorical effects within well-defined phonetic parameters. Interspeaker variation in the location of output targets may be found to be limited by universal grammar or recurrent functional constraints to the use of a small number of choices, or speakers may be found to be able to vary in far more subtle ways. Similarly,

phonemic oppositions may be strictly curtailed (or limited by markedness considerations) within the phonetic space, or systems may be more subtle and flexible. The question that arises then is whether such variation is arbitrary and idiosyncratic, or whether it is conditioned.

This paper reports monolingual subjects who a priori speak "the same" language with different "strengths" of accent. They have all been brought up in the same small community and share many experiences of language outside the home in the community, but are stratified by their exposure to different accents of English from their parents. No attempt has been made to control this exposure or quantify it in anything other than the broadest terms. Among these subjects with identical or highly-similar phonology, variation in phonetics can be investigated in detail.

2. Method

The subjects come from the Shetland Islands, an isolated archipelago about 300km (180 miles) north of the Scottish city of Aberdeen, a major transportation link, and 350km (220 miles) west of Bergen in Norway. For more information on background and method, see [2]. In general terms, the Shetlands have a strong vernacular dialect of English [3, 4], audibly distinct from general Scottish-accented Standard English [5, 6]. These varieties are closer to each other phonologically (and phonetically) than either is to dialects in England.

Table 1: Speaker characteristics and identifiers

Parents from	Male subjects	Female subjects
Shetland ("shet/shet")	S1: age 20 S3: age 21	S2: age 30 S4: age 22
Scotland ("shet/scot")	S5: age 16 S7: age 17	S6: age 17 S8: age 17
England ("shet/eng")	S9: age 20 S11: age 19	S10: age 17 S12: age 17

Each subject's parental background, age and sex are shown in Table 1. They were recorded in same-sex, same-parent parental-background dyads in their home, school or workplace by a native Shetlandic fieldworker (Marie Cluness). After an unmonitored spontaneous conversation, the fieldworker returned to the room for more structured data collection. With one of the subjects out the room, the other read words from a wordlist, and answered questions about particular dialect forms that they might use.

In this paper I will look at the stop voicing contrast in the subjects' wordlist productions. This contrast is phonemically identical in the three parental systems under normal generative assumptions about the strict separation of phonetics and phonology: all contrast /ptk/ vs. /bdg/ in initial and final position. Interspeaker differences will largely therefore be "phonetic". (Such modularity is not necessary, of course [7].)

In word-initial position traditional Shetlandic opposes prevoiced /bdg/ with voiceless unaspirated /ptk/, while in England and Scotland, /bdg/ are usually voiceless unaspirated and /ptk/ voiceless aspirated (see [2] for full details). Thus VOT is measured here in order to see how it varies. I will recap the main relevant findings from [2], which addresses just the labial stops, and add VOT results for /t/ and /k/.

The stop voicing contrast in word-final position is investigated for /t/ and /d/. In many varieties of English, vowels are far longer before voiceless stops compared to voiced ones, the Voicing Effect ("VE") [8]. In Scottish English, however, for some vowels, this effect is absolutely minimal whereas the Morphological Effect ("ME"), a structural distinction between final tautomorphemic /d/ (e.g. *crude*) vs. the suffix /d/ (e.g. *crewed*), is very large [5], [6], [9]. A small VE and a large ME is known as the

Scottish Vowel Length Rule ("SVLR") and is characteristic of Scottish and Shetlandic English. It has some categorical properties and is a "quasi-phonemic contrast" in vowel duration, at least for /i/ and /u/ [5], [9]. (Quality and timing have the same systematic effect for /ai/ [9].) Thus the duration of vowels preceding /t/, /d/ and suffixual /#d/ are measured here to see how they vary.

3. VOT of stops in initial position

In [2], VOT for /p/ was shown to demonstrate a high degree of interspeaker variation. Figure 1 augments this finding with extra data for /t/ and /k/ confirming that the speakers' VOT targets span the entire positive VOT continuum and are not classifiable just as short or long lag. (Note the means are not artefacts of bimodal distribution.) See [10] for similar results.

The variation is non-arbitrary in two ways. First, it reflects experience somewhat: the shortest lag /ptk/ was generally used by the shet/shet speakers (S1-S4), plus the shet/eng male S9 plus maybe S11, his brother. The shet/scot speakers and the shet/eng females exhibit longer VOT.

