1. Background

In Scottish English, a typologically-unusual pattern of cues to the voicing contrast in postvocalic consonants means that there is very little difference in vowel duration between, for example *neat* and *need*. Yet a vowel duration cue alone *does* seem to cue the distinction between *need* and *kneed*, a pair which are not categorically distinct in almost any other variety of English. In traditional phonological analysis, the categorical *need*/kneed* distinction is not phonemic, since the phonetic difference is predictable from the morphological difference between the suffixed and the unsuffixed verb. But in fact this “marginal” or “quasi-phonemic” contrast raises a number of difficult theoretical questions. Is the *need*/kneed* distinction phonological or phonetic? Is it categorical? Is the difference a direct phonetic expression of suffixation? Moreover, the distributional pattern of vowel duration in Scottish appears to be highly complex and controversial. Other questions arise. Is it hard for children to acquire this pattern? Is it susceptible to dialectal levelling?

In this research project, we approached the “Scottish Vowel Length Rule” (SVLR) from phonological and phonetic perspectives, in order to bring multiple complementary techniques to bear on the knotty linguistic phenomenon itself, and in order to advance theoretical understanding.

The literature on Scottish vowels is based on impressionistic work and contradictory instrumental studies of a small number of middle class speakers. Our laboratory phonology study was intended to provide a more reliable, empirical basis for theoretical discussion. We reviewed the instrumental literature in parallel with making new measurements, and concluded that McKenna’s unpublished M.Litt. Thesis (1988) was the only reliable source of phonetic evidence about the SVLR. We were able to re-interpret the other two phonetic studies to show that their data actually supported the unexpected conclusion that only three vowels are subject to the traditionally stated SVLR. These are /*i*/ (short in *need*, long in *kneed*), /*a*/ (short in *brood*, long in *brewed*) and /*ai*/ (short [ɹai] in *side*, long [ɔː] in *sighed*).
We were able to collaborate with an on-going project into Glasgow English, run by Dr. Jane Stuart-Smith at the University of Glasgow. This “Glasgow Speech Project” (subsequently funded by the Leverhulme Trust) is a variationist sociolinguistic study of consonant variables, and we collaborated at the planning stage, so that SVLR-relevant words were included in their study. We describe below how this collaboration influenced our research. We were also able to collaborate with Ben Matthews, a PhD student at QMUC, who is currently completing his doctoral studies into the acquisition of Scottish English vowel systems and the influence of consonantal context on vowels in early phonology.

2. Objectives

The aims and objectives of the project as presented in the Revised Research Proposal have in large part been achieved. The Revised Proposal was necessitated by the granting of funding which was insufficient to pursue our ambitious aims as originally stated (though of course our research proposal was awarded substantial funding). The main activities which could not be supported were (a) a research assistant to undertake a focused study of articulation using Electromagnetic Articulography (EMA), and (b) ongoing dedicated technical support for EMA. Consequently, we decided to undertake only pilot work on acquisition, while hoping to secure extra funding for a doctoral student (rather than a research assistant), and made best use of available technical support and goodwill from co-reseachers, especially Dr Alan Wrench when employed as an EPSRC Research Fellow.

The aims and objectives of the research evolved slightly during the 3 years and 9 months of the project in the light of circumstance and our findings. They are given in their final incarnation in the End of Award Form (page 7). In this section we will take each of these objectives in turn and briefly indicate how it has been achieved (and perhaps altered from the Revised Research Proposal). We will also refer to the process and management of the research, and the ways in which we attempted to balance the demands of the research project with other opportunities and commitments. An orthogonal management issue was the change of Dr Scobbie from full-time to part-time research. This was for personal reasons (child care) and the effects on the project was beneficial, because it allowed more time for collaboration and dissemination, as well as allowing time-dependent problems to resolve more easily. We would like to thank the ESRC for their flexibility in this matter, and also in the extension of the end of the grant to account for Dr Turk’s maternity leave.

i. To collect and analyse speech data for the purpose of providing a definitive statement of the phonetic facts involved in the so-called ‘Scottish Vowel Length Rule’ in the speech of adult and child speakers with native Scottish English accents from east central Scotland.

