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Descriptive adequacy in phonology: a variationist perspective

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This paper offers a variationist critique of aspects of phonological theory and method, focusing on advances in descriptive methods and highlighting the problems that need to be addressed in explaining phonological variation. On the one hand, socially situated language samples which have been systematically collected and analysed constitute a legitimate – indeed often vital – source of evidence to be utilised by linguists for assessing and refining theoretical models. On the other hand, variationists cannot operate in isolation from theoretical concerns, and can benefit from an evaluation of the competing theoretical frameworks available to them.

The paper begins with a brief review of the philosophical foundations underlying the tension between 'external' and 'internal' methodology. We then focus on a particular phonological example – glottalisation in English. We demonstrate that phonological models of this can be complemented by systematic and accountable data collection and analysis of the kind associated with sociolinguistics. It is suggested that the patterns of variation produced by speakers are significantly more complex than has been indicated in the phonological literature. Consequently, these approaches can be usefully expanded and extended as theoretical models. We discuss some desiderata for extending the range of phonological models, focusing chiefly on the need to account for variability and change in language.

1. Introduction

The aim of this paper is to offer a critique of aspects of phonological theory in variationist terms, by bringing together some of the concerns of theoretical phonology with those of the quantitative paradigm of sociolinguistics associated particularly with the work of Labov. This subfield, which has come to be described as 'variation theory' (see particularly Labov 1994; Chambers 1995), characteristically uses evidence from large bodies of systematically collected contemporary language data to develop socially sensitive accounts of language change.

Insights from both of these frameworks need to be considered in order to work towards a theoretical model that takes adequate account of both inter-speaker and intra-speaker variation. We consider the roles of what is sometimes called 'external' evidence (derived from analyses of linguistic

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corpora) and a posterioristic reasoning in the development and defence of theoretical positions, looking also at the use of so-called 'internal' evidence and a 'top-down' theory-driven approach to phonological analysis. In this connection, it should be noted that like other linguists variationists look initially for an underlying commonality: Labov has remarked that 'the general program of all linguists begins with a search for invariance' (1975: 7). Once invariant phenomena have been excluded, attention is focused on the 'orderly heterogeneity' characteristic of socially situated speech. We make this point to avoid the simplistic division between 'theoretical' and 'atheoretical' that is sometimes used to reject the findings of data-based (including variationist) research, our chief concerns being with observational and descriptive adequacy and thus with the contribution of adequate descriptive accounts to linguistic theory.

By way of exemplification we examine recent phonological accounts of glottalled and glottalised variants of English stops, and compare these with variationist studies of the same phenomena. We shall see that patterns of variation (both within and between speakers) emerge as quite systematic, but are more complex and of greater magnitude than has been suggested in the phonological literature. Consequently, these accounts may require revision or refinement. Indeed, it may be reasonable to work towards the development of an integrated theoretical model that gives a central place to variation. Phonologists have apparently not often attempted to integrate what might be described as 'top-down' (or primarily theory-driven) with 'bottom-up' (primarily data-driven) approaches; exceptions are Kiparsky (1988, 1994) and many of the contributions under the Laboratory Phonology rubric (Kingston & Beckman 1990; Docherty & Ladd 1992; Keating 1994; Connell & Arvaniti 1995). However, it is worth noting that in the field of syntax Henry's (1995) account of dialect variation within a Principles and Parameters framework attempts to bridge the chasm between these two research traditions, with useful results. Not only does she illuminate patterns of syntactic variation in a sociolinguistically accountable fashion, but derives from her findings clear implications for the theory, in particularly its latest version, the Minimalist program (see further Milroy 1996).

Variationist approaches generally differ from strongly theory-led approaches in a number of respects. First, prior specification of a closed set of precisely formulated theoretical assumptions is not usual: the theoretical base is initially relatively broad, and theoretically important insights frequently emerge in the form of working hypotheses, many of which are formulated in the course of systematic analysis of a substantial body of data. An example is Eckert (1991), who uses data collected from male and female adolescent peer groups associated with sharply polarised social categories to further develop a chain-shift model. As Labov (1994) makes clear, such a model is intended as a set of universal principles which state constraints on possible changes in vowel systems. Thus, the aims of the subject are just as

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'theoretical' as any other branch of linguistics. A second requirement is that the description offered must be ACCOUNTABLE to the data, which in turn is normally a sizeable sample systematically collected from one or more speech communities. The principle of accountability as formulated by Labov requires not only that occurrences of a particular variant (such as a glottal stop) should be noted; it is necessary also to identify sites where it can occur and to note not only instances of that variant but all the variants that occur in these sites, even if the pattern revealed does not immediately support a priorly specified theoretical position. Characteristically, variationists handle these data quantitatively, specifying distributional constraints in terms of a greater or lesser likelihood of occurrence rather than as categorical. In our current work in Tyneside[1] for example, to be discussed further in the body of this paper, at least FIVE variants of 'underlying' /t/ are auditorily distinguishable and are providing the input to quantitative analysis. Quantification can thus be seen as a refinement in microlinguistic description.

These methodological principles are largely independent of the social side of the variationist enterprise, although in fact a wide range of social factors has been found to be relevant to an account of patterns of variant distribution and mechanisms of linguistic change (see again Chambers 1995). Those which are particularly relevant to the arguments in this paper are social class, gender and age. To this list we might add the situational context in which data are gathered, as systematic patterns of variation within the speech of individuals are associated with this factor. Following the agenda set out by Weinreich, Labov & Herzog (1968), systematic social and stylistic variation is treated by sociolinguists not as a peripheral phenomenon irrelevant to linguistic theory, but as a central, socially functional aspect of human language without which linguistic changes could not be implemented. Hence the importance of a systematically designed and collected language sample, which can offer insights not afforded by observation of even quite large bodies of unsystematically sampled data. Such a sample allows a range of clear distributional regularities to be specified and data that appear initially to be irregular or randomly distributed (to be in 'free variation') may nevertheless turn out to exhibit theoretically suggestive regularities in their sociolinguistic distribution. We attempt to demonstrate the contribution

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of socially and situationally sensitive accounts of phonological variation in section 4 below.

In what follows we bear in mind that a strict division is often maintained in the literature (implicitly or explicitly) between 'internal' and 'external' aspects of language, and that findings of research into what Chomsky calls 'E-language' are often undervalued and sometimes discounted. In section 2 below we briefly review some of these philosophical and methodological differences which characterise the two different research traditions which we subsequently suggest are in need of integration.

2. Some methodological issues

Traditional pre-Chomskyan linguistics has always explicitly depended on the analysis of 'external' (E-language) data, and the methodology has normally involved a primary examination of data followed by an attempt to build a theory that can model the attested data. It is generally accepted that no linguistic observation or description can be devoid of theory and that all linguistic observation is to that extent 'theory-impregnated' (Popper 1972: 104). Anyone attempting to describe a corpus of data brings to bear (pre-) theoretical assumptions which in part dictate the method of analysis. For example, in the simplest terms, one expects there to be entities in the data identifiable as phonemes, morphemes, words and sentences. These entities are of course theory-dependent constructs. Thus, in data-driven research we do not claim to report 'raw' data or wholly objective 'facts' about language. Data analysis necessarily involves a process of extraction which is to some extent informed by an individual's own judgements and interpretations, informed however (implicitly or explicitly) by theoretical linguistic frameworks.

Nevertheless, despite the fact that no analysis can be entirely theoretically neutral, it is clear that linguistic analysis must depend to an extent on the collection and analysis of 'external' corpora. This dependence is perhaps greatest for phonology. Whereas knowledge of syntax, for example, may be argued to be reasonably accessible to the intuitions of the investigator or of the native speaker informant (in the shape of grammaticality judgements), knowledge of phonological variation in language is far harder to access. This is partly because it is a property of a speaker's overall performance, as opposed to a single phrase or sentence in the case of grammaticality judgements, and partly because it is not at all obvious what strategy could be used to tap into a native speaker's intuition in this regard. Whilst no corpus can be exactly representative of a 'language' (Chomsky 1965), extensive data-bases that are systematically collected and analysed in an accountable way are more likely to overcome the limitations of intuition than more limited data-bases that have not been thus collected and analysed. This means that in practice a strict separation of theory-oriented and data-

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oriented approaches is not achievable, and this is particularly clear in the case of phonology. Apart from the difficulties in accessing speaker inuitions that we have noted, recall also that phonology takes much of its terminology, metalanguage and representational framework from the concrete domain of phonetics. Thus, one could argue that whereas the data used by linguists are theory-impregnated, theory is also necessarily data-impregnated.

The question, therefore, is not WHETHER we need to use a corpus of data in phonology, but HOW we are to use it vis-à-vis the various theoretical positions that can be adopted. In a theory-led approach, the corpus is not regarded as the principal source of information; rather, its function tends to be reduced to one only of verification. In a data-led approach, on the other hand, patterns observed in the data must be accounted for whether or not they support some prior theoretical position. In this paper we aim to contrast these two approaches. (The methodological controversy concerning the relationship between theory and data is of course one which, in a number of different guises, has exercised linguists for a very long time and generated a large literature; see for example Labov (1975), Givón (1979), Botha (1981), Matthews (1993).)