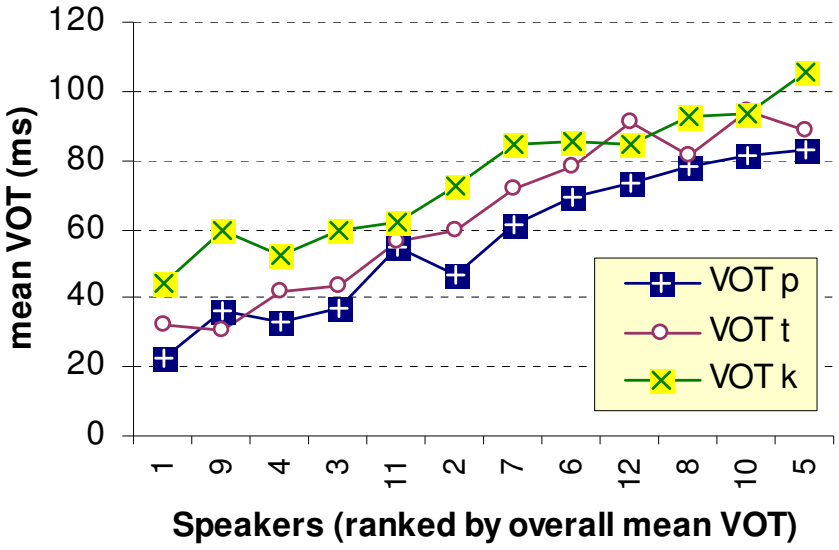

Figure 1: Shetlandic subjects' mean VOT for /ptk/. Low VOT (left) is typical of the traditional vernacular.

Second, there appears to be a gradient inverse relation between the relative number of prevoiced tokens of /b/ produced by an individual and their mean aspiration duration for /p/ (Figure 2, reproduced from [2]). Thus the "same" contrast is realized along a VOT continuum with /p/ and /b/ remaining phonetically distinct in a gradually changing way. The shet/eng male S11 does indeed appear to be intermediate for both /p/ and /b/. Two speakers (S8, S10) use a high proportion of prevoiced stops despite having long lag aspiration, a linguistically highly-marked system albeit one which could be expected to function very successfully, both cross-linguistically and specifically in the context of the inter-speaker variation in Shetland. These two female speakers avoid the voiceless unaspirated stop productions which, other cues being equal, are ambiguous between /p/ and /b/.

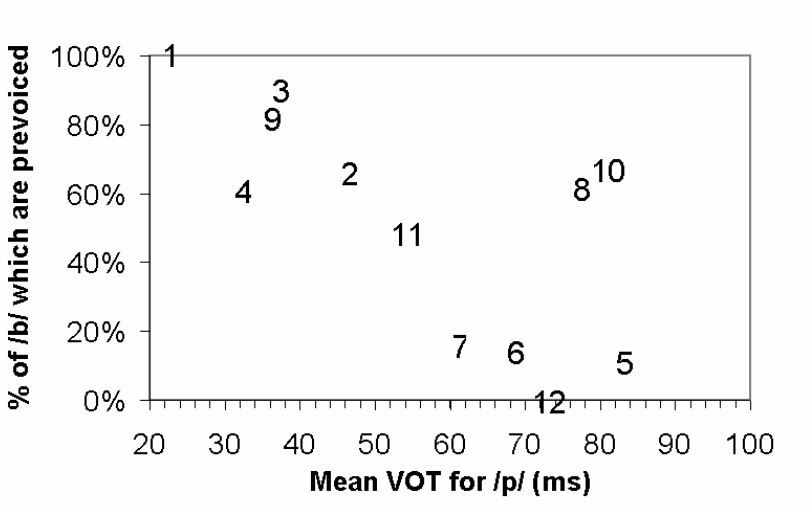

Figure 2: Different locations in phonetic space of the /p/-/b/ contrast for the 12 subjects.

4. The Voicing Effect and the Morphological Effect on pre-stop vowel duration

Of previous studies, McKenna's [5] is the most methodologically reliable [6], but is limited in the representativeness of its subjects. It does however make a useful control for the Shetlanders (Figures 3 and 6). Consider too the average 68% ME that was found for Glasgow /u/ and /i/ [9] (117ms-199ms and 123ms-205ms respectively) in a wordlist task comparable to the current study. In [9], no significant ME was found for /o/ (201ms-193ms) or /ɔ/ (207ms-222ms), as seems the case here.

