Language Variation and Change, **6** (1994), 327–357. Printed in the U.S.A.

Glottal stops and Tyneside glottalization: Competing patterns of variation and change in British English

JAMES MILROY, LESLEY MILROY, SUE HARTLEY, AND DAVID WALSHAW
University of Newcastle upon Tyne

ABSTRACT

Glottalization and glottal replacement (particularly of /t/ in British English) have traditionally been assumed to be variants characteristic of male, lower-class speakers. Both phenomena have been heavily stigmatized, but are spreading rapidly. Recent studies in various parts of the British Isles (including Tyneside) have suggested that glottal replacement of /t/ is led by middle-class and/or female speakers. A fuller understanding of the nature of this linguistic change depends on treating glottalization of /p,t,k/ (a more localized Tyneside feature) and glottal replacement as independent phenomena, rather than as points on a lenition scale corresponding to a social continuum (e.g., casual to careful style). The studies of Tyneside glottalization reported here show that, while females lead in the use of glottal replacement, males prefer glottalization. This pattern is interpreted in terms of a preference of males for localized variants, whereas females lead in adopting supra-local norms.

Phoneticians such as John Wells (1982:261) and Peter Roach (1973) noted some years ago that "T-glottaling"—the replacement of [t] by a glottal stop in words such as *butter*, *letter*, *not*, *what*—was on the increase in British English, particularly in urban accents. Roach (1973:21) remarked that he found it difficult at that time "to find English speakers below about forty years of age who do not have some type of glottalization, while among older speakers it seems less common." As sociolinguists, we have also noticed this rapid spread of glottalization, and our chief aim here is to explore the social mechanisms and social and linguistic trajectories of this continuing process of change. In view of the general tendency of influential studies of English (see esp. Labov, 1994) to focus on vowel variation, it is perhaps timely to attempt a systematic study of variation and change in the consonant system.

The main empirical basis for this article is a series of studies of glottalization in Newcastle upon Tyne. These include a pilot study by Rigg (1987), the results of which have been reported elsewhere (L. Milroy, 1992) and are sum-

We gratefully acknowledge the contributions of Gerry Docherty, Paul Foulkes, and Penny Oxley to the research reported in this article. We are grateful to Peter Trudgill for helpful comments on an earlier version, to Henrietta Cedergren for advice on a specific problem, and to two anonymous referees who also contributed constructive suggestions.

marized here, and a larger extensive preliminary study by Hartley (1992) of 16 elementary school children. The aims of the latter study were to examine the range of glottal and glottalized variants produced in certain linguistic environments and to correlate frequency variations with the extralinguistic variables of age, gender, and style. Finally, we report on some early findings of a more substantial current research project in Tyneside and other urban areas in Britain. To date, interviews have been recorded with 32 Tyneside adult speakers from two generation cohorts in two social classes (working class and lower middle class), equally divided between males and females. This material is currently undergoing further analysis.

Findings from these three Tyneside studies are supplemented with information from other recent studies carried out elsewhere in the British Isles, allowing them to be discussed in a more general context of sociolinguistic argumentation, particularly with respect to the role of social variables and (linguistic) contextual constraints on linguistic change. We have also added to the argument additional material on the history of glottalization and its rural and urban origins. It is important to emphasize at the outset that glottal replacement of (t) in certain phonetic environments (known as the glottal stop and referred to by Wells, 1982, as "T-glottaling") is very heavily stigmatized.

T-glottaling arguably shares with H-dropping the distinction of being one of the two most stereotypically stigmatized features of British English pronunciation (see Milroy, Milroy, & Hartley, 1994, for an account of the evaluative remarks of various commentators). However, glottalization is spreading very rapidly, not only into cities (Wells pointed out that it is increasing in urban accents everywhere in England), but also into various regions where it was not found before. For example J. Milroy (1982) reported its presence in Galloway speech (southwest Scotland), where it is apparently of recent origin. Mees (1987) reported it in the urban dialect of Cardiff, although it is not characteristic of the hinterland Welsh dialect of English. It was observed in Belfast, apparently as an innovation in the mid-1970s. Knowles (personal communication) reported that it is now quite common in Liverpool. In the late 1960s, however, it occurred only rarely and in limited contexts (Knowles, 1973:235).