A second fundamental issue which must be borne in mind when making reference to data presented within the framework of a phonological analysis concerns the phonetic properties of the data itself. It is typically the case that the data used by variationists, or the less extensive examples used elsewhere, are based on auditory analysis. For instance, in transcribing a body of taped data, the usual practice is to listen for auditorily distinguishable categories, usually segments where phonology is concerned. Of course, though, what the listener hears and the transcriber transcribes may not be a completely faithful representation of what the speaker actually says. Coarticulatory effects, for instance, can obscure the segmental targets we assume the speaker is aiming for. Likewise, similar acoustic products can result from various articulatory configurations: labialisation and pharyngealisation, for example, both cause the acoustic effect of 'flattening' formants (Jakobson, Fant & Halle 1952). In analysing a corpus the transcriber makes inferences about the articulatory activity of the speaker often based on auditory analysis alone. The articulatory information thus collated then tends to be projected on to phonological – therefore cognitive – structures, which in turn introduces yet another level of abstraction and distance from the data itself. The implication of all this for phonology of course is that one can be dealing from the start with entities that have reality only for the analyst, and not the speaker (an issue raised elsewhere by, for example, Browman & Goldstein 1992).

This last point can be amply illustrated with reference to the Tyneside glottal variants we discuss at length later in this paper. [ʔ] is usually described as sharing many of the properties of other voiceless stops (for example, Gimson 1980; but for a conflicting view see Ladefoged & Maddieson (1996: 75)); specifically, it is the result of a build up of air-pressure behind an

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occlusion in the vocal tract which is maintained for an appreciable interval of time and during which there is no vocal fold vibration. Hence [tʔ] or [ʔt] is seen as a form of double articulation involving the overlap of two sounds with the same degree of constriction and similar temporal characteristics, differing only in respect of their place of articulation. However, such a conception contrasts markedly with observations of the ACOUSTIC characteristics of these sequences (Docherty & Foulkes 1995). Figure 1 is a spectrogram of the word *daughter*, a typical example from the Tyneside corpus (this token being extracted from the word-list read by a young middle class male). The /t/ in this example is realised as a glottal-reinforced stop, the variant which is usually transcribed as [tʔ] or [ʔt] (see, for example, O'Connor 1947; Wells 1982; Carr 1991; Milroy, Milroy & Hartley 1994).

Figure 1 exemplifies the findings of Docherty & Foulkes (1995), namely that in the vast majority of these 'glottal-reinforced' tokens it is difficult to identify an interval on the spectrogram which could be labelled the 'stop gap' (and in the few cases where it is possible to do this, the duration of the gap is markedly shorter than descriptions in the literature would predict). In fact, 68% of tokens have voicing throughout the interval where the glottal articulation is perceived. In some cases all that is required to cue a percept of a glottal articulation is one or two pulses of voicing which are slightly irregular with respect to neighbouring pulses.

We are thus presented with two sharply contrasting perspectives on the same sample of speaker performance: that which arises from an auditory analysis, suggesting a superposition of [t] and [ʔ]; and that provided by an acoustic analysis which suggests the glottalised token cannot be adequately described simply as an overlapping production of [t] and [ʔ]. The acoustic analysis would therefore indicate the phonological link underlying [t] and '[ʔt]' is a complex one, and far more opaque than the simple reconfiguration of material which would be the solution espoused in most phonological models. (See further the discussion in section 3.2 below.)

We believe that understanding the relationship between these perspectives is fundamental in enabling meaningful theoretical discussion to take place. Of course it is not always possible or practical to undertake acoustic analysis of large bodies of data, but the key point here is that analyses based on intuition or transcription of limited sets of data do not make allowance for the complexity of speaker performance which they are taken to represent. Moreover, we believe that this can have significant repercussions for theoretical matters.

Leaving these issues aside, we now move on to consider in greater detail the contribution which systematic observation and analysis of data can make to phonological theory. We focus on the phenomenon of glottalisation in English, reviewing first of all two strongly theory-led accounts, and going on to describe findings from two variationist studies that bear on their descriptive and theoretical adequacy. These findings concern:

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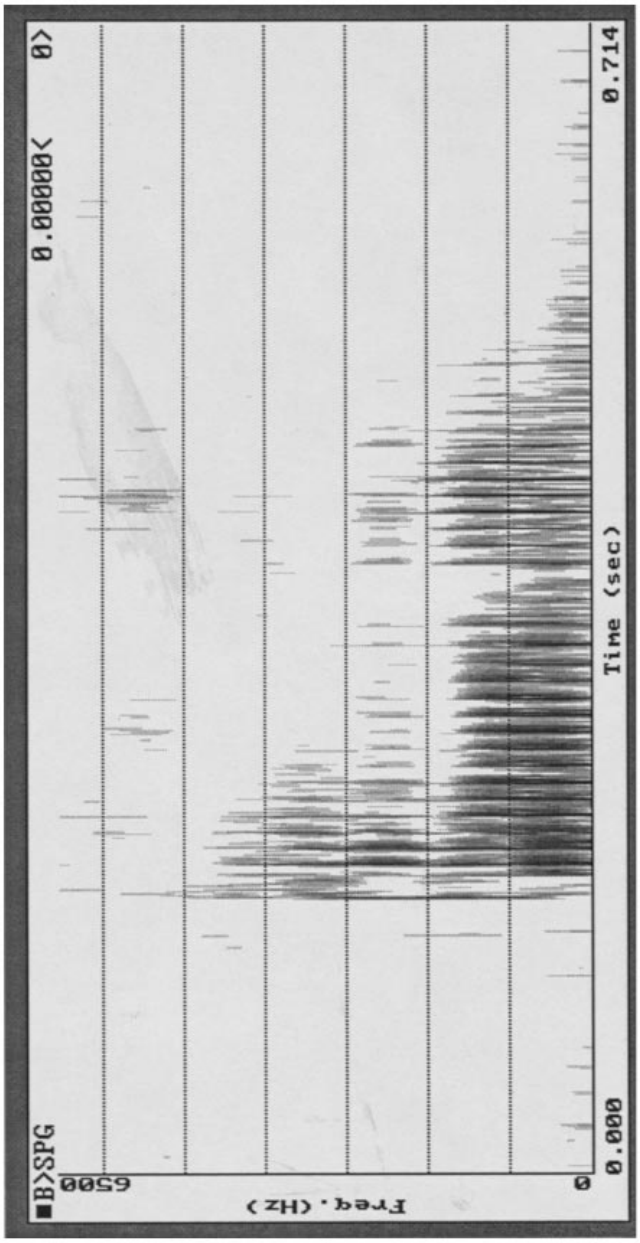


Figure 1
Spectrogram of *daughter* (spoken by 18 year old middle class Tyneside male)

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- the phonological distribution of glottalisation in Tyneside English
- its relation to other variants (of /t/ in particular)
- its possible stylistic and discourse functions
- its sociolinguistic distribution

We conclude that current theoretical models may, in light of these findings, require revision and extension.

3. Recent phonological accounts of glottalling and glottalisation

There is no doubt that glottalling (realisation of /t/ as [ʔ]) has become increasingly established in British English during the twentieth century. The same is largely true of glottalisation (traditionally described as glottal reinforcement of /t/, and in some accents also of /p/ and /k/) in some varieties of RP, although in accents such as Tyneside it appears recessive. Interest in these phenomena has been shown from the perspective of phonetics (particularly Andrésen 1968; Roach 1973; Wells 1982; Lodge 1984), sociolinguistics (for example Trudgill 1974; Romaine 1975; Newbrook 1986; Mees 1987; Holmes 1995; Kingsmore 1995), and phonology. It is the accounts provided under this last heading which we focus on in this section, presenting theory-led analyses by Carr (1991) and Harris & Kaye (1990) of glottal(is)ed variants in English. We bear in mind here that up to now the aims of sociolinguistic and phonological theory have been different and that the purposes for which the data have been assembled have also been different. In reviewing these analyses we highlight claims about the factors which determine the occurrence of one variant or another, and subsequently offer a variationist perspective on this work.

3.1. *Carr's (1991) account of T → R 'weakening' and of glottalisation in Tyneside English*

Carr (1991) focuses on 'weakening' and glottalisation in Tyneside English, considering in particular the environments which give rise to weakening as opposed to glottalisation. By weakening Carr is referring to the process whereby /t/ is realised as [ɾ] or [ɹ] – what Wells (1982) has called the T-to-R rule. Glottalisation refers to what is traditionally described as reinforcement of /p,t,k/ with a glottal stop.

A general statement of Tyneside glottalisation is that it is found in voiceless stops and affricates following a primary stressed vowel both before a following obstruent and intervocalically. In the case of intervocalic glottalisation, a sonorant consonant may intervene between the vowels and the stop. Glottalisation applies irrespective of word and morpheme boundaries, leading Carr to describe it as an 'across-the-board' phenomenon.

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Morpheme-internal	Across morpheme boundary	Across word boundary
stupid	*clipper*	*clip her wings*
temper	*clamper*	*clamp her down*
pulpit	*pulper*	*pulp it*
pretty	*fitter*	**fit her*
winter	*chanter*	*chant it*
alter	*halter*	*halt her*
reckon	*wrecker*	*wreck her*
hankie	*thinker*	*think her strange*
welcome	*milker*	*milk her*

Table 1
Glottalisation sites in Tyneside English

(from Carr (1991); note that the word-final stops before *him* and *her* in the third column are analysed as intervocalic due to the absence of [h] when these pronouns are unstressed)

Table 1 shows the examples presented by Carr of glottalisation sites under a range of boundary conditions.

From the perspective of the present paper two predictions made by Carr are important. First, he adopts Giegerich's (1985) view that English feet are trochaic, and therefore, due to the presence of an unfavourable stress contour, glottalisation is not predicted to occur in words and sequences such as *appear*, *attack*, *accuse*, *a peer*, *a tack*, *a cake*, *up here*, *at Easter*, *suck oranges*.

Secondly, noting the occurrence of weakening in what appears to be a glottalisation environment (word-finally and intervocalically, as exemplified by the asterisked form *fit her* in Table 1), Carr adopts the following position. He notes the presence of a syntactic category effect on the occurrence of weakening, namely that, with the exception of *lot* (and we would add *bit* to this list), weakening does not apply to nouns, adjectives or prepositions, even when monosyllabic and followed by an unstressed syllable. In these cases, glottalisation is found. However, Carr observes that this does not account for the entire process. In response to this, he postulates that 'weakening applies to feet formed under cliticisation *post-lexically*' and that this takes place prior to the across-the-board application of glottalisation. This analysis would explain why weakening is found in *fit her* and *put it* but not in *fitter*, *putty*, etc., because in the latter examples these feet are formed in the lexicon.

Therefore, Carr predicts weakening, but not glottalisation:

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i. in certain words belonging to non-lexical categories:
   a. *not: not a chance*, *not altogether*
   b. *but: but he wouldn't*
   c. *what: what a night*, *what is he doing*, *what about Jim*
   d. *that* (as a complementiser or determiner): *I knew that he would*, *eat that egg*
ii. in verbs:
   a. monosyllabic: *put it down*, *put in front*, *met him*, *hit him*, *get away*, *get up*, *got a light*, *I thought I had*, *fit her*
   b. bisyllabic, with stress on the second syllable: *allot it*, *delete it*, *incite it*, *excite her*
   but not when stressed on the first syllable: **edit it*, **elicit it*, **interpret it*

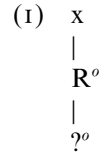
The principal focus of Carr's analysis is on demonstrating the 'post-lexical equivalent of derived environments', but in doing so, certain claims are made about the distribution of glottalisation and weakening in Tyneside English. This is the aspect of the analysis which we return to later in this paper.

3.2. *Harris & Kaye's (1990) account of t-glottalling in London English and of tapping in New York City English*

Glottalling and tapping are described by Harris & Kaye as lenition phenomena, and their patterns of occurrence in two varieties of English are explored as a means of illustrating the mechanisms and explanatory power of government phonology (for example Kaye, Lowenstamm & Vergnaud 1985, 1990; Harris & Lindsey 1995) which, it is claimed, can account for t-glottalling and tapping without recourse to resyllabification, ambisyllabicity or derivation by rule.

There are three stages to Harris & Kaye's analysis of t-glottalling and tapping. First, they describe the elemental representation of coronal stops and their 'lenited' variants. Secondly, they define the environment in which lenition takes place. Finally, they describe the nature of the segmental decomposition that takes place.

The proposed elemental representation of a coronal stop is shown in (1).

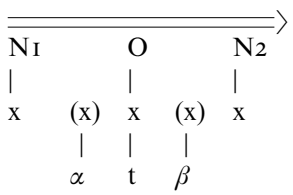
(1)


?^{o} is an occlusion element which has as its salient property a 'significant reduction in overall amplitude in the speech signal', and as its unmarked property 'an absence of resonating characteristics, which is consistent with

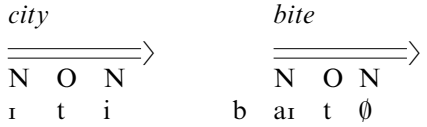
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an absence of any supralaryngeal gesture'. It is, according to Harris & Kaye's analysis, independently produced as a glottal stop. R^o is individually manifested as a tap. Its marked property is coronality, and one of its unmarked properties is a tapped articulation. Combining $?^o$ and R^o, with the latter as the head, yields a segment which is both coronal and a stop. In describing the lenition process, Harris & Kaye point out that 'each of these elements … defines a particular residual segmental content whenever other elements present in the initial representation are stripped away under reduction'. That is to say, if $?^o$ is lost from the above representation the representation which remains corresponds to a tap. If R^o is lost, the remaining representation corresponds to a glottal stop. Tapping and glottalling are therefore seen as the loss of particular elements from the internal composition of a coronal stop. As Harris & Kaye's paper is limited to a discussion of glottalling and tapping, they do not discuss other lenition processes that might be relevant, such as spirantisation and affrication, but Harris (1990, 1994) has discussed these elsewhere.

Harris & Kaye further provide a definition of lenition sites with the claim that glottalling and tapping (and other lenition processes) take place under the same governing conditions as shown in (2):

(2)


According to this analysis, /t/ is claimed to act as an obstacle to nuclear projection government and therefore comes under pressure to reduce in complexity. Note that by assuming Coda Licensing (Kaye 1990), the two apparently distinct environments where glottalling takes place (inter-vocalically and word-finally) can be conflated. This is shown in (3) (as exemplified by Carr (1993: 295)).

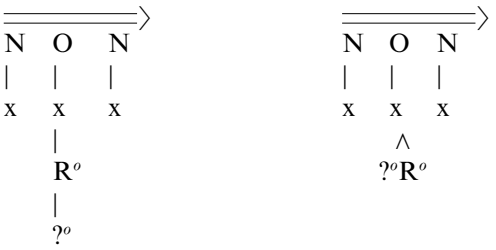
(3)


Harris & Kaye then describe the nature of the decomposition that takes place when the governing conditions for lenition are met. Lenition is broken down into two stages: breaking and element-loss. Breaking involves rearranging the occlusion and coronal elements into a contour structure

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which Harris & Kaye state is 'parallel to that normally assumed for prenasalised stops, light diphthongs or affricates', that is to say that it incorporates some notion of temporal precedence between the elements. This process is illustrated in (4):

(4) Initial Representation ⟹ Representation after breaking



Harris & Kaye point out that 'the broken structure describes a preglottalised coronal segment [corresponding to] the preglottalised unreleased version of /t/. When released onto a following vowel, it describes a preglottalised tap of a type that is actually attested in some leniting dialects, for example, in some varieties of English spoken in the north of Ireland and in the north-east of England, we find *ci*[ʔɾ]*y*, *Pe*[ʔɾ]*er*.'[2]

Breaking takes place in both the tapping and glottalling dialects investigated by Harris & Kaye (New York City and London) in the prime lenition site described above, but accents differ with respect to how the segment is subsequently decomposed. Subsequent decomposition depends on whether the governed nucleus is filled. In London English R^o is lost regardless of whether the governed nucleus is filled or not (resulting in glottal stops), and in New York City $?^o$ is lost only with a following filled nucleus, leaving the broken representation (corresponding to [ʔt]) for the unfilled nucleus cases (i.e. word-finally).

The analysis continues by noting that accents differ in the extent to which they permit lenition to operate at higher-order levels of projection (for example, word-internally, but above the level of the foot, where /t/ precedes a syllable bearing secondary stress) in forms such as (a) *retail*, *latex*, *context*, *daytime*, where the dominant foot preceding /t/ is degenerate, and (b) *sabotage*, *meditate*, *habitat*, *dinnertime* in which /t/ is preceded by a branching foot. Harris & Kaye point out that the precise extent to which

[2] As we discussed in Section 2, the phonetic correlates of such segments indicate that Harris & Kaye's description of them as 'preglottalised taps' needs considerable qualification. In some cases, it is possible that a form of tap is produced, but in many other cases it would not be possible to make use of this phonetic label to describe the (t) variants which are produced (see section 4.2). Consequently, the phonological link between these variants and non-glottalised forms is not as transparent as the government account implies.

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glottalling and glottalisation are found in different accents remains to be investigated, commenting that they may be subject to geographical and social factors. These, of course, are what we consider later in this paper.[3]

Harris & Kaye then consider how the Complexity Condition (Kaye, Lowenstamm & Vergnaud 1985; Harris 1990) determines the constraints on glottalling imposed by consonants adjacent to the /t/. They point out that a preceding obstruent blocks lenition, and that 'lenition is favoured if /t/ is preceded by a historical resonant, more especially if the latter has undergone vocalisation'. Rather than stipulating that the preceding segment must be [−consonantal] or [+sonorant] for lenition to occur, as has been done in previous analyses, Harris & Kaye appeal to the Complexity Condition, by which a governed segment cannot be more complex than its governor. Decomposition of /t/ following obstruents would countervene this principle (because inter-constituent government operates universally from right-to-left, i.e. is right-headed).

Whilst this is not the place to dwell on the fine detail of this account, it is noteworthy that whilst the complexity condition blocks lenition of /t/ to [ʔ] in the environment of a preceding obstruent, it would nonetheless not be countervened by the intermediate broken representation, i.e. a pre-glottalised stop.

The accounts that we have discussed are both very much more advanced with respect to their treatment of data than some of the theory-led analyses that have appeared in recent decades within generative and post-generative frameworks. These have often been content to support substantive theoretical claims (for example, regarding rule-ordering or analogy) by citing limited numbers of, sometimes dubious, examples culled from the literature. In the field of dialect syntax, Henry (1995) has made similar criticisms of Chomsky & Lasnik's (1977) account of features of Ozark English. However, the accounts by Carr and Harris & Kaye are neither accountable in the sense used in sociolinguistics, nor are they based on systematic sampling. It is possible that the data-bases are insufficient to bear the claims put forward, or that the theoretical base may be unable to accommodate the phenomena that actually occur.

There are, however, some issues which emerge as salient from a systematic variationist analysis that are not addressed even in the rather data-sensitive analyses reviewed above. These issues are taken up in the remainder of the paper.

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[3] More generally, we are aiming as part of our current project to bridge this gap in the literature. We are at present examining the patterns of spread of glottal variants with respect to the social variables of class, age and gender in several urban areas (Tyneside, Derby, Milton Keynes, Glasgow, Cardiff), as well as analysing the phonetic characteristics of glottal(ised) stops.

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4. Variationist approaches to phonological distribution

General principles of variationist analysis involve, as we have seen above, ACCOUNTABILITY to large amounts of data systematically collected from the community. Variationists who observe these principles have learnt to be wary of making negative claims – to the effect that a particular variant cannot or does not occur in some language, dialect or phonological environment, bearing in mind the principle memorably expressed by Wang (1969) that 'you cannot prove that a platypus does not lay eggs by showing a photograph of a platypus NOT laying eggs'. Although this principle was enunciated with regard to historical data (which are quite impoverished), it is also true to a lesser degree in synchronic theory, where the forms attested from fieldwork are frequently forms that are not predicted by theorists. Similarly, it must be borne in mind that no sociolinguistic investigation can be exhaustive in obtaining all forms current in a community, as it is normally impeded by the effects of the Observer's Paradox (Labov 1972) and other factors. This point of course is about descriptive adequacy and input to theory and does not affect the necessity for a theory to make predictions that are scientifically testable (this is also done in the course of sociolinguistic argumentation). However, our own work has shown that certain claims made by the phonological accounts reviewed above are not correct.

The main empirical basis for these findings is provided by a variationist study carried out in Newcastle upon Tyne, which is still in progress. Interviews have been recorded with 32 adult Tyneside speakers from two generation cohorts in two social classes (working class and lower middle class) equally divided between males and females, and with four speakers per cell. Informants were recorded first in a (usually single sex) dyadic conversational exchange for around 50 minutes and were then asked to read a word-list constructed to elicit citation forms. A similarly structured sample has been collected in the city of Derby. Our own recordings are supplemented with information from other recent studies carried out in Tyneside and elsewhere in the British Isles, notably the study by Hartley (1992) of sixteen children from a working class area of Newcastle (see Milroy, Milroy, Hartley & Walshaw (1994) for extensive discussion of this corpus).

The quantified data we refer to from our Tyneside study has been assembled principally via auditory analysis. In order to minimise the effect of the problems outlined in section 2, we are also carrying out acoustic analysis of a sample of the variants under discussion, an important function of which is to assess the accuracy and validity of the analyst's auditory judgments (see, for example, Docherty & Foulkes 1995, 1996a, b). Whilst this remains work in progress, preliminary results of this study confirm that each of the auditory categories we have identified are characterised by a particular distinguishing set of acoustic correlates. The important point for present purposes, however, is that examination of a large corpus of data, even by ear

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alone, reveals patterns of variation which have been overlooked in the phonological accounts which we have reviewed (and which are themselves based on auditory analysis).

We summarise below four findings relevant to phonological description and theory, which are then dealt with in turn in sections 4.1 to 4.4.

- Glottalisation occurs in certain environments where it is not predicted by the analyses described in section 3.
- Glottalisation and weakening of /t/ are not in complementary distribution in the traditional sense, and any prediction that one will occur categorically in a given environment is not borne out by the data. There is, however, a substantial quantitative difference in incidence, so that some environments may be described as preferential sites for one process or the other. It is also clear that 'weakening' to [ɹ] has a much more restricted SOCIAL distribution than glottalling and glottalisation.
- Glottalisation appears to be blocked in utterance-final and other prepausal positions, raising a number of interesting questions, particularly about possible discourse level restrictions on occurrences of particular variants.
- From a sociolinguistic perspective, glottal reinforcement and glottal replacement cannot easily be ranged on a lenition scale with the glottal stop as the most lenited. They appear to be independent phenomena in that their sociolinguistic distributions systematically covary with the social characteristics of speakers. This forces us to consider the sense in which speakers might be said to be implementing a process of 'lenition'.

The last comment above draws attention to a distinction between SPEAKER and SYSTEM, which has been suggested as a general descriptive principle in Milroy & Milroy (1985) and elsewhere. When phonologists discuss lenition and other processes, it is often unclear whether they are proposing that these are implemented in the language system or in the usage of speakers. In what follows, we shall bear this distinction in mind.

4.1. *On the phonological distribution of glottalisation in Tyneside English*

Glottal reinforcement of /p,t,k/, AS DISTINCT FROM THOUGH ASSOCIATED ALSO WITH T-GLOTTALLING, is an extremely salient regional marker of Tyneside English. It apparently affects all three fortis stops in a wider range of linguistic contexts than general British glottalisation as usually described, although the contexts in which it can occur are not yet entirely clear. Giegerich (1992: 221), for example, distinguishes between syllable-initial

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stops in di/polysyllables, such as *apron*, *matron*, *micro*, and ambisyllabic stops as in *Cypriot*, *petrol*, *macron*, stating that glottalisation occurs in the latter, but not the former set. This is not the case in Tyneside English (nor in fact does it appear to be true of Central Scots English). In word-list style (which might be assumed to be the most 'careful' style), male speakers in our Tyneside corpus commonly have glottalisation in *metro*, *leprosy*, *petrol*, *atlas* – as predicted by Giegerich – but also in *apron*, *matron*, *micro*, where it is not predicted. Working class males, for example have glottalisation on the first set in 22 out of 32 tokens (69%). In the second set, they glottalise 13 tokens out of 24 (54%). Thus, although there are quantitative differences, glottalisation is the majority variant found in both contexts, and the status of the consonant as ambisyllabic (as opposed to syllable initial) does not account for restrictions in the distribution of glottalised variants.

Similarly, syllable-initial glottalisation of /t/ is frequently found in items like *nineteen*, *sometimes*, *three times*, *see you tonight* (usually, but not always, under secondary stress). This feature distinguishes Tyneside from most southern British patterns and associates it (as elsewhere) with Central Scots. Glottalisation is furthermore attested in the syllable-final foot-internal positions specifically excluded by Carr (1991) – in *suck oranges*, for example.

Glottalisation also affects syllable onset /t/ in contexts of a preceding rhymal consonant where it is reported by Harris & Kaye as blocked in London English. Although it can certainly occur in words like *chapter*, *doctor*, where the rhymal consonant is a stop (i.e. /p/ and /k/ here), it is at present not clear whether the process also affects words like *after* and *custard* where the preceding rhymal consonant is a fricative. Word-list recordings yield four (male) speakers who produce glottalised forms in words of the *chapter* group, but no glottalised forms occur in words of the *after* type. However, glottalisation in *whisper*, *whisker* is reported by Hartley (1992), and also occasionally occurs after fricatives in the Tyneside adult conversational corpus, for example in *fifteen*, *sulphur*, *half-past*.

Distributions in word initial syllable onset positions are currently being investigated; as noted earlier, it is in general unwise to make a negative claim to the effect that glottalisation does NOT occur in this position, even if the occurrences are rare. Variationist accounts assume that the occurrence or non-occurrence of glottalisation in different environments is quantitatively more or less likely rather than categorical. In the environments reviewed above which are said to block glottalisation, we can state more accurately that the probability of glottalisation occurring is lower than in, say, pre-syllabic-lateral positions (in, for example, *bottle*, *settle*), where it appears to be near categorical. In alternating environments also (for example where both glottalisation and weakening may apply) preferred variants can be identified by means of a quantitative analysis, and we turn now to the alternation between glottalisation and weakening in Tyneside.

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Speaker	Glottalised	[ɹ]
A	go**t** a nice jacket go**t** a dark red car	go**t** a little bow
B	go**t** a real monkey	go**t** it go**t** a big black dog
C	ge**t** out	go**t** an accent pu**t** in

Table 2
Alternation between glottalised realisations and [ɹ] by three Tyneside speakers

4.2. *Glottalisation and weakening in Tyneside English*

Recall Carr's claim (discussed in section 3.1 above) that under certain conditions weakening, but not glottalisation, occurs intervocalically across word boundaries. He correctly states that all contexts listed in Table 1 are glottalising sites, and that the T-to-R rule is not applied within word-boundaries. (In fact, weakening to [ɹ] does occur very occasionally both morpheme-internally and across morpheme boundaries in items such as *bottom*, *matter* and *putting*.) The prediction which most concerns us here however is that only weakening (specifically T-to-R), and not glottalisation, applies across word-boundaries under certain conditions, in this case on monsyllabic verbs as in *fit her*. Thus, according to Carr minimal pairs are to be found of the type *fitter* (glottalised)/*fit her* (weakened); in these contexts, the two phenomena are thus apparently claimed to be in complementary distribution.

With respect to this claim, consider first Table 2, based on a transcription of a small amount of data taken from Hartley's recordings (1992). Even this limited amount of material shows that individual speakers produce either the glottal variant or [ɹ] on a monosyllabic verb across word boundaries, one of the contexts predicted by Carr to permit weakening, but not glottalisation.

Consider next the word-list data in Table 3 (which is designed primarily to illustrate a different issue, the so-called 'final release rule', to be discussed in 4.3 below). The items in column B clearly reveal the effect of contextual style on speakers' choice of variants, namely that the boundary conditions specified by Carr are apparently irrelevant in citation forms, since glottalisation occurs at all three types of boundary shown in Table 1. Many speakers use glottal reinforced variants near categorically in all intervocalic contexts in the Tyneside word-lists, regardless of boundary conditions, while in prepausal contexts a fully released variant is also near categorical. Thus, weakening to [ɹ] occurs very rarely in word-list style even in those contexts which favour

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List A (all full release	List B (all glottalised)
sheet	I beat it
gate	I hate it
bet	drat it
bent	I got it
hat	I bought it
can't	I wrote it
pot	meter
font	later
salt	better
felt	batter
caught	carter
boat	totter
put	footer

Table 3
Pre-pausal and within-sequence forms: word-list style, young male speaker

it in spontaneous speech (in our corpus only one token was registered from a possible word-list total of 444, by an older working class male in the phrase *I hit it*).

These contexts do not so far appear to have been correctly specified. On the basis of our analysis, we would suggest that a LEXICAL conditioning factor is involved in weakening, perhaps in addition to boundary type, since a small number of lexical items such as *got*, *lot*, *put*, constantly recur with [ɪ]. Sentence stress may also have an effect, in that weakening to [ɪ] seems more likely to occur when the main phrasal prominence is not located on the syllable where /t/ is the rhymal consonant. Thus, taking examples from Carr's list presented as Table 1, weakening may be more likely in *get* ˈ*up*, or *put it* ˈ*down*, than in ˈ*fit her*. While it is not yet clear how these constraints interact, what is clear is that variants which are apparently argued to be in complementary distribution turn out on closer inspection to occur in the same environments and furthermore to be constrained by contextual style. Moreover, since all constraints are variable rather than categorical, in the sense that they do not always apply in eligible contexts, theoretical models which require that constraints be specified in categorical terms (even when 'optionality' is allowed for) are unlikely to be sufficiently precise to model speakers' underlying phonological competence. Thus, for example, Carr's claim about rule-ordering in which weakening bleeds the condition for 'across the board' glottalisation fails to meet the requirement of even observational adequacy; both constraints can apply in given identical contexts.

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Variant →	ɹ	t̬	t	ʔt	ʔ	*N*
Older WC females	40	18	27	12	2	404
Older WC males	15	35	7	42	2	178
Young WC females	21	39	5	20	13	402
Young WC males	3	59	4	23	12	230
Older MC females	12	27	39	20	2	366
Older MC males	6	32	5	53	4	398
Young MC females	2	42	5	17	34	383
Young MC males	1	46	4	27	23	305

Table 4
Percentage realisations of /t/ in word-final pre-vowel position, by speaker group, Tyneside corpus (WC = working class, MC = middle class, *N* = number of tokens analysed)

The limited amounts of data set out in Tables 2 and 3 illustrate some of the regularities and complexities revealed by a variationist analysis of a sizeable body of data. Table 4 provides a more comprehensive picture, setting out the results of a fully accountable analysis of five variants of /t/ in word-final intervocalic contexts (as in *get off*) taken from the adult Tyneside corpus; percentages are based on 2,666 tokens of /t/ in the speech of the 32 adults, set out in columns as follows:

i. [ɹ] – realisations which probably correspond to the output of the T-to-R rule or to Carr's 'weakened' variants;
ii. [t̬] – voiced realisations which sound [d]-like rather than rhotic, and which may result from tapped articulations;
iii. [t] – fully released variants, including tokens which are aspirated or spirantised;
iv. [ʔt] – glottalised variants;
v. [ʔ] – glottal stop variants.

Several points arise from Table 4 which are of relevance to Carr's account of glottalisation and weakening. First, the question is raised of what might be meant by 'weakening' as opposed to 'glottalisation'. Carr apparently focuses on the alternation between (i) and (iv)/(v) above, but if this is so it is not clear why he does not consider voiced tokens also (percentages shown in the second column) as the output of a weakening rule. Second, the two weakened variants which we have distinguished have quite a different SOCIAL distribution. Whereas [ɹ] is favoured by working class females (particularly those in the older group, for whom [ɹ] accounts for 40% of all tokens) and

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rare in younger middle class speakers, the voiced variant is more widely distributed socially. Thus Carr's account focusses on a socially restricted set of variants and does not include a further set which are more characteristic of the speech community as a whole; again, the motivation for this selectivity is not clear. Third, the totals in the final column reveal a tendency for young speakers, particularly from the middle-class, to prefer glottal variants in intervocalic contexts. In fact, glottal variants seem at present to be spreading rapidly in many urban locations in Britain, a change associated particularly with younger middle class females (see Milroy, Milroy & Hartley 1994; Milroy, Milroy, Hartley & Walshaw 1994). While it is not the purpose of this paper to examine the social mechanisms of linguistic change, the data in Table 4 show that different social groups show quite different patterns of distribution with respect to both glottalised and weakened variants. Thus, Table 4 suggests that a phonologist whose data on glottalisation and weakening is derived from a group of young middle class men is likely to draw very different conclusions from one whose observations are based on the speech of older working class females; hence the importance of systematic sampling and accountable analysis. Indeed, the extent of systematic variation evident here between different social groups makes it difficult to conceive of an ASOCIAL description which captures some underlying commonality. (The social effects identified here are overwhelmingly supported by statistical evidence. Throughout this paper, variation in linguistic variables with respect to social variables is analysed using log-linear models. The variation inherent in the figures in Table 4 can be well accounted for by independent effects of age, gender and class, in decreasing order of importance (although all significant at $p < 0.001$).)

Bearing these comments in mind, we now turn to the pattern of alternation between glottal(ised) and fully released variants which we have described for convenience as 'the final release rule'.[4] In this case, a variationist analysis has revealed striking regularities where variants might have appeared on preliminary inspection to be in free variation.

4.3. *The final release rule*

Although glottalisation, including the glottal stop, has a wide distribution in Tyneside, there are indications that it occurs very rarely indeed in certain sites, and this rarity seems to be best understood in relation to conversational structure or utterance structure. It appears that neither the glottal stop nor glottal reinforcement can occur (with certain rare exceptions to be specified below) in pre-pausal or turn-final position. Kerswill (1987: 47) has noted

[4] The term 'rule' here indicates only a recurrent tendency to 'final release' in a particular context and does not imply commitment to any particular theoretical model.

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that, for Durham City (a few miles south of Tyneside), the glottal stop never occurs pre-pausally, and Local, Kelly & Wells (1986: 416) associate non-glottalised aspirated releases in Tyneside specifically with endings of conversational turns. Thus, although glottal stops MAY occur sentence-internally or turn-internally in items like *sheet*, *shoot*, *about*, [t] is fully released when such items occur turn-finally.[5] It appears that although other factors may contribute to a complex structure of constraints on variation, the operation of the 'final release rule' may be ultimately dependent on aspects of conversational and/or utterance structure: it is not yet clear whether the relevant positional constraint should be stated as turn-final (as suggested by Local et al.) or pre-pausal (as suggested by Kerswill).

The operation of the final release rule (FRR) in our adult Tyneside corpus has been examined in word-list style and conversational style. As this phenomenon had been noticed in pilot work using the tape-recordings made by Hartley (1992), we were able to devise the wordlist in such a way as to test the FRR. Speakers are asked to read single word citation forms (such as *sheet*, *gate*) as well as sequences including the same word-final variable (for example, *I beat it*, *I hate it*) and disyllables such as *better*, *meter*. Similar items were analysed from the conversational data. Here the aim was to identify 30 tokens per speaker of both pre-pausal and turn-final /t/. This was achievable in most cases in pre-pausal position, but proved more difficult in turn-final position, partly due to the fact that in several cases it was unclear precisely into which category a particular token fell.

The prediction that the single-word monosyllabic citation forms will be treated as turn-final or pre-pausal has been convincingly supported. In these forms, 31 of 32 speakers use a non-glottalised, fully released aspirated or fricated variant 100% of the time. The exceptional informant is a young WC female, K, who produces glottal stops in 2 out of 30 items (*print* and *salt*; i.e. 93% application of the FRR). Thus, in the word-list corpus as a whole the FRR applies 99.8% of the time and glottals are used in this position 0.2% of the time; from a variationist perspective this is effectively categorical. Sequence-internal and word-internal forms, on the other hand, are (in contrast) all glottalised by the majority of speakers. Table 3 above illustrates the typical word-list pattern.

This pattern is repeatedly attested and is by far the most common, the main exception being that a few female speakers do not glottalise on List B items in careful style. As we have noted, it is unlikely that the rule-governed nature of this variation would be noticed by an observer who did not have access to at least some tape-recorded data, as a considerable amount of

[5] Acoustic analysis is being carried out in order to formulate a more precise definition of 'fully released'. It appears that many of these segments are spirantised or strongly affricated rather than canonical stops followed by aspiration. See Docherty & Foulkes (1996a, b) for a fuller discussion.

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Group	Total tokens	*n* glott.	% glott.
Older WC females	120	2	2
Older WC males	111	2	2
Young WC females	101	30	30
Young WC males	120	6	5
Older MC females	120	7	6
Older MC males	116	2	2
Young MC females	120	5	4
Young MC males	120	8	7

Table 5
Number (*n*) and percentage of glottal or glottalised tokens Tyneside conversational data, pre-pausal position

casual observation would be needed in order to determine that the variation is systematic.

When the FRR is further examined in conversational style, additional points of interest emerge. Results of this analysis are presented in Tables 5 and 6. These report occasional violations of the FRR.

From word-list style the categorical nature of the rule seems to be quite clear; however, in conversational style the rule is sometimes violated. For most speakers violations (i.e. use of glottals in pre-pausal position) are very rare. In pre-pausal position (Table 5) 11 speakers never violate the rule at all; a further eight violate it on one occasion out of 30, and only two speakers violate the rule frequently. That is to say that 30 out of 32 speakers either never use glottals in this position or use glottals very rarely: full release occurs in the overwhelming majority of cases. The exceptional speakers are two young working class females (note the 30% incidence in Table 5), one of whom is speaker K. Between them they account for over one third of all the violations of the FRR. We return to details of these speakers below. In turn-final position (Table 6) a comparable pattern emerges (although the smaller number of tokens here means that the results require more careful interpretation).

Although glottal realisations in turn-final positions are rare, we are obliged to try to find the rules that govern the exceptions. We can approach the task of explanation by using orthodox phonological procedures and additionally considering insights provided by conversation analysts (for a comparable analysis see Local, Kelly & Wells (1986); and for a clear account of CA procedures see Atkinson & Heritage (1984)).

The analysis carried out so far tends to confirm that the (infrequent)

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Group	Total tokens	*n* glott.	% glott.
Older WC females	15	0	0
Older WC males	9	0	0
Young WC females	36	14	39
Young WC males	9	1	11
Older MC females	31	2	6
Older MC males	33	1	3
Young MC females	70	4	6
Young MC males	66	3	5

Table 6
Number (*n*) and percentage of glottal or glottalised tokens Tyneside conversational data, turn-final position

exceptions to full release are short-vowel items, and hence that full release is effectively categorical after long vowels. Thus, items such as *shoot*, *gate*, *meet* have full release in turn-final position. On this basis, we might be tempted to postulate a rule that allows glottalisation to be applied variably after short vowels, for example in items such as *bit*, *get*, *lot*. Variationist procedures, however, require that we should go further than this, as certain lexical items, such as pronouns, occur very frequently indeed in the data, and glottalisation may be characteristic of only these frequently occurring items. In fact, our evidence suggests that glottalisation overrides the full-release rule most frequently in the lexical items *that* and *it*, and these of course are very frequent items – much more frequent than long-vowel items such as *gate*, *shoot*, etc. Thus, if we postulate that the rule for glottalisation is currently spreading into the turn-final environment in which it was formerly prohibited, it is observed in orthodox phonological terms to be spreading by lexical diffusion, with very frequent items such as *that* and *it* in the vanguard of the change. It does not however follow that all short-vowel items are affected: many of them may still be categorically fully released in turn-final position.

We may summarise our observations on this rather complex situation as follows. Word-list data suggest that full release is categorical and glottalisation blocked in turn-final position, regardless of vowel-length of the relevant items. Therefore a part of the observable variation in realisation of /t/ is best accounted for with reference to conversational (or utterance) structure, in addition to purely intra-linguistic (for example, prosodic) or social factors. In conversational style, however, there are exceptions to turn-final full release, and these are virtually all short-vowel items. However, while

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vowel-length is clearly relevant to an accurate specification of the rule, it does not seem to be the most important conditioning factor, as glottalisation is particularly associated with very frequently occurring items, such as *that* and *it*. Thus, the type of rule that accounts for this pattern appears at this stage of the argument to be lexical. Clearly, however, this lexical rule is not categorical as far as lexical items are concerned: the affected items sometimes have full release (i.e. in pre-pausal position) and sometimes glottalisation (in other positions). It thus seems reasonable to look more closely at the full utterance contexts of the exceptional glottalised items, and it turns out that an analysis sensitive to such contexts suggests that further factors can be specified as relevant to observed patterns of variation.

This analysis depends very largely on the two exceptional speakers noted above, whose usage frequently violates FRR. These speakers have 22 violations of the rule out of 41 pre-pausal tokens – about 54% – in striking contrast to the other speakers (who have very few violations). One of these young working class females is informant K, who was in fact recorded twice: first in conversation with her brother, L, and second in conversation with a close female friend, A. In the first conversation, K's pattern of /t/ realisation is similar to that of other informants, predominantly full release with only 9% glottalised segments. In conversation with A, however, the results are in sharp contrast, with 50% glottal stop realisations counted in 30 tokens (a fuller count identifies 29 violations in 57 tokens). This is very striking, and there are various questions that naturally come to mind. Is this difference accounted for by difference in style or topic? Is it gender-related, i.e. does it arise from the fact that the conversation with A is all-female and therefore perhaps more casual in style? If so, why should this be? The most convincing immediate explanation of the difference, however, is an intra-linguistic one, arising from the nature of the linguistic environments in which the full release rule is violated. These are overwhelmingly occurrences of sentence tags, including *isn't it*, *wasn't it*, but particularly the tag *and that*, for example: *you just miss your friends and that*; *the money that you get and that*. This tag alone accounts for 25 of the 29 occurrences of the turn-final glottal stop in K's conversation with A. Speaker A herself produces six pre-pausal glottal tokens, and four of these occur on the tag *and that*. Thus, note that while the approach is socially sensitive, it is an intra-linguistic factor (the sentence tag context) which best accounts for FRR violations.

If we now consider K's conversation with L, we find that the tag occurs only twice, and that one of the two occurrences ends in a glottalised variant. Similarly, the tag is rarer in the speech of other informants, and its rarity accounts almost completely for the overwhelming absence of glottal realisations in their turn-final usage. It is also clear that other tags with final /t/, such as *isn't it* and final *what* in questions, are possible sites for glottalisation, which accounts for many of the FRR violations of other speakers. For example, one young middle class male produces four pre-

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pausal glottals, two of which occur on the tag *isn't it*, whilst another member of the same speaker group produces his only FRR violation on the tag *wasn't it*.

This frequent association of FRR violations (which are in any case rare) with tags suggests that an interactional explanation of the FRR and its apparent exceptions should be considered. In a dialect with heavy use of glottals, interlocutors appear to be oriented to a fully released variant of /t/ as a turn-delimitative signal (i.e. that a speaker is prepared to yield the floor). There is in fact a small but suggestive literature on such interactive functions of phonetic cues, constituting a field described by Local, Kelly & Wells (1986) as PHONOLOGY OF CONVERSATION. French (1988) presents evidence that post-vocalic [r] is used in this way in a Yorkshire dialect; Local, Wells & Sebba (1985) similarly examine a range of phonetic procedures for turn delimitation in London Jamaican, while Local, Kelly & Wells (1986) document a range of phonetic signals, but make observations similar to our own on the turn-delimitative function of fully released /t/ in Tyneside.

In addition to phonetic cues, however, grammatical elements such as tags of various types may additionally (or alternatively) constitute turns as complete. For example, Local, Wells & Sebba (1985) discuss this function of the tag *you know* (for example, *Yeah, they thump him them thump him good an' proper you know*). A range of prosodic and non-verbal cues fulfil a similar function. With respect to the Tyneside data presented here, the turn-delimitative function of tags may thus suggest a motivation for the absence of the phonetic cue – the fully released variant of /t/ – on words such as *it* and *that*, which, as we have already noted, are the short-vowel items most likely to be realised as glottal variants. Younger working class females use by far the highest number of tags (this may itself be a gender-related feature) which largely explains why they have much the highest rate of exceptions to the FRR.

Exceptions may thus be plausibly accounted for with reference to the turn-delimitative functions of the FRR, being redundant when it co-occurs with a sentence tag which is a particularly salient turn-delimitative cue. We need to look further, however, at the extent to which such an interactive account is adequate. Particularly, we have found that the FRR generally operates before mid-turn pauses, even when it seems clear that the turn is not constituted as complete. Examples include *the fact tha*[*t*] # *the kids are a lot more streetwise*, *the da*[*t*]*e* # *was that day*. Our findings in this respect do not at present support those of Local, Kelly & Wells (1986: 416) who note that where 'delimitative features are present at a potential transition point but no transition occurs, current speaker frequently displays in his or her subsequent talk a desire to relinquish the turn'. Such evidence may be found in subsequent attempts to achieve turn transition to another speaker 'by the production of a tag-question followed by a brief pause' (p. 432). It is not entirely clear at present how far the instances of full release without

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glottalisation in intra-turn contexts in our own data may plausibly be projected as potential opportunities for turn handover to which the current speaker is oriented; one confounding factor is the apparent stylistic function for some speakers of the fully released variant to mark emphatic stress. Nevertheless, despite these problems the disproportionate tendency of utterance final tags to be realised contrary to the norm with glottal or glottalised tokens requires some explanation, which phonological accounts are not designed to offer. We suggest, however, that the variant realisations of /t/ permitted by the phonological system provide conversationalists with a resource which is exploitable for interactional purposes, and a consideration of the way speakers use these resources may provide a clearer and more accurate account of phonological optionality than is at present available. What is certainly clear is that a number of different factors will be involved in any satisfactory explanation of this rule and violations of it – factors that are not always amenable to analysis by standard phonological methods.[6]

In discussing the final release rule we have brought to bear some interactional sociolinguistic information. In section 4.4 below we examine the broader community-level sociolinguistic profile of glottalisation, drawing attention to a potential conflict between a sociolinguistic analysis of the data and broader statements that might be made in terms of phonological processes, such as lenition or weakening.

4.4. *Sociolinguistic profiling of Tyneside glottalisation*

A variationist analysis shows that in purely quantitative terms, glottal replacement differs from glottal reinforcement in that glottal reinforcement affects /p/, /t/ and /k/ at high frequency levels, whereas glottal replacement is virtually restricted to /t/. Tables 7 and 8 show patterns of both glottal replacement and glottalisation in the speech of the Tyneside informants.

[6] Statistical analyses based on these data may not be regarded as adding much to the interpretation, although they are included here for completeness (aggregating the data in Tables 5 and 6). The data do constitute evidence for social effects in the population, with age ($p = 0.003$), gender ($p = 0.012$) and class ($p = 0.013$) all being significant. There is also evidence for an interaction involving age and class ($p = 0.027$) and a suggestion of an interaction involving gender and class ($p = 0.072$) which together help to explain the quite complex patterns hidden in the data. Note that because many speakers make little or no use of the glottal stop, small variations in usage can provide strong evidence for social effects if these are duplicated across the members within each social subgroup. This is not to say that the effects are necessarily LARGE. Perhaps the most important contribution of the statistics is to show that the variation cannot easily be explained away by the existence of two heavy glottal users. This is partly because they are unlikely to have been sampled in the same social subgroup purely by coincidence, and partly because other effects are evident, for example older working class speakers seem to make less usage of the glottal stop than middle class speakers in both age groups.

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	/p/ %	/t/ %	/k/ %	*N* /p/	/t/	/k/
Male	1	8	0	337	952	404
Female	1	16	0	328	1098	345

Table 7
Percentage use of [ʔ] for individual phonological variables (word medial position, Tyneside conversational data; *N* = number of tokens analysed)

	/p/ %	/t/ %	/k/ %	*N* /p/	/t/	/k/
Male	87	82	82	337	952	404
Female	58	42	37	328	1098	345

Table 8
Percentage use of glottal-reinforced variants for individual phonological variables (word medial position, Tyneside conversational data; *N* = number of tokens analysed)

Table 7 sets out the relative frequencies of glottal stop realisations in word medial position of /p/, /t/, /k/, extracted from the conversational data. It is clear that /t/ is much more likely than /p/ or /k/ to be realised as a glottal stop. Furthermore, females are more likely than males to use this variant ($p < 0.001$).

Table 8, by contrast, indicates that males use a significantly higher proportion of glottalised forms than females ($p < 0.001$).

Interestingly, /p/ emerges as the most susceptible of the three stops to glottalisation.[7] Thus, an analysis which distinguishes between glottalling and glottalisation, rather than treating them together, illuminates interesting differences in the relative susceptibilities of /p/, /t/ and /k/ to these two processes.

While Tables 7 and 8 thus show that the social distribution of the the two types of glottalisation phenomenon is different, so also is their geographical spread. Some dialects of English have a high incidence of glottalisation of /p,t,k/, but little or no glottal replacement. An example of this is Belfast

[7] A comprehensive analysis of all speaker groups simultaneously provides evidence that glottalisation rates vary over the three stops ($p = 0.026$). The nature of the hierarchy is /p/ > /t/ ≈ /k/, given that there is moderate evidence for /p/ > /t/ ($p = 0.046$), stronger evidence for /p/ > /k/ ($p = 0.004$), but no explicit evidence for a difference between /t/ and /k/ scores.

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English. Glottalisation is also characteristic of traditional rural speech in Galloway, south-west Scotland (Milroy 1982), and when glottal stops appear in such dialects they tend to be perceived as due to external influence from urban Central Scots, with which glottal replacement is stereotypically associated (Grant & Dixon 1931). Although the existence of these patterns does not prevent a sociolinguist or phonologist from presenting glottal reinforcement and replacement as points on a continuum of lenition, the fact that the two phenomena show a different (and sometimes converse) pattern of social distribution suggests that weakening to the glottal stop may be better modelled as what is usually called a 'dialect borrowing' process, rather than purely as a natural phonological process affecting the output of speakers within a single speech community. That is to say that when speakers use a glottal stop for /t/, it is not self-evident that they are applying a synchronic rule of 'weakening' or 'lenition': the rule involved may be described just as readily in terms of abrupt substitution as in terms of gradual weakening.

This last comment depends on the assumption of a speaker/system distinction, as referred to above – an assumption that phonologists sometimes make, without consideration of how this distinction might be operationalised or of its implications. Phonologists frequently have recourse

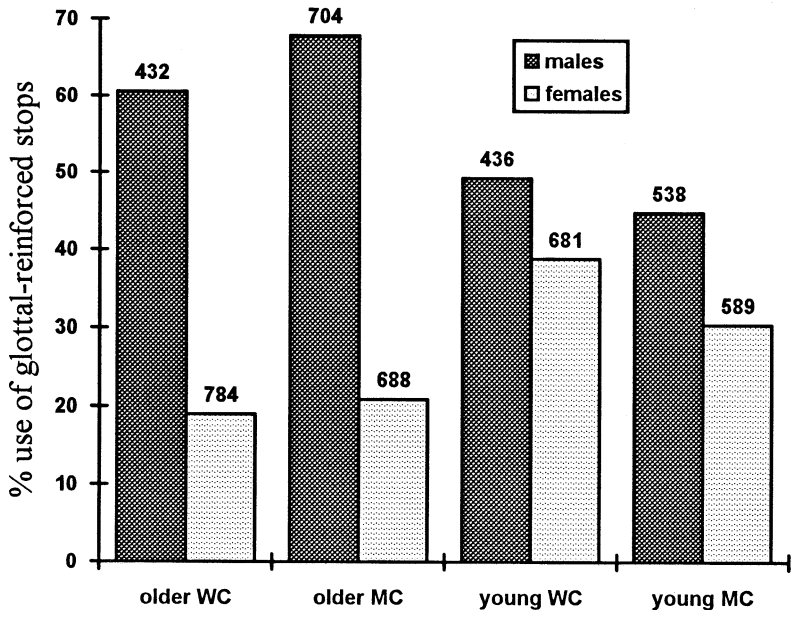


Figure 2
Percentage use of glottal-reinforced variants of /t/ ('[ʔt]') (word medial and word-final pre-vowel position, Tyneside conversational data; the figure above each bar indicates the total number of tokens analysed)

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to argumentation based on speaker-behaviour in describing a phonological process. Harris (1994: 120), for example, in respect of lenition, states that, 'in articulatory terms [it] manifests itself as an opening of consonantal stricture. So for example, close approximation of the articulators marks a fricative gesture out as weaker than the complete closure of a stop and as stronger than the open approximation associated with a glide'. This quite clearly envisages gradual differences in articulation, which surely implies a continuum of 'stronger' to 'weaker'. If lenition is not held to correlate with some kind of continuum observed in the behaviour of speakers, there appears to be no clear motivation for calling it lenition.

Figures 2 and 3 illustrate in more detail the patterns revealed in Tables 7 and 8 with regard to glottal realisations of /t/. Figure 2 shows that glottal reinforcement is favoured more by males than by females ($p < 0.001$), particularly so with older speakers. Figure 3 on the other hand indicates that glottal replacement displays a broadly converse pattern – females use a significantly higher proportion of glottal stops than males ($p = 0.013$), although this effect is not explicitly apparent in all groups.

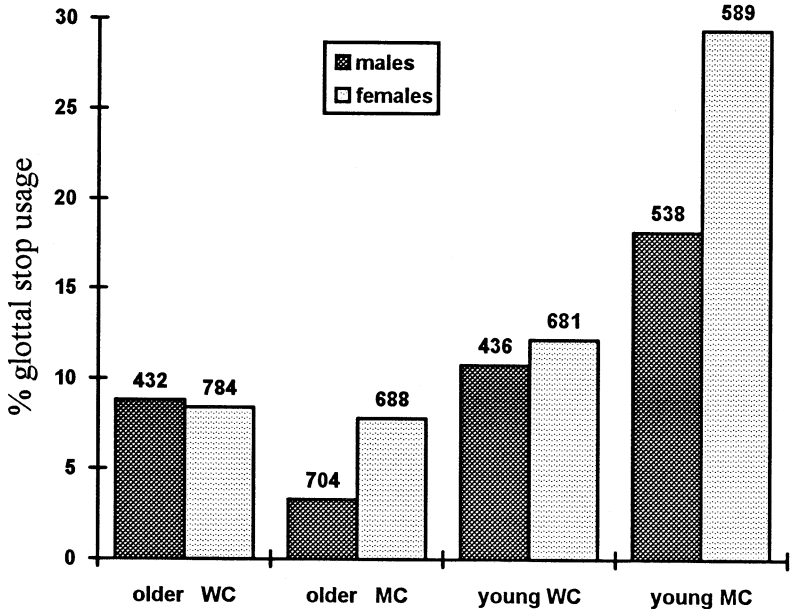


Figure 3
Percentage use of glottal stop variants of /t/ (word medial and word-final pre-vowel position, Tyneside conversational data; the figure above each bar indicates the total number of tokens analysed)

The percentage scores in Figures 2 and 3 are based on analysis of variation in conversational stye in realisation of /t/ in both word medial and word-

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	t	ʔt	ʔ	*N*
Older working class females	55	28	16	358
Older working class males	10	74	13	249
Older middle class females	61	23	15	309
Older middle class males	7	91	2	296
Younger working class females	10	77	13	245
Younger working class males	4	88	8	191
Younger middle class females	18	59	21	186
Younger middle class males	10	73	13	216

Table 9
Percentage use of variants of medial /t/ (Tyneside conversational data; N = number of tokens analysed)

final pre-vowel contexts. However, linguistic gender marking in Tyneside is clearest when medial contexts only are considered, as is evident from the relative frequencies in Table 9.

Table 9 shows that females in all groups use higher proportions than the corresponding males of BOTH the glottal stop AND non-glottalised [t].[8] All males, on the other hand, show a marked preference for glottal reinforcement ($p < 0.001$ in all cases), confirming the pattern visible in Figures 2 and 3. Thus, with respect to the lenition continua that appear to be implicit in some accounts (both sociolinguistic and phonological), speakers cannot reasonably be placed on a single continuum from most to least 'glottal'. High scores for the glottal stop do not entail low scores for the standard form or any general increase in glottalisation along a continuum, since females use the glottal stop more than males, without a corresponding decrease in their use of [t]. These data cast doubt on assumptions of a non-standard to standard continuum which aligns with a phonetic hierarchy of increasing glottalisation or lenition, in this case from [t] > [ʔt] > [ʔ]. The organisation of these linguistic variants into a linear series (sociolinguistic or phonetic or phonological) may indeed sometimes be appropriate, as for example in Norwich (Trudgill 1974). However, the sociolinguistic evidence from Tyneside presented here suggests that in sociolinguistic terms the phenomena are not continuous, in the sense that speaker choices do not seem to be best characterised as ranged on a continuum. Rather, glottalling and glottalisation are more plausibly presented in this community as different choices available to speakers, who systematically prefer one to the other.

[8] Six of the eight comparisons turn out to be statistically significant using a chi-squared test. For [t] usage: older speakers (both classes) $p < 0.001$; young working class $p = 0.001$; young middle class $p = 0.020$. For glottal stop usage: older middle class $p < 0.001$; young middle class $p = 0.023$; scores for working class speakers are not significantly different.

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This seems to be an example of a mismatch between a linguistic account and a sociolinguistic account of variable phenomena, a consequence perhaps of the existence of two sharply opposed research traditions and procedures (see section 2 above), and the speaker/system distinction is once again relevant. In a speaker-oriented account, speaker-knowledge may not in this case include the knowledge that segments can be related to one another in terms of 'stronger' to 'weaker', but rather that the variable phonological system makes available two separate choices which groups of speakers are then free to exploit for purposes of social distinctiveness and social identity. In a system-based account, however, it may be quite reasonable to appeal to the notion of a continuum.

The female preference for the glottal stop in Tyneside may seem surprising in view of the traditional stigmatisation of the glottal stop and the general assumption that this variant is a male working class norm. It is true that evidence from many locations shows that it is preferred by males, but such evidence needs to be closely scrutinised; recall that most researchers do not distinguish glottal stops from reinforced stops, and as we have shown, this conflation can obscure significant patterns in the data. Sociolinguistic studies in Norwich (Trudgill 1974), Edinburgh (Romaine 1975; Reid 1978), London (Hudson & Holloway 1977), Glasgow (Macaulay 1977), Ayr (Macaulay 1991), Exeter (Sullivan 1992) and Milton Keynes (Kerswill & Williams 1992) generally support the view that glottalling is a predominantly male and/or lower class feature. Preliminary analysis of our data from Derby, which replicates the procedures used in Tyneside, furthermore shows that in word-list style it is young working class males who produce by far the highest proportion of pre-pausal and pre-vocalic glottal stops. However, in the conversational data from Derby, middle class speakers do use a slightly higher proportion of pre-vocalic glottal stops than their working class counterparts (although the difference is not statistically significant). Furthermore, similar patterns to those discussed above from Tyneside are reported in sociolinguistic work in other locations. Mees (1987) finds that in Cardiff glottalisation is most advanced in middle class, rather than working class, speech and that the glottal stop is particularly associated with young, middle class females. Comparable findings are reported by Holmes (1995) for New Zealand English, Newbrook (1986) for The Wirral, and by Kingsmore (1995) for Coleraine, County Derry, an Ulster Scots dialect area. Kingsmore, for example, shows that in each of several age-groups the males favour the flap consonant in words of the type *water*, *butter*, whereas females prefer the glottal stop.

To interpret variable data such as that reviewed above, a good deal of information about the distribution of glottals and other variants of /t/ in associated dialects is required. In Cardiff, for example, it is important to know that glottal replacement is not a traditional characteristic of South Wales dialects of English, and that the female/middle class pattern therefore

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represents an urban innovation (in general, the history of the glottal stop in English associates it rather strongly with urban areas). Similarly, while the glottal stop is spreading rapidly in mainstream English, glottal reinforcement (especially of /p/ and /k/ in intervocalic positions) is possibly recessive. It is characteristic not only of Tyneside male speech but also of rather conservative rural varieties, such as those of south-west Scotland and much of Northern Ireland.

In summary, it is evident from the research summarised in this section that the different distributions of the two types of glottalisation phenomenon are not random and unpredictable but regular in terms of social rather than purely intra-linguistic distribution. We have suggested that these regularities do not lend immediate support to any gradualist hypothesis (note Labov's (1994) recent defence of the neogrammarian gradualist view of sound change): speakers in the community in some sense 'know' that the two phenomena have different social meanings and different speaker functions, and it seems reasonable to suggest that the analyst can access this knowledge by employing quantitative procedures which reveal regular patterns of variable language behaviour. However, the important point is that such patterns can be revealed only by detailed analysis of systematic samples of data and are not accessible to unsystematic observation or intuition.

5. Conclusions

In this paper, we have scrutinised the results of some phonological and sociolinguistic (variationist) accounts of glottalling and glottalisation, and have drawn attention to the contrast between the different methods and assumptions associated with each research tradition. The chief points which emerge are the following.

First, it appears that at present phonological accounts, such as those of Harris & Kaye (1990) or Carr (1991) do not always accurately predict patterns of surface variation. For example, the predictions that are made about contexts where glottalisation cannot occur, and about the relationship between glottalisation and 'weakening' do not seem to be correct. In fact, data gathered from a substantial number of speakers of both sexes and different ages tends to disconfirm specific predictions, such as Carr's claim that glottalisation and 'weakening' to [ɹ] are in complementary distribution. Similarly, as predicted by variationist theory, individual speakers or groups of speakers actually use quite different patterns of glottalisation in a socially systematic way (with females favouring glottal replacement and males favouring glottal reinforcement, for example). This raises issues of the accountability of theories to data, and the general question of how far phonological theorising can, or should, account for variability within the same 'dialect' or community. It also suggests that variationist description can contribute more to phonological theory than it has done to date. More

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specifically, it can provide the basis of a more accurate and satisfying account of the notion of OPTIONALITY than is currently available, and suggests that phonologists might be justified in working towards a view of variation as central rather than peripheral (see Pierrehumbert 1994).

Second, we have noted that several sociolinguistic accounts have shown a sharp distinction between the social trajectories for glottal replacement as opposed to glottal reinforcement, which have normally been treated by phonologists as aspects of 'the same thing'. It may therefore not always be appropriate to treat the two phenomena as manifestations of a single process or as points on a single continuum (presumably along which speakers move through time). From the speaker's point of view (as manifested by different patterns of speaker behaviour) they appear as independent phenomena.[9] It may be the case, therefore that, glottalisation is spreading in Tyneside as a SOCIALLY gradual rather than necessarily PHONETICALLY gradual change. This is not to suggest that phonological processes may not also be involved, but processes such as weakening and lexical diffusion are theoretical constructs rather than directly observable phenomena. They do however ultimately depend on observation, which therefore needs to be as accurate as possible to enable a strong subsequent analysis and interpretation. It is clear also that a thorough acoustic and auditory analysis of the phonetic characteristics of the variants being investigated can enhance our understanding of them, which in turn may have important repercussions for phonological modelling.

Third, we have noted that, with certain interesting exceptions, glottal or glottalised variants do not occur in turn-final and other pre-pausal contexts in Tyneside. This constraint appears to be localised, since it does not hold not true for Kerswill & Williams's (1992) data from Milton Keynes, nor for our own from Derby, where glottal variants occur freely in such contexts. If, as seems plausible, non-glottalised variants function conversationally as turn-yielding cues, interesting issues are raised on the domain within which variation can best be described. However, further investigaton of this constraint may well identify other factors that are relevant, such as sentence stress and rhythm, or even syntactic category of affected items. What is certainly clear from our discussion of the final-release rule and its violations is that analysis of the conversational context can provide insights for phonological description and our understanding of change, and more generally that phonological theory can benefit from description of this kind.

This observation raises a more general principle which is quite central to variation theory. Linguistic change is the chief issue addressed by

[9] A key issue being addressed in the acoustic phonetic analysis is whether the auditory categories which form the basis of this and other analyses of glottal variants of English stops can be considered to be discrete categories or whether they are best viewed as being points on some form of continuum. The answer to this question does affect the thrust of the present paper, but it is important when considering the mechanism by which phonological change is implemented. See further Docherty & Foulkes (1996a, b).

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variationists, and both phonetic and sociolinguistic accounts have stressed the rapidity with which glottal or glottalised variants are spreading to varieties of British English. Following the general agenda set in 1968 by Weinreich, Labov & Herzog, variationist accounts assume that rapid change will be characterised by STRUCTURED HETEROGENEITY; that is, patterns of use will vary according to social and regional group and speech style. Nor is this simply a matter of a rule being applied at different frequency levels; an ongoing change will spread to different phonetic contexts in a socially structured way. And as linguistic change is implemented by speakers, rather than by languages, the conversational context is the locus in which to study its spread.

Finally, it is likely that difficulty encountered by phonological analysts in making accurate predictions about permissible contexts for variation is partly a result of inadequate databases in which, for example, cases of complementary distribution cannot be reliably established. Similarly, it seems that if particular phonological frameworks do not make sufficient provision for the centrality of variability in language, they are likely to have particular difficulty with phenomena like glottalling and glottalisation, which are highly variable in their occurrence and exhibit complex patterns of alternation with other phenomena. They are also involved in rapid linguistic change, the implementation of which is associated with the structured variability that emerges so clearly from a variationist analysis.

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