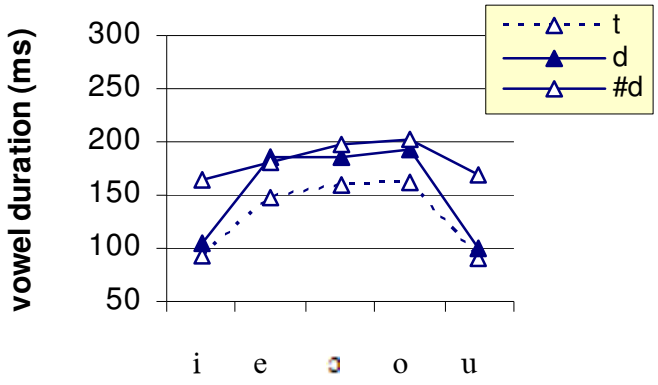

Figure 3: Control Scottish mean vowel duration [5], [6].

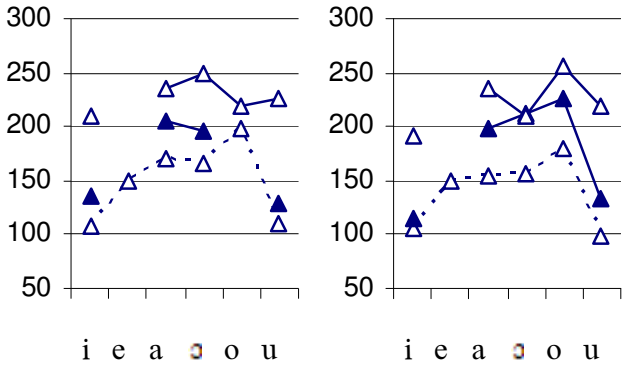

Figure 4: Mean vowel duration of the four shet/shet subjects (left panel) and shet/scot subjects (right panel). For legend and axes see previous Figure.

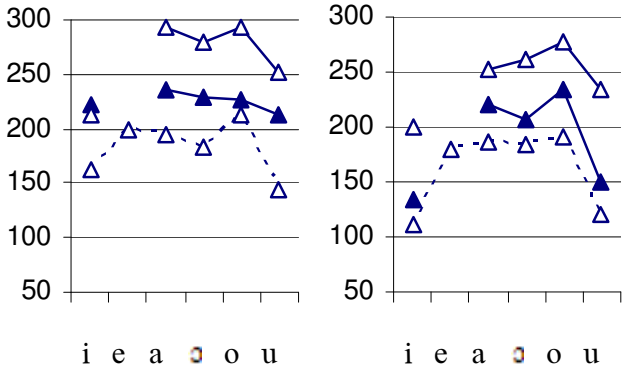

Figure 5: Mean vowel duration of the two female shet/eng subjects (left panel) and the two male shet/eng subjects (right panel). For legend and axes see previous Figure.

The preceding figures show typical Scottish durations for the shet/shet, shet/scot, and the male shet/eng speakers. An English-looking pattern of high VE and low ME for /i/ and /u/ is found in the shet/eng females. Vowel duration before /d/ above 200ms rather than below 150ms is indicative of this.

These relational patterns are easier to see in Figures 6-8, which show relative increases in vowel duration from /t/ to /d/ contexts (VE) and /d/ to /#d/ contexts (ME). As expected, /i/ and /u/ differ from the other vowels in showing strong SVLR effects, and, except for the shet/eng females, the groups clearly use vowel duration in the expected way.

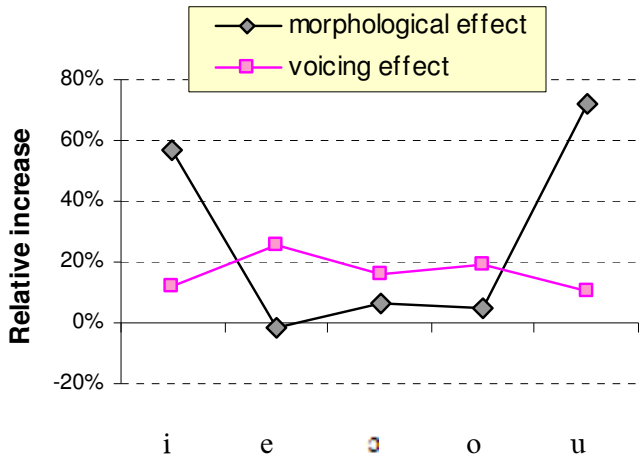

Figure 6: Relative vowel duration increase in different conditioning contexts for Control Scottish [5], [6].

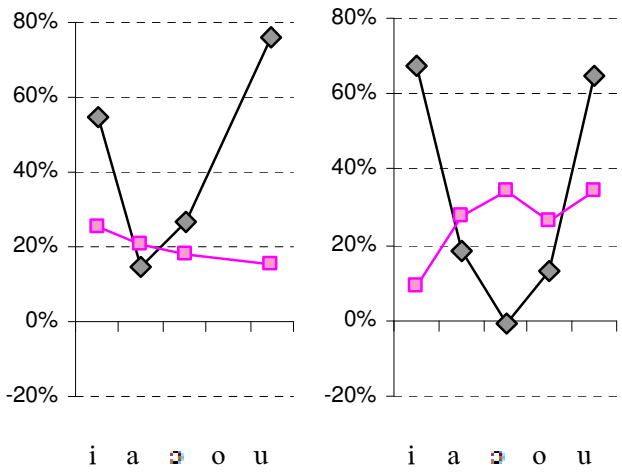

Figure 7: Relative vowel duration increase of the four shet/shet subjects (left panel) and the four shet/scot subjects (right panel). For legend and axes see above. There is no data for shet/shet /o/.

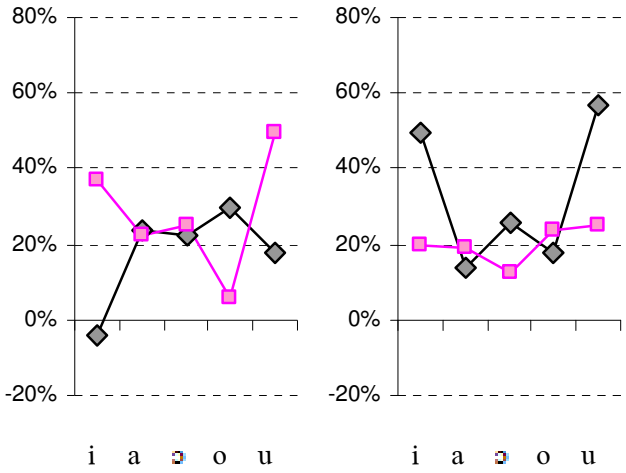

Figure 8: Relative vowel duration increase of the two female shet/eng subjects (left panel) and the two male shet/eng subjects (right panel). For legend and axes see previous Figure.

These group results summarise trends. Individual differences in /i/ and /u/, the crucial SVLR vowels, are presented in Figure 9, and appear less gradient than VOT was in Figure 1.

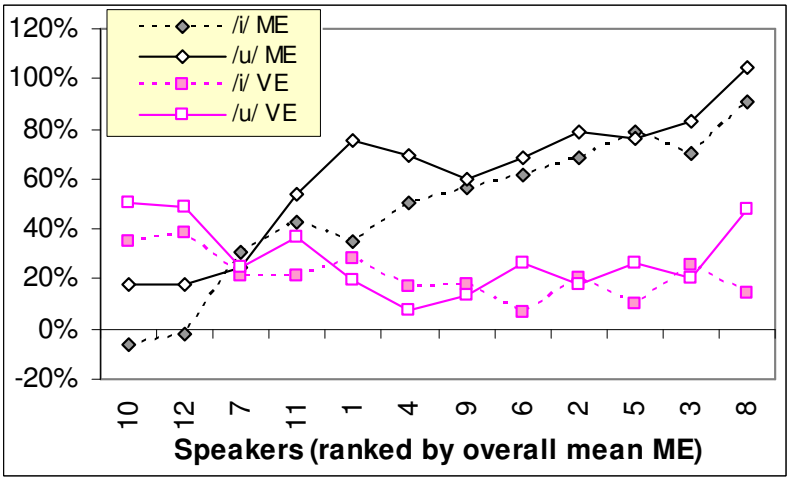

Figure 9. Relative vowel duration increase for /i/ and /u/ due to VE & ME. Low ME (left) is typical of English.

The contrastive use of vowel duration for each speaker is presented in Figure 10, (the mean in each case representing pooled /i/ and /u/ tokens). Gradience (in an inverse relationship) is not well supported and there is apparently more categorical clumping. Clearly S10 and S12 have an English system. S12 was Anglicised in her VOT system also, but S10 (with S8) was characterized by a marked system. (S8 and S10 diverge strongly here.) S7 and S11 are intermediate between Scottish and English systems. S11 was also intermediate in Figure 2, despite his impressionistically strong vernacular accent. His brother

S9 in both cases sits plum among the shet/shet speakers. S7's output is not explicable through parental origin. The other speakers have typical SVLR systems, though S8 may have a marked system of three durations.

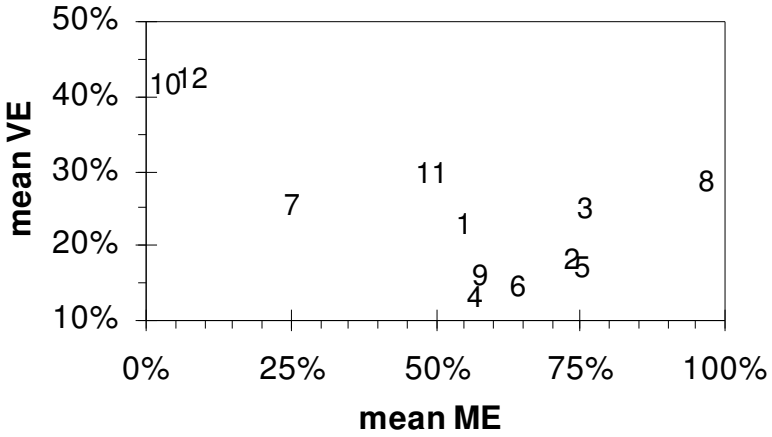

Figure 10. Different locations in SVLR phonetic-phonological space for the role(s) of vowel duration.

5. Conclusions

The subjects vary in subtle ways that reflect a shared set of phonemic contrasts in initial position as well as, it seems, different systemisations in final position. Though only two cues and small number of speakers was presented, it seems likely that the speakers' choices of phonetic target are not limited by a strict set of universal features, though they may well reflect functional considerations such as the need to maintain perceptible contrast and the need to function in a varied speech community.

Knowing the identity of a speaker can influence a listener's interpretation of their phonetic cues or the weight it is given relative to others [11]. This may be true here, because subtly-different relationships between targets exist, and the same target may cue different categories.

Though focusing on a small and isolated speech community, variation in VOT is entirely normal in English [2]. If individual speakers are approached in a sociolinguistically stratified study instead of in an unstructured way [1], these results should be replicable in larger and urban communities.

It is misleading to present a linguistic system as if is essentially homogenous, albeit subject to (a) arbitrary indexical variation which need not concern any linguist, and (b) conditioned variation which need concern only specialists whose particular interests involve variation and change. We should view systems as (parts of) heterogeneous networks with no discrete boundaries between one learned grammatical system and the next. Under this view, it always makes sense to consider a grammar in the context of other similar grammars, and to expect subtle fine-grained conditioned differences, the sort that are averaged-away or never observed by undertaking research on pools of "identical" speakers.

Languages tend to use certain phonetic target areas, but this does not mean that individual speakers of those languages are unable to target other parts of phonetic space, nor that speakers are unable to learn and use marked systems. Both are seen here. We cannot make assumptions about individual speaker systems on the basis of homogenised data.

Acknowledgements

Many thanks to Marie Cluness, who recruited and recorded the subjects for this study as part of her honours project at QMUC, to ESRC (R000237135 & R000271195) who provided support for the analysis of these materials, and to Jane Stuart-Smith for showing me the value of phonetic (and phonological) research on stratified pools of subjects.

Note

In the published version of this paper in the PSP2005 proceedings, Figure 9 contained some errors in Subjs 9, 10, 11 & 12 which have been corrected here. All now appear correctly, as less intermediate. Other figures were as intended and are unchanged. A minor typo in §4 has been fixed, from /o/ to /ɔ/.

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