Our pilot recordings and review of the literature confirmed that McKenna’s unpublished work on the Scottish monophongs provided a reliable picture of the SVLR. We therefore decided, rather than repeating large parts of his work, to focus on representativeness, variation, the diphthong /ai/, and vowels in polysyllabic contexts. These decisions were also prompted by the opportunity to collaborate with Dr Stuart-Smith’s Glasgow Speech Project, though we also addressed them by looking at aspects of the SVLR in other dialect groups (Shetland and Fife).

ii. To analyse these results using surface-oriented constraint-based phonological frameworks together with phonetic models of duration to illuminate theoretical issues relevant to the Phonetics/Phonology Interface.

This objective has been achieved, though the results are not yet written up. Some dissemination, mainly to a research group at Johns Hopkins (Jusczyk, Smolensky, Burzio) was very helpful, as was joint research with Prof Ladd at Edinburgh University (into the categorical status of a consonant duration phenomenon in vernacular Sardinian) and theory development in collaboration with Dr Stuart-Smith.

iii. To use the EMA facility at QMUC to determine whether ‘lengthened vowel duration’ is due to a single articulatory strategy or whether the different conditioning environments of the SVLR each induce different types of articulatory lengthening strategies, and to compare these results with similar articulatory phenomena in another accent.

This technically-demanding research strand was even more problematic than anticipated. Consequently we did not attain our subsidiary goal, to study stress-induced or prosodic lengthening. Otherwise, our
main objectives as revised in (iii) have been met, though some final analysis is still ongoing. A number of factors conspired in the early stages to make matters difficult. For example, a resolution of ±1mm was only intermittently achieved. Coils place further from the centre of the circular field described by the EMA’s three electromagnets (which are mounted near the chin, forehead and nape of neck) cannot be as accurate as coils located nearer to the centre of the field. Since the surface of the face is at the periphery of this area, one of the crucial reference coils, on the bridge of the nose, is especially vulnerable. It turned out that one electromagnet had a weak fieldstrength, making data from this reference coil overly variable, undermining the head-motion correction algorithm (making all the data a little noisier). This only became a serious issue when it transpired that we had to examine high vowels (see below). The problem was ultimately solved by the manufacturers increasing the strength of one of the electromagnets. Initial recordings with EMA were also laborious and uncomfortable. After much development work by Dr Wrench on time-alignment, software development, calibration, MATLAB analysis macros and recording protocols, and having gained experience, the technical side of our recordings improved enormously. One valuable outcome of the research is that we and the whole laboratory have gained a great deal of practical experience. There is now considerable skill and expertise at QMUC in capturing articulatory data thanks to Dr Wrench and Mr Steve Cowen, our senior experimental officer. Our advice to future research teams relying on new equipment of this technical and scientific complexity is not too be too ambitious in the initial goals that are set, but to persevere in replicating standard findings, to build a committed team of researchers and technical support, to collaborate with other centres of excellence where available, and to expect a relatively long time-scale over which problems can emerge and be ironed out.

A scientific problem arose because we were not aware in advance that only the two high vowels /i/ and /u/ were active in the SVLR. We were forced to work around the problematic consequences of these phonological fact: there is very little movement from either /i/ or /u/ to a following alveolar consonant. The small distances involved (in the case of /dit/, the closing gesture tongue tip coil trajectory distance was 1.2mm on average) are not conducive for the resolutions attainable in reality from EMA, and are subject to large token-to-token variation (typical standard deviation 0.5mm for 15-20 tokens). We chose to use alveolar consonants to flank the vowel otherwise we would have had to deal with the additional issue of interarticulator timing, but in Scottish English, the central vowel in /du/ is articulated, like /di/, with the tongue braced in an almost stationary position, with only small movements in the tip. The difference between /i/ and /u/ is one of lingual configuration and lip rounding, and is not primarily a dynamic one. We settled on materials beginning /tu/ to maximise the articulatory travel of the tongue tip into (>5.5mm) and out of (approx 2-3mm) the vowel. Of course, the bulk of this movement is to front the tongue from /r/ to /u/ and from /u/ to the alveolar region. This global fronting is relatively constant in acceleration and deceleration, and differences conditioned by the SVLR were in many cases variations in overall acceleration and deceleration, not velocity maxima and minima (as occur unambiguously with non-high vowels). Unable therefore to use standard procedures, we experimented with a number of options and settled on the use of “jerk”, the second derivative of the tangential velocity, as a means of annotation where minima and maxima were not observable.

iv. To carry out pilot work on the acquisition of the SVLR and to consider the implications for theories of normal and pathological development.

We were successful in this objective. We also secured funding from QMUC to support a doctoral student (Ben Matthews) whose thesis will be completed in 2001. His is a longitudinal study into the acquisition of Scottish English vowels. We were flexible in our research goals in this area and the two projects have complemented each other, so that while Matthews’ study looks at 2-3 year olds, this project has looked at older subjects and adults to determine how the SVLR is influenced by competing parental systems.

v. To evaluate the integration of experimental phonetic analysis with aspects of sociolinguistic methodology.

This objective became more explicitly a focus of our research as the project went on, and we think we are making a significant contribution to methodology.

3. Methods
3.1 Acoustic studies
Our original intention was to follow standard laboratory phonology methods: collection and instrumental phonetic analysis of experimental speech data in order to provide a more reliable, empirical basis for
theoretical discussion. We knew in advance that if our subjects were academic colleagues or university students we would need to deal with potential influence from other varieties of English. On the other hand, it is not easy to elicit naturalistic vernacular Scottish speech, nor is obviously valid simply to select subjects with impressionistically stronger Scottish accents. These issues raise the problem of what exactly our data would be representative of.

Our radical solution to this problem was to analyse acoustic data taken from recordings planned independently by Dr Stuart-Smith’s Glasgow Speech Project. Our main subject pool was therefore a sociolinguistically structured group of 32 subjects from Glasgow, which included two age groups, both sexes, and two socioeconomic backgrounds. Consequently, rather than having a number of repetitions of a given word spoken by a small homogenous group of speakers, we analysed a single token of each word spoken by 32 speakers. Although this results in highly variable data, results were still easily extracted for the entire group. Moreover, we could analyse the variation itself to see the extent to which it was conditioned by sex, age or social group. For more on the methodology, see Scobbie, Turk and Hewlett (1999)’s ICPhS paper (enclosed). Our materials were designed to confirm McKenna’s findings on monophthong duration, so we examined only a representative set: /i u o/. We did, however, have a much larger and more representative group of subjects. We also made three entirely new studies: a spectral analysis of the monophthongs and both durational and spectral analyses of /ai/ and /au/.

We employed similar techniques in a study of 12 young Shetlandic adults. An undergraduate student, Marie Cluness, performed the recordings as part of her honours project. Spontaneous conversational data and wordlist data were gathered. In addition to the normal spontaneous readings of the wordlist, Ms Cluness (a native Shetlander who was known to all subjects) attempted to elicit more vernacular productions through encouragement and explicit questioning. In addition, vernacular lexis was included in the wordlist to complete experimental paradigms and to encourage a more vernacular phonetic/phonological style.

These studies led to the piloting of a new methodology, again using a sociolinguistically structured subject pool. One part of our simple but novel refinement is not to attempt any analysis of spontaneous conversation, but to focus completely on elicited materials. Experimental materials are essential because many of the contexts required for a phonological analysis of complex distributions (in this case /ai/ in polysyllabic words) can only be exemplified by relatively low frequency lexemes. Our other requirement was to overcome the problem that the declamation of citation forms in a carrier phrase tends not to produce vernacular pronunciations. Nor are wordlists suitable for vernacular lexis which is never encountered in a written form. Our materials for this experiment included low frequency words important for the phonological analysis of SVLR (mylar, Titan) along with more normal SVLR words (lycra, pylon, spider), vernacular SVLR forms (gey) and a range of vernacular and English distractors (Klingon, leaflet, proximate, dreep). Each word appeared in a sentential context that supplied the correct meaning for the word. Subjects read the sentence twice and the second pronunciation only was transcribed (to ensure lexical access has occurred, if possible). Speakers estimated at what age they learnt the word, or whether it was new to them. This allowed us to find out which words were not already part of the speakers’ lexicon, and moreover it was a very successful distractor, hiding the fact that the speaker had been asked to pronounce hundred of words containing /ai/. We call this the “lexical questionnaire” method, and it provided most of the data for the phonological analysis because it provided examples of /i, l/ and /ai/ in a very wide range of environments. Below are a sample of the materials, including a probe for a contrast between the Scottish name Dougal and Dougal the dog, a specific character from a TV show featuring English accents:

- Apparently, a fugue is a style of music
- Apparently, Krug is a type of champagne
- Apparently, Dougal is the dog in the Magic Roundabout TV show
- Apparently, Dougal is a Scottish name for boys or men
- Apparently, a beluga is a white whale
- Apparently, to boogie means to dance
3.2 EMA study of articulation
We recorded three speakers of Scottish English from central Scotland, and three control subjects from England (Sheffield and Cornwall). EMA, acoustic and laryngographic data was collected. The materials were all real words, though they included non-core lexis. We felt strongly that pseudo words might generate inappropriate phonetic data, and that speakers would have no means for self-monitoring other than spelling differences. A set of real minimal contrasts is hard to find, however, so we used loan words to fill out the paradigm. In addition to a smaller set of words with /ai/, our focus was on monophthongs /o/ and /u/, and materials were chosen to allow comparison of:
- tautomorphemic vs. suffixual /d/ and /z/
- voiced vs. voiceless postvocalic stops and fricatives
- stop vs. fricative
- oral stop vs. nasal stop
- high vs. mid rounded vowel
- open syllable vs. suffixed syllable
- Scottish systems vs. English systems

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One carrier phrase was used for all consonant-final words, and a segmentally similar one for vowel-final consonants with a /l/ immediately following the target word to enable study of the effect of suffixation on open syllables. Eighteen blocks of pseudo-randomised sentences were used, each block flanked with probes of other vowels (heat, hit, hate, etc.) to allow for normalisation across vowel spaces. All words were checked with speakers for familiarity, especially the loan words (Ballet Russe, River Rhone).

For the tongue tip we delimited the opening and closing gestures using tangential velocity minima (or jerk spikes). Initial /l/ is easy to segment using EMA. For each gesture we recorded the duration and distance of the trajectory, the peak velocity, the location of the coil at the edges of the gesture and at the peak velocity. We calculated the skewness of the gesture (acceleration section duration/total gesture duration).

3.3 Child study
Only one of our experiments made use of young children as subjects. Standard picture-naming techniques were used to elicit data. We looked at the voiced/voiceless contrast rather than trying to elicit past-tense forms, and measured vowel duration. Matthews’ thesis work, which was undertaken in full knowledge of this research project, is based on longitudinal data, recorded monthly from seven subjects aged about 2-3 years at the start of the study. We do not report his work here, but future collaborations are planned.

4. Results
4.1 Acoustic Studies
Our main findings were contrary to standard assumptions. Only the vowels /i/, /u/, and /ai/ follow the patterns claimed in the SVLR literature. That is, they are short before /t/, /d/ and /s/, and long before /z/ and # (i.e. before /d/ and /z/ suffixes). Other vowels show durational patterns reminiscent of other dialects, that is, they are slightly longer before all voiced obstruents than before voiceless obstruents, and show no additional durational adjustments associated with morpheme boundaries.

SVLR patterns for /i/ and /u/ are purely duration-based, with no associated vowel quality differences. The short /ai/ vs. long /ai/ contrast had been described previously as an /æ/ vs. /ɜ/ contrast, a transcription convention that reflects only the quality difference. In fact, our phonetic analysis shows that:
1. variants of /ai/ in a word-final syllable exhibit a duration difference, though
2. in non-final syllables of polysyllabic words, there is not necessarily a duration difference between a “long” /æ/ and a “short” /ɜ/ in a word like crisis or psycho which can select for either variant.
3. There is a quality difference in the first element of the diphthong, such that the “long” variant has a lower vowel target — in both contexts (1) & (2), and
4. there is a timing difference in the movement from the first to the second element of the diphthong such that the “long” variant assigns greater duration to the first element and a lesser duration to the second in both contexts (1) & (2).
Within social/geographical groups (Bearsden vs. Maryhill), the most reliable cues to the short /æ/ vs. long /ɜː/ contrast are (3) & (4), but there is a between-groups difference in the quality of the first element of the diphthong, exactly analogous to (3). Bearsden speakers have a lower setting for the first element of both variants of /ai/ than Maryhill speakers. The only phonetic variable that appears to be constant across all contexts and all social/geographical groups is (4).

Had we only looked at a group of subjects from a homogeneous social background, e.g. undergraduate students from Edinburgh, we would not have discovered the primacy of the diphthong timing mechanism.

Although our results from speakers from central Scotland are representative of the vast majority of the Scottish population, we also undertook a study of Shetlandic, a qualitatively different dialect. Subjects whose parents were from Shetland or elsewhere in Scotland had SVLR patterns comparable to our Glasgow study, though subjects whose parents were “incomers” to Shetland from English did not have a clear SVLR pattern.

4.2 Phonology

Our initial quest was to determine whether or not the SVLR was “phonological” or “phonetic”. One main result is that such a question may not be the right one to ask. Rather, we have concluded that traditional generative structural phonological theory may have little to offer in a situation like this where a categorical alternation (with a quasi-phonemic function) sits alongside more obviously phonetic alternation, and where there are strong phonetic parallels between the categorical and noncategorical patterns. It may be that future research ought to consider whether the categorical aspects of a system are emergent properties of what is in fact a family of gradient patterns. One less radical interpretation is that, in this case, the SVLR has distinct categorical and noncategorical aspects, which affect different vowels in similar environments in different ways. Alternatively, the SVLR may be seen as a family of durational phenomena which has arisen historically, in which only some some alternations have been phonologised.

One firm conclusion we have reached is that in a framework with a clear distinction between phonology and phonetics, the long and short variants of /ai/ are categories in the phonological inventory. More tentatively, the variants of /i/ and /u/ should be included too. The evidence for this is not the strict phonological minimal pair test. There is, however, the “quasi-phonemic contrast” (our preferred term for the “marginal” contrast in the project title) which prompted our theoretical interest in the paradigm. We conclude that traditional lexical contrast is not a necessary condition for defining the segmental inventory.

Our approach to the inventory sits well with monostratal theories of phonology, such as Declarative Phonology or Optimality Theory, in which there is no privileged “underlying representation” consisting only of distinctive features, but instead there is only one phonological representation, which incorporates categorical (“extrinsic”) allophones and other predictable or redundant structures. Insofar as is possible to identify a set of segments in this surface structure (and this is no simple task), this set constitutes the language’s segmental inventory, not the distinctive set supported by minimal pair evidence. On this view, phonologisation and category formation precede the development of lexical contrast.

This approach is further supported in the case of the SVLR by recourse to another type of evidence: native speaker intuition. Scottish speakers, including preliterate children, have strong intuitions about the categorical distinction between long and short, even though is not phonemic. We do not find it surprising that speakers find it easy to accommodate loan words from Scots which might give rise to a single minimal pair (guy /æ/ vs. gey “very” /ɜː/). Nor that that unpredictable vowel incidence is possible, e.g. the choice of /æ/ or /ɜː/ in hyper among younger speakers appears both speaker-specific and independent of the choice of vowel in typo and viper. On our view, the appearance of the very first minimal pair or one case of unpredictable lexical incidence in a speaker’s lexicon due to borrowing or dialect contact is to be expected, because the “allophones” are already categorised and of equal phonological status to phonemes (albeit not of equal lexical status due to lack of appropriate lexemes). If the phonemes /æ/ and /ɜː/ can only be categorically distinct, i.e. phonologically distinct if a minimal pair already exists to distinguish them, many conceptual problems arise with the mechanisms which admit such minimal pairs into the lexicon and are forced to restructure the phonology at the same time. Our approach deals successfully with data normally regarded as peripheral for a phonological analysis (loan words, proper names, onomatopoeia, mixed dialect forms, low frequency segments) and in fact predicts that such non-core lexis will attach to readily-available category members which have been established through prosodically or morphologically conditioned extrinsic allophony. Phonemic contrastiveness does
not exhaust the evidence for establishing the inventory of any language, a conclusion with many ramifications for phonological theory and fields related to phonology.

4.3 Articulatory study
Our results show that the Scottish speakers exhibited acoustic categories as expected, that the articulatory patterns are different from other accents and that similar acoustic durations are not due to a single articulatory timing strategy. Acoustically,

- *root*, *rude*, and *Russe* have comparable, short, acoustic durations.
- *rued*, *ruse*, and *rues* have comparable, longer acoustic durations.

Articulatorily, however, the acoustically short vowels in *root*, *rude*, and *Russe* all have similar trajectory distances, but *root* and *Russe* are different from *rude* because the former have

- longer articulatory durations
- more overlap from the acoustic consonantal closure

In a similar vein, the acoustically long *rued*, *ruse*, and *rues* have comparable overlap from the consonantal closure and comparable articulatory durations, but *ruse* and *rues* differ from *rued* because the latter has

- a greater trajectory distance
- a higher peak velocity in both closing and opening gestures.

We have identified two strategies for producing longer vowels in Scottish English. Comparing *rued* (long) to *rude* (short), *rued* has a longer trajectory distance, and lower peak velocities for opening and closing gestures. In other words,

- *rued* has longer, slower movements than *rude*.

*Rued* has lower opening gesture skewness, and higher closing gesture skewness. It also has a lower minimum velocity during the vowel, as compared to both *root* and *rude*. Therefore

- *rued* has a longer steady state region as compared to *root* and *rude*.

At least one of our Scottish speakers applies the latter strategy alone to create long vowels before voiced fricatives. *Ruse* and *rues* (long) have a lower opening gesture skewness, and a higher closing gesture skewness than *Russe* (short). Further, *ruse* and *rues* have a lower minimum velocity during the vowel.

- *ruse* and *rues* have longer steady states than *Russe*.

4.4 Acquisition study
An experimental study into the acquisition of the pattern of near-identical vowel duration in voiced and voiceless stops showed a relationship between the parental accent and the acquisition of the system by their children. The children, aged 6-9, were all born and brought up in Edinburgh, but those with two non-Scottish parents did not manifest the SVLR: rather they had much longer duration vowels before /d/ than before /t/, the normal pattern in other varieties of English. This is not merely a case of late acquisition: Matthews’ PhD research indicates appropriate variants of /ai/ may be acquired before the age of 3, and adults in Shetland with parents whose accents were Shetlandic, English or Scottish displayed the same pattern. We interpret these findings as evidence that the SVLR is one of the aspects of the Scottish accent that is susceptible to dialect levelling, either due to its complexity or because it is typologically marked. The implications for developmental speech pathology are that non-phonemic distinctions may be as important as phonemic ones in diagnosis and treatment. In particular, the phonetic characteristics of allophones and non-contrastive alternants may be used as models in the therapeutic context.

4.4 Methodology
Our main result is that laboratory phonology need not be confined to the laboratory. We do not want to imply that we wish to do away with sound-dampened recording studios, fixed facilities and technical support. Field recordings for the purpose of experimental science should probably only be undertaken where there is no reasonable alternative. Our goal is to challenge the standard experimental procedure of selecting a homogenous group of subjects (often colleagues or university students who are likely to have undergone accent standardisation) and eliciting multiple repetitions from each. Our acoustic results were clear despite the heterogenous group of subjects, and were more representative of Scottish dialects generally. The analysis of the “/ai/” variants, in particular, was greatly facilitated by the discovery that the quality of the first part of the diphthong varied along the same dimension socially and due to SVLR conditioning, meaning that some Glasgow speaker’s /æ/ has the same first mora quality as other Glasgow speakers’ /ɟi/. On the other hand, all speakers varied the timing of the diphthong transition in the same
way, meaning that it is the primary cue to the SVLR. A homogenous group of speakers could not disambiguate these patterns.

For the analysis of vernacular systems we have developed a new methodology (4) which overcomes the problems of methods (1)-(3).

(1) **spontaneous dialogue** is unsuitable because many phonological paradigms can only be established completely from the study of low-frequency lexemes.

(2) **wordlists** are very useful but can introduce a non-vernacular, reading-based style. Often reading skills are not good enough, particularly for teenagers, to guarantee access to the appropriate lexeme, an even greater problem for vernacular forms which tend to have no standard orthography and are seldom used in anything but oral styles.

(3) **task-oriented dialogues** (e.g. the Map Task or battleships games) successfully elicit lexemes, but their context is not be as controlled as is necessary for experimental phonetic study.

(4) **the lexical questionnaire** is an elicitation task disguised as a knowledge-of-the lexicon task. It offers the potential for a controlled context, a naturalistic vernacular delivery, and it is possible to determine how familiar the speaker is with vernacular and learned words. (See §3.2 for details.)

5. Activities

not applicable

6. Outputs

6.1 Publications
Seven works have been published or accepted for publication to date (see REGARD). We mention three here: [1] and [2] have been included in this report, and [3] is in press so is not on REGARD yet.


6.2 Oral and Poster Presentations
16 conference presentations have been given on the research which were oral or poster presentations so are not entered on REGARD. Details are given in the appendix.

6.3 Invited Overseas Talks
Dr Scobbie gave two presentations on the phonetics-phonology interface and the implications for surface-oriented phonology at Johns Hopkins University, Baltimore USA, April 28th - May 5th, 2000. See also [17] in the list of conference presentations.

6.4 Non-academic dissemination
The press, radio and TV outputs were more in the character of reports about our research, rather than broadcasts or news articles generated by us. The Edinburgh Evening News article was a. We have only included those with a bit more detail [2], [3] and [5] as outputs on REGARD.


7. Impacts
The Scottish National Dictionary Association has shown continued interest in the research. Unpredictable distribution of vowel categories in particular English and Scots lexemes (e.g. vibes, dude, psycho, gey) and social dimensions of vowel incidence (and to a lesser extent, phonetic targets) are important for any pronunciation guide for Scottish English and Scots. Academic impacts are presented passim.

8. Future Research Priorities
8.1 Methodological
In laboratory-based phonetic and phonological studies, we think our methodological advances merit further attention. The use of socially-structured subject sets avoids two major criticisms of much theoretical and experimental linguistic research: that it is unrepresentative and that it is unable to examine structured variation.

8.2 Theoretical
The relationship between categorical and non-categorical phenomena requires further close examination, ultimately to discover whether this distinction itself is one of kind, or one of degree. A theoretical underpinning to the a priori simple and appealing concept of a phonological inventory needs further examination. Can our conclusions about /ai/ be extended to other quasi-phonemic cases of syllabically, prosodically and morphologically-conditioned extrinsic allophony and to contrasts in phonological systems with a low functional load? Are our phonetic results on /ai/ applicable to other cases of short/long diphthongs?

8.3 Applied
A cornerstone of diagnosis and treatment in Speech and Language Therapy are standardised tests that catalogue the chronological age of acquisition of a representative set of phonological contrasts. We think that extrinsic allophones should be added to such tests, and we will pursue this idea. Our descriptive results, together with results on the role of specifically Scottish consonant phonemes by Dr Jane Stuart-Smith, University of Glasgow, suggest that the time may have come to update the main standardised assessment of Scottish English acquisition, the Edinburgh Articulation Test.
Appendix

Conference Presentations