The spread of the glottal stop is so rapid that it is now widely perceived as a stereotype of urban British speech, and (as Roach implied in the comment cited earlier) it is now evident in the casual speech of middle- and upper-class people, both male and female. Trudgill reported that, in Norwich between 1968 and 1983, the main increase in glottal stop usage was in formal styles; he remarked that this change "tallies very well with a strong casual impression shared by many older people that younger people in many parts of Britain today no longer feel [ʔ] to be a stigmatized feature to be avoided in certain situations, as older people do" (1988:44). As well as spreading into more formal styles of a regional dialect where it was already well established, the glottal stop has spread into more linguistic contexts in the prestige accent—

Received Pronunciation (RP). Wells (1982:106) remarked that "mainstream RP is now the subject of imminent invasion by trends spreading from working class urban speech, particularly that of London." It should be borne in mind here that (nonstigmatized) glottalization in certain syllable-final environments (e.g., *button*, *cutlet*) is already an established characteristic of RP and mainstream American English (the latter also has it in items like *Latin*, *mountain*). What is happening is that T-glottaling in different environments, notably intervocalically in word-final positions, is spreading into RP (as in *not enough*), though not yet word-medially (as in *waiter*, *water*, *butter*). There exists also a sizable body of recent phonological work that formulates the conditions on glottaling/glottalization and related phenomena such as tapping and flapping within various frameworks in terms of syllable structure (e.g., Cohn, 1993; Gussenhoven, 1987; Harris & Kaye, 1990; Kahn, 1976; Selkirk, 1982). We make use of this research in our current work.

The tendency for low-status features to spread upward is frequently attested in the history of English since about 1550 (see, e.g., Strang, 1970: 164). One probable example of such an upward social movement is the use of the so-called broad [a] in RP (as in *path*, *dance*). Mugglestone (1990) cited evidence that suggests that in the late 19th century it was to some extent stigmatized and slow to be accepted as an RP norm, as it was a very salient characteristic of Cockney. We suggest that this tendency can illuminatingly be described in terms of local and supra-local variation—as a tendency for low-prestige features of relatively localized varieties to spread into supra-local varieties. As these supra-local varieties include not only standard or prestige varieties, but also nonstandard varieties, the notions "supra-local" and "local" cut across the more familiar sociolinguistic notions of "stigma" and "prestige." They also cut across the Labovian distinction between change from above and change from below, where " 'above' and 'below' refer . . . simultaneously to levels of social awareness and positions in the socioeconomic hierarchy" (Labov, 1994:78). The question of why and how this type of change is implemented is a challenging one to which there is no simple answer. As we shall see, the diffusion of glottalization in British English exhibits quite complicated sociolinguistic patterns.

In addition, variation in the use of glottals and certain other variables is clearly gender-related. This article is therefore very much concerned with the role of gender in linguistic change. We bear in mind the generalization suggested by Labov (1990:240): "As the innovators of most linguistic changes, women in intermediate social classes spontaneously create the differences between themselves and men. In adopting new features more rapidly than men and in reacting more sharply against the use of stigmatized forms, women are again the chief agents of differentiation." While our findings confirm the importance of gender differentiation in language change, we present evidence that females are tending to favor the stigmatized variant—the glottal stop. Far from reacting against stigmatized forms, they seem to be instrumental in diffusing a very salient exemplar of such a form.

THE GLOTTAL STOP, PREGLOTTALIZATION, AND TYNESIDE GLOTTALIZATION

In addition to T-glottaling—replacement of (t) by a glottal stop—there is another kind of glottalization, which is usually known as "preglottalization." Wells (1982) discussed preglottalization/glottalization as one of the invasive and dynamic phenomena currently affecting RP, where /p,t,k,tʃ/ are preceded in a syllable-final position with a glottal stop; candidate examples are *stop! quite! look! watch!* The likelihood of preglottalization is dependent on linguistic environment, and, as Wells pointed out, the details of this are intricate and variable (1982:106).

A glottalization phenomenon auditorily distinct from both the general British type of preglottalization and T-glottaling is distinguished by Wells (1982:374). He commented that the urban dialect of Newcastle upon Tyne (known as "Geordie") shows "a particular kind of glottalization of /p,t,k/," which "may consist either in a purely glottal realization, [ʔ], or of a combined glottal and oral plosive." O'Connor (1947) transcribed the latter type as [ʔp,ʔt,ʔk]. Wells stated that his auditory impression is of [pʔ,tʔ,kʔ], with "glottal masking of the oral plosive burst." It is at present not entirely clear why Tyneside glottalization sounds so different from the more general British type found in RP (we reserve the term "preglottalization" for this), but it is clear that glottalization of /p,t,k/, *as distinct from though associated also with T-glottaling*, is an extremely salient regional marker of Tyneside English. In fact, an auditorily similar pattern of glottalization is found in a number of other British dialects, including those of East Anglia (as reported by Trudgill, 1974), London, and central Scotland. However, the distribution of glottalized tokens is complex, as different ranges of environments seem to be affected in different dialects. For example, in some dialects but not in others, the process apparently takes place always within foot boundaries. Harris and Kaye (1990) pointed out differences in this respect between glottalization in London and glottalization in Fife, Central Scotland. In London it is reported always to occur freely in words like *city*, but less freely within the phonological word above foot level where the syllable following the (t) bears secondary stress (e.g., *latex*, *context*, *meditate*). In Fife, on the other hand, these contexts are common sites for glottalization. The distinction between glottalization and glottaling, the replacement of (t) by a glottal stop, is important for the argument presented here. Both phenomena, which are not always clearly distinguished, are associated not only (increasingly) with contemporary urban British accents, but also historically with those of London, Glasgow, Edinburgh, and Tyneside, and with the rural accents of Norfolk and Suffolk.

Apart from its auditory distinctiveness, glottalization of this type apparently affects all three fortis stops in Tyneside in a wider range of linguistic contexts than the preglottalization pattern characteristic of RP discussed earlier, although the contexts in which it can occur are not entirely clear. For example, although it certainly does not occur in word-initial syllable-onset

positions, it seems to occur sporadically in foot-initial positions within word boundaries, at least with respect to (p) in words like *apply*, *appear* (contrary to the apparent assumptions of Carr, 1993:234). It also affects syllable-onset (t) in contexts of a preceding rhymal consonant, where it is reported by Harris and 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 rule also affects words like *after* and *custard*, where the preceding rhymal consonant is a fricative. However, glottalization in *whisper*, *whisker* is attested by Hartley (1992), and it is perhaps significant that both of these examples are reflexes of syllable-onset non-coronal stops. As we shall see, Tyneside glottalized variants of (t) occur less frequently than glottalized variants of (p) and (k). Recall that all three stops can be realized in Tyneside either by glottalized variants or by glottal stops.

The apparent co-existence in Newcastle of a general urban British pattern of glottaling, along with a more localized type of glottalization, is of particular interest, as glottal replacement and glottalization in Tyneside and elsewhere have usually been thought to be much the same kind of phenomenon. For example, Harris and Kaye (1990) treated both glottal replacement and glottalization compositely, along with flapping, as instances of a more general lenition process. Nor did Carr (1993) see any need to distinguish the Tyneside pattern clearly from the general British pattern, except insofar as the process regularly affects all three fortis stops in Tyneside. Phonetic/phonological accounts frequently place glottal reflexes of (t) on a scale in which glottalization lies between [t] at the top and the glottal stop at the bottom. This ordering may then be treated as a natural lenition scale. Similarly, sociolinguistic analysts have treated these variants as points on a single continuum—usually a continuum that corresponds to a continuum of social evaluation—with the glottal stop counting as lower in prestige than the glottally reinforced variant (Macaulay, 1977; Romaine, 1975; Trudgill, 1974). One of the conclusions we draw from the evidence presented in this article is that in Tyneside at least (and possibly elsewhere) they are not the same in sociolinguistic terms: that is, they do not exhibit the same sociolinguistic patterns in co-variation with extralinguistic variables, and they are not socially evaluated in the same way or on the same scale of evaluation. This hypothesis was initially derived from long-term observation of rural and urban dialects in Northumberland, the Scottish Borders, Galloway, and Northern Ireland, where glottalization is characteristic (e.g., Wigtownshire, Belfast: J. Milroy, 1982). However, glottal replacement is not and indeed is often perceived by older speakers within these speech communities as an intrusion from elsewhere—usually an intrusion from a large urban center into smaller urban and rural areas. Grant and Dixon (1931) attributed glottal replacement in central Scotland to recent influence from Glasgow. This observation is particularly relevant to Tyneside glottalization, where glottalization, but not glottal replacement, is quite evident in the speech of the elderly. This pattern of

social distribution contrasts sharply with a more general British type of glottalization (usually replacement), which is associated with younger speakers.

Bearing in mind the phonetic and descriptive complexities associated with the various glottalization phenomena described, we attempt to relate variable realization patterns to extralinguistic variables in order to determine the social route by which glottalization phenomena are spreading. Because we find that gender and social class are central to this process, we turn now to a brief discussion of these extralinguistic (or speaker) variables.

EXTRALINGUISTIC VARIABLES: SOCIAL CLASS AND GENDER

The use of glottalization in British English has usually been held to be class-marked and is stereotyped as a feature of Cockney or some other low-status dialect (see, for example, the studies cited by Wells, 1982:322–327). Harris and Kaye (1990) apparently viewed this as a fairly uncontroversial assumption, and one that may also spring partly from the tendency of the sociolinguistic tradition, following Labov's New York City study, to emphasize the importance of social class as a primary extralinguistic variable, where social class divisions are mirrored in a fairly predictable way by variable frequencies of use by speakers of variants that lie on a continuum from most to least standard. Many scholars working within the Labovian paradigm have tended to interpret patterns of linguistic variation associated with other speaker variables such as age, sex, and ethnicity primarily in relation to social class.

Because the early sociolinguistic surveys were initially designed with social class dimensions of variation in mind, gender marking in language tends to be treated as falling out in some way from class marking, which is seen as primary. This affects the formulation and interpretation by sociolinguists of the recurrent and now familiar pattern in Western urban societies whereby females generally approximate more closely to what is usually described as the prestige form or the standard form than males of the same social class, using prestige variants more frequently and nonstandard variants correspondingly less frequently. Fasold (1990) provided a comprehensive review of the findings and comments on gender marking in language. The inner-city Belfast study carried out by Milroy and Milroy (1978) started out as a critique of the primacy of social class and associated ideas (such as prestige) in sociolinguistic method and theory. This investigation, which dispensed with social class and looked directly at the gender pattern, also established that females tended toward careful styles and less localized variants for nearly every linguistic variable studied.

Trudgill (1983:167) offered a tentative interpretation of this pattern (which appeals implicitly to the primacy of social class) as an attempt by women to signal status linguistically in the absence of opportunities to be rated according to occupation and achievement, which are denied them in their profes-

sional lives. However, in an article that deals comprehensively with the issue of gender marking in language, Chambers (1992) related the frequently observed class/gender pattern to a tendency for women to engage in less localized patterns of social interaction than men. He also associated it with a biological tendency for women to develop superior linguistic skills, and his account is notable for its avoidance of an explanation of gender differentiation in language directly in terms of class.

Horvath's (1985:65) regraphing of Labov's data in accordance with the linguistic groupings into which speakers seem to cluster (rather than initially in terms of social class) suggests quite strongly that (dh) in New York City is more clearly stratified by gender than by class. The same point emerges more clearly from a study by Rigg (1987). This shows variation between glottalized and non-glottalized realizations of /p,t,k/ in Tyneside in relation to the gender and social class of 16 speakers. Specifically with a view to examining the interacting effects of gender and class on their language, these speakers were selected to contrast sharply with respect to the class variable: the working-class group consisted of unskilled or unemployed workers, and the middle-class group consisted of higher professionals. Although some effect of class is evident, this effect is far less than that of gender, such that glottalization is more coherently characterized as a male norm than a working-class norm. Furthermore there is no overlap between male and female quantitative norms; male scores range between 99.5 and 80.5, whereas female scores range between 60.0 and 11.0 (see Table 1).

The quantitatively greater effect of gender than that of class shown in Table 1 is not isolated or idiosyncratic. Coates (1986) regraphed a substantial amount of data from a number of well-known sociolinguistic surveys that show that gender can account for patterns of variation at least as well as, and in some cases better than, social class. In a study of the dialect of Amsterdam, Schatz (1986:102) provided a concrete example of a problem arising from the standard practice of conceptualizing sex differences in terms of social class. Gender-related differences in the distribution of variants of the (a) variable in Amsterdam vernacular emerge in low-status speakers only, rather than the expected pattern of women approximating to the norms of a higher social group. The problem faced by Schatz and others who encounter such patterns is that generally accepted sociolinguistic thinking does not provide a framework for interpreting them. What might be described as the traditional gender/class explanation, which views women as approximating to the language of the social class immediately above them, cannot account for patterns of gender differentiation that are restricted to a single low-status group. Further afield, findings by Arab linguists (Abdel Jawad, 1987; Alahdal, 1989; Jabeur, 1987) challenge the standard interpretation of the gender/class relationship. Although many sociolinguists are careful not to claim universality for this account, Chambers' (1992) explanation in terms of characteristic male and female interactional practices does not depend on a prior analysis of social class variation and is able to accommodate findings from

TABLE 1. *Percentage of glottalized variants of fortis plosives in the spontaneous speech of 16 Tynesiders*

	Working Class			Middle Class		
	(p)	(t)	(k)	(p)	(t)	(k)
Male	99.5	97.0	94.5	96.5	91.0	80.5
Female	60.0	31.0	28.0	27.0	32.5	11.0

both the Arab and the Western world. In view of Chambers' work and the evidence reviewed earlier, it seems reasonable to suggest that a more general account of gender-related patterns of language variation might be achieved if the analyst focuses primarily on gender rather than presenting explanations of gender-based variability in terms of class. Although it is clear that gender differences (which do not always map directly on to the binary biological categories of "male" and "female") involve differences in orientation to other social categories, Eckert (1989) showed that a somewhat more satisfying account of these interacting effects is possible if gender is treated seriously in its own terms as a complex social construct.

Next, we summarize findings from studies of both Tyneside and general British glottalization in relation to their distribution by gender and in some cases class; following this discussion, we focus primarily on gender.

GENDER, SOCIAL CLASS, AND PATTERNS OF GLOTTALIZATION

Taken together, the findings from several pieces of recent research suggest that gender differences are involved in quite a complex way in the spread of glottalization. Lodge (1984:22), reporting on the social distribution of both glottal and glottalized variants in Stockport, Cheshire (in the northwest of England), noted that teenaged girls use both variants as realizations of (t) in word-final contexts, while boys use glottal stops intervocalically and as realizations of the definite article. However, a curvilinear pattern of distribution by age is evident, with older and younger people using more glottalization than the economically active middle-aged group. This suggests that glottalization is relatively stable and well established in Stockport, as is the pattern of gender variation, where males use many more glottalized variants than females and glottalization is avