

Speaker, Community, Identity: Empirical and Theoretical Perspectives on Sociophonetic Variation

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ABSTRACT

This presentation focuses on our understanding of the relationship between patterns of variation in speech and the social dimensions characterising individual speakers and their speech communities. Particular emphasis is placed on highlighting the centrality of 'sociophonetic' questions to phonetic theory more generally.

1. INTRODUCTION

The ICPhS offers an opportunity to take stock of the progress that has been made with some of the “big” questions which unite (indeed, define) the phonetics community. An eloquent perspective on these high-level objectives of phonetic research was depicted by Bjorn Lindblom [23] at the Stockholm ICPhS: "Phoneticians seek facts and insights about how speech is produced, perceived and acquired. And about how the world's sound patterns are related to the on-line phenomena of speaking, listening and learning." [23, p462]. Lindblom further highlights the need to ensure that our understanding of central linguistic-phonetic questions is located within broader models of behaviour, learning and evolution. All of this seems to require that we develop a clear view of the extent to which speech performance is governed by its role as a vehicle for social interaction. However, it is striking how relatively little this is attended to in phonetic research. Research on the shaping of the properties of speech by its social context has most typically been carried out within a *sociolinguistic* framework, feeding primarily into theories of language variation and change (e.g. the Labovian variationist paradigm; [19, 20]). However, in recent years there has been a tangible increase in awareness of the relevance of sociophonetic variation for core areas of phonetic theory. This is the focus of the present paper.

2. SOCIAL-INDEXICAL FEATURES

A key platform for contemporary interest in the indexical properties of speech is Abercrombie's influential account [1] of how “the medium, not being taken up by carrying the patterns which convey language, is thus able at the same time to accommodate a quite separate complex system of non-linguistic signs” [1, p6]. Abercrombie points out that while some indexical properties are non-volitional, arising from long- or short-term organic properties of the vocal apparatus, others appear to be learned and systematically

present in the performance of an individual or members of a speech community. The latter impact more centrally on the core areas of phonetic theory referred to above and they constitute the central focus of what has been referred to as ‘sociophonetics’ or the study of the ‘social-indexical’ properties of speech. These are the central focus of the present paper.

As Abercrombie points out, a key role of learned social-indexical properties of speech is to provide an index of group membership. The investigation of group-correlated variability has long been the main-stay of variationist sociolinguistics. The methodology typically adopted is to identify a candidate sociolinguistic variable and to quantify all of the variants observed within a representative sample of the performance of a defined community. Table 1 provides an example of this line of research, showing the patterns of realisation for the variable (t) in Tyneside English [5].

	<i>Variant</i>					<i>n</i>
	ɹ	ʔ	t	ʔt	ʔ	
<i>older WC males</i>	15	35	7	42	2	178
<i>young WC females</i>	21	39	5	20	13	402
<i>young WC males</i>	3	59	4	23	12	230
<i>older WC females</i>	40	18	27	12	2	404
<i>older MC females</i>	12	27	39	20	2	366
<i>older MC males</i>	6	32	5	53	4	398
<i>young MC females</i>	2	42	5	17	34	383
<i>young MC males</i>	1	46	4	27	23	305

Table 1: % realisations (to the nearest integer) of variants of (t) in word-final pre-vowel position, by speaker group (n=4 per group), Tyneside English corpus (WC = working class, MC = middle class, n = number of tokens analysed).

As is typically the case in studies of this sort, the patterns which emerge are not categorical. Nevertheless the results do indicate some significant differences across sub-groups of the sample; for example, plain [t] is only found to have a significant presence in the speech of older women; use of [ʔ] is non-uniform, being most marked in younger (especially MC) speakers. A critical evaluation of this *genre* of investigation might call for greater sophistication with regard to defining the contexts within which variability is tracked and in respect of defining what a sociolinguistic variable actually is. However, irrespective of these (and other) points, there is now a substantial body of evidence from a range of languages that points to significant systematic variability in speech as a function of non-linguistic factors such as speaker age and sex, and a

complex set of interacting dimensions typically badged as “class” (see [3, 29] for recent surveys).

Most previous studies of social-indexical variation have been based on auditory analysis of segmental variables. Nevertheless there has been a long-standing interest in applying acoustic analysis to the analysis of vowel variation (generally considered to have started with [21] and amply described in [19] and [40]). It is only more recently that consonant variation has been studied with the assistance of instrumental phonetic techniques, but it is significant that the use of these techniques has shown that systematic variation of this sort can also be found at a relatively fine-grained level of phonetic realisation.

For example, in an analysis of pre-pausal (t) in the Tyneside and Derby varieties of English, Docherty & Foulkes [6] quantified two acoustically salient features of stop realisation in this context: (i) ‘continued voicing’, where periodicity associated with the vowel continues through the stop occlusion, and (ii) the occurrence of a period of ‘pre-aspiration’ manifested either as noisy excitation of formants in the transition between vowel and stop and/or an interval of what appears to be alveolar fricative energy *before* the stop closure (see Fig. 1). The key finding of this study was that these properties are not equally distributed across the speaker sample: the continued voicing pattern is particularly associated with Newcastle males, with no class or age differences; pre-aspiration is strongly associated with young Newcastle women (both of these features were found to occur much less commonly in Derby and similar inter-group differences were not found). This suggests that systematic consonantal variation, like that of vowels, can be very fine-grained: in these examples, the locus of variability is subsegmental, perhaps best expressed in terms of the relative timing of articulatory gestures.

Recent research has also indicated that social-indexical variation is not restricted to segmental or sub-segmental aspects of speech production, but can also extend to other properties of speech. For example, a study of voice quality in Glaswegian [39] revealed “clear differences in voice quality according to age, gender and, above all, social background”. There is also evidence that intonation can be implicated in social-indexical marking [4].

The overall picture then is one of a diversity of phonetic resources being harnessed systematically by speakers for social-indexical purposes. The details of such variation differ across languages and varieties, but the fact that it is so ubiquitous suggests that social-indexical variation is a fundamental element of speech communication in general.

While most previous work in this areas has tended to look at the association between aspects of speakers’ performance and primary (or 1st order) social factors such as age, sex and class (referred to by Milroy & Gordon [29] as “analyst’s constructs”), there is an increasing awareness that this may only reflect part of the social-indexical function fulfilled by variability of this sort. In particular, the concern is that a focus on the performance of socially-defined *groups* may mask the crucial area of how

individuals’ performance is shaped by *locally-constructed* social context [27, 28].

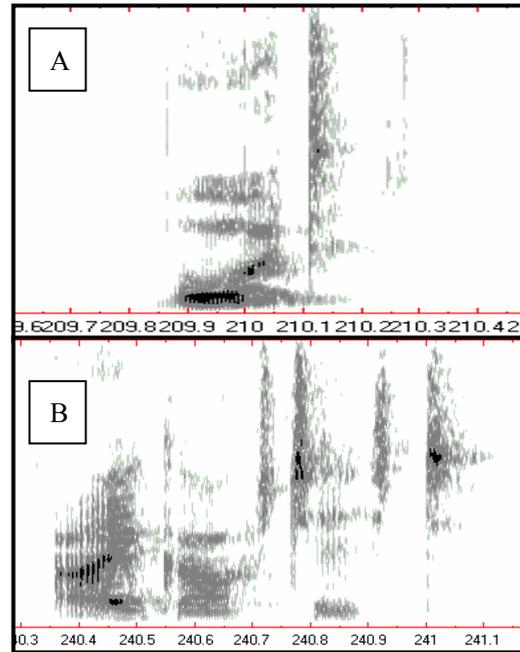


Figure 1: Spectrograms of (A) *boat* (B) *I got it* produced by speakers of Tyneside English (an old WC male and young MC female respectively). (A) illustrates ‘continued voicing’. (B) shows examples of ‘pre-aspiration’ marked by alveolar frication prior to the stop occlusion for the (t) in *got* and *it*.

These concerns are reflected to some extent in the investigations of the interaction between personal social networks and phonological variation (e.g. [26]), and in more recent years are particularly highlighted in the more ethnographically-oriented approach to sociolinguistic research advocated by (amongst others) Eckert [10].

Johnstone & Bean [16, p236] note that “[while] class, sex, age, region, the nature of the linguistic task and the make-up of the audience all have an important bearing on how people sound,... they do not *determine* how people sound. These social facts along with other factors such as ethnicity, ideology and identity, provide (or withhold) resources among which individuals choose as they decide how to be and talk”. In other words, in order to fully understand the social-indexical functions of speech we need to begin to probe “how speakers frame their understanding of linguistic varieties and map those understandings onto people, events and activities that are significant to them” [14, p35]. This is what (following [37]) is increasingly referred to as 2nd order indexicality [27, 28].

It is fair to say that we know substantially less about how this particular aspect of indexical behaviour is manifested in speakers’ performance. However, we can see evidence for indexicality of this sort influencing individuals’ phonetic behaviour in the language use of adolescents as their trajectory towards establishing their own identity propels them through diverse patterns of behaviour including phonetic behaviour [10, 17]. But adults, too,

commonly report that they are multi-lectal and that they choose to express themselves differently according to context (although the level of consciousness of that choice does seem to vary [36]). Nevertheless, there is relatively little concrete evidence about what this actually means in phonetic terms (in terms of speech production/perception, for example), and about how speakers make use of this capacity in natural situations. It is also fair to say that until relatively recently there were relatively few studies of the way in which individuals perceptually evaluate the different varieties to which they are exposed. This is a key element in our understanding of 2nd-order indexicality (see [30, 41] for recent reviews of work in this area).

Thus, elaborating on the overview given above, the picture that emerges from work on social-indexical aspects of speech is one of speech production providing a resource which can be harnessed in systematic fashion by individuals for social-indexical purposes which may be as much about asserting individual identity (and “difference”) as about asserting association to a particular socially-defined group. Furthermore, it seems that individuals have the capacity to migrate in and out of particular patterns of performance as dictated by their dynamic orientation to the social context.

3. THEORETICAL STATUS

For sociolinguists findings of this sort help inform theories of the interaction (both diachronic / synchronic) between social factors and language performance. From the point of view of phonetic theory, the ubiquity of systematic social-indexical variability raises issues about how such variability is controlled and learned by individual speakers; i.e. how can we account for it as part of the on-line phenomena of speaking, listening and learning?

The answer is that we don't really have an account for it at all. As highlighted by Francis Nolan at the last ICPHS [31], “the devil is in the detail”; current models provide only a limited account of systematic fine-grained phonetic variability not attributable to physical causes. Nolan based his arguments principally on allophonic and dialectal variation, but the same applies *pari passu* when one considers social-indexical variation.

To all intents and purposes the bulk of work geared to building theories of speech production, perception and acquisition has dealt with speech as if it could be lifted out of its social context. To some degree this is perhaps a consequence of the search for a solution to the non-invariance problem (i.e. there has been a focus on invariance rather than on variability, and it has been ‘convenient’ to marginalise the many additional sources of variability arising from social-indexicality). It is also an approach that has been bolstered by the tendency within phonology to marginalise systematic features that might be attributable to non-linguistic factors [7]. What this fails to recognise, however, is the fact that the social-indexical properties of speech are fundamentally intertwined with the other strands of information present within the signal.

Social indexicality is expressed in precisely the same media as information about lexical contrast: the auditory and vocal mechanisms that are used to encode and decode lexically-contrastive information also serve to encode and decode indexical information. Furthermore, social-indexical properties clearly form part of what a language learner needs to learn. Learning about speech sounds involves more than acquiring knowledge about lexical contrast and the associated motor skills that enable the speaker to reproduce and understand contrastive information within a phonetic medium. In addition to this, language learners must learn to control their speech production mechanisms in order to sound like other members of their geographically- and socially-defined speech community. That is, they learn a sociolect and accent. Learners furthermore learn to interpret and understand the phonetic variation they hear in other speakers' speech.

The challenge for phonetic theory then is how to move towards a more integrated account of lexical/indexical aspects of speech reflecting the fact that these are intertwined in production/perception and that both are clearly learned and systematic properties of sound patterning.

4. CLUES FROM LEARNING

One way to pursue this matter is to consider it from the point of view of a child who, in acquiring a first language, faces the task of having to figure out the systematic patterns present in the ambient phonic stimuli. This was one of the goals of a recent research project [8, 9, 12] which sought to investigate how social-indexical features emerge in children's performance. It is axiomatic that children acquire ‘an accent’ in the process of learning to speak, but, what we know of social-indexical variability within a variety suggests that the notion of ‘accent’ is more complex than many assume. Pursuing this also involves tackling the question of what sort of phonetic variability children are exposed to in child-directed speech (an area which is surprisingly under-researched, with most previous studies focusing on aspects of prosody as opposed to other types of realisational variation). The following are three of the key questions addressed in the project: (1) what is the nature of the structured variability in the sound patterning children are exposed to during the process of phonological learning? (2) how do children acquire the phonetic features that are indexical of their speech community? (3) what are the implications of the answers to (1) and (2) for our understanding of how linguistic and indexical information is handled in speech production/perception?

Our study was carried out in a Newcastle vernacular community for which previous research had yielded a thorough account of patterns of social-indexical variability for adult speakers. Two parallel studies were undertaken, one cross-sectional and one longitudinal. In total 96 recordings were produced from 53 normally-developing children. Only a sample of the findings is referred to below,

drawing from the cross-sectional sample shown in Table 2. An age-range of 2;0-4;0 was chosen on the basis that the level of phonological development typically achieved at 2;0 would probably be the earliest feasible starting point for addressing the research questions. Beyond 4;0, it would be difficult to control for other sources of input, e.g. from the peer group and younger siblings.

	2;0	2;6	3;0	3;6	4;0	AGE (± 1 month)
Male	4	4	4	4	4	
Female	4	4	4	4	4	

Table 2: cross-sectional study sample design (no. of subjects by age and sex):

The principal material collected was a sample of interaction between mother and child, mediated by the fieldworker. Typical interactional situations were playing with a toy or reading a book. The goal of each recording session was to obtain as much data as reasonably possible, with the focus/topic of the interaction geared by the fieldworker towards eliciting tokens of relevant variables. Recordings were made in as quiet surroundings as could be achieved at the subjects' homes, using radio lapel microphones and digital recording facilities.

Several phonological variables were analysed including (t), (p), (k) and a number of vowel variables. Auditory analysis was used to record transcriptions using IPA symbols. This was supplemented by acoustic analysis, both to register measurements of key parameters (e.g. voice onset time) and also to compile a detailed profile of the acoustic properties found in each token. For (t) we analysed over 3,000 tokens from mothers, and over 7,500 from children.

Space constraints preclude a detailed presentation of the findings, but for present purposes the following outcomes can be highlighted (derived from an analysis of variability in the realisation of (t)). There was evidence in child-directed speech of gender differentiation by mothers in their speech to male as opposed to female children (for example in relative frequency of the usage of the more localised glottal variants of (t)). This of course is in line with a whole range of other gender-differentiated parental behaviour, but we are unaware of any previous indication that this differentiation extends to fine-grained phonetic realisation. We interpret this as suggesting that the role of child-directed speech may be broader than is often supposed, not being simply restricted to enhancing linguistic contrast as has often been claimed.

The performance of the child subjects was as variable as expected, but there were clear signs of social-indexical patterns characteristic of adult speakers starting to emerge even in some of the youngest speakers. The role of ambient patterns as a model for the child was reinforced by the finding that children of both sexes made substantial use of the pre-aspirated variants of pre-pausal (t) known to be characteristic of adult female speakers (the influence of maternal input at this stage of development is predicted by Labov [18]). However, our results yielded no significant gender variation, except for the 3;6/4;0 age-band at which some sign of differentiation was evident (c.f. Allen [2], who

shows sharp gender differentiation at 8;0 for children from the same community, suggesting that the intervening period is a key time in the development of social-indexical features of speech relating to individual identity).

We are in the process of investigating to what extent these findings are replicated across other variables within the same data-set and in other varieties of English, but their relevance to the present discussion seems to be as follows. Given the intertwining of the phonetic patterns associated with social-indexical and lexical information within speech it is not obvious how a child could know *a priori* which is which. If early learning is focused on identification of sound-experience associations in general (as opposed to a narrow focus on sound-lexical meaning), then it may be the case that there is a stage of development at which the linguistic/indexical channels are fused. For example it may be as significant to a child that its mother says [k^hv^ht] but its father says [k^hvt] as the fact that both forms indicate a place for sleep. It may be that these channels are separated out in later development (a point which is discussed further below), but the key point is that theories of phonological learning need to take full account of the systematic social-indexical patterning which is intertwined with that associated with lexical contrast. Thus our findings emphasise the social embeddedness of phonological learning. The path followed by the child is partly about learning the sound patterns for lexical contrast, but is also about learning to be a member of one's family and broader community and to be able to communicate effectively within those groups.

5. CONVERGENCE

It is not only sociophonetic studies that bring into question the way in which indexical properties of speech are handled within phonetic theory. It is striking that identical points have been raised by a number of investigators in the area of speech perception. Evidence from a number of studies suggests that aspects of the signal which have in the past been viewed as being unconnected to speech perception or word recognition (such as speaker characteristics, gender, accent, speaking rate) do appear to be implicated in decoding the linguistic properties of the speech signal (see [22] for a review). An interesting example of this is the finding [38] that gender stereotypes appear to influence listeners' categorisation of tokens on a nine-step [s]-[ʃ] continuum, suggesting that "higher-level relatively complex social expectations might have an influence on such low-level basic processes as phonological categorization of the speech signal" [38, p93]. In light of studies of this sort, Lachs et al [22] suggest that "the traditional dichotomy between linguistic and extra-linguistic information in the speech signal may be somewhat misleading and possibly an incorrect characterization of the sensory information that human listeners perceive, encode and store about their language" [22, p151].

These findings, as well as those of sociophonetic studies,

are a significant impetus behind the application of stochastic models of learning and representation to speech (e.g. [32, 33]). This offers a theoretical framework which accommodates a more integrated view of systematic indexical and lexical properties of speech. At the heart of this is a recognition of the value of sub-phonetic detail and of the unlikelihood that it is simply thrown away either in the process of acquiring phonology or in the on-line task of decoding the speech signal. A key element of this theoretical modeling is the adoption of exemplar theory (see [15, 34]) which assumes that perceptual categories are derived from phonetically detailed memory traces of tokens of words that have been heard/recognised.

It is still relatively early days for stochastic modeling and the application of exemplar theory to speech production and perception. Nevertheless, these approaches offer a plausible framework for embedding a social-indexical dimension into models of speech production/perception. Experience would lead to knowledge being acquired by individuals of the typical patterns of correlation between phonetic forms and individuals/groups of individuals. This information could then be used in adaptively tuning aspects of their performance to achieve the intended social-indexical outcomes.

A crucial attraction of these models is that they embed all of the systematic properties of speech (including those related to indexicality) within phonological knowledge more generally, without necessarily jettisoning some of the basic notions of the conventional models, such as abstraction and productivity. So, for example, Luce et al [25] argue for a mixed (abstract-/form-based) representation, noting the possibility that “episodic models may behave as if they contain abstract representations, via emergent generalisations over episodes” (see [42] for discussion of emergent generalizations in phonological learning). Indeed, Pierrehumbert [32] argues that abstract and form-based representations are two sides of the same coin; within a stochastic model the statistical properties of variation are the necessary basis for deriving abstraction.

However, where these models break radically from conventional thinking is in their assertion that phonological knowledge is dynamic and constantly updated by experience. Furthermore, to the extent that individuals’ experience may differ, phonological knowledge does not necessarily take exactly the same form across speakers of the same language or even variety. These features are in line with studies showing real-time changes in the details of individuals’ phonetic realisation [35, 13] They are also in line with a view of social-indexical features which sees the individual as the prime channel through which these features are determined and interpreted.

These promising theoretical developments have the effect of placing a much greater focus on the specifics of phonetic realisation than has been the case in the past. Equally they challenge investigators to look beyond the conventional primacy of the lexical encoding within the signal to consider other types of information which speakers learn to

systematically encode [24]. The time would seem to be ripe for our knowledge of social-indexical variation in speech to move more towards the centre of the theoretical stage.

As it does so, research methodologies will need to be adjusted appropriately. At the very least this calls for socially-sensitive sampling of data [7], both in production studies when the question is generally to do with homogeneity of a group of speakers, and in perception studies where there is the additional question of degree-of-match between the listener and the phonetic properties of test stimuli (i.e. what makes for a homogeneous group of listeners?). But it also indicates the need to supplement the typical focus on group means relating to measures of production/perception with a more detailed and systematic account of individual variability. See [11] for an overview of these methodological issues.

8. CONCLUSION

This paper suggests that, rather than being on the margins, social-indexical properties of speech ought to occupy a more central position within phonetic theory. As learned and systematic properties of the speech signal they are a key strand of the rich stream of information encoded within the speech signal. In order to do this, we need to develop more thorough accounts of the way in which speech production is harnessed to convey social-indexicality, and we need to continue to develop theoretical frameworks which are able to accommodate the multiple intertwined strands of meaning systematically encoded in the speech signal and interpreted by listeners.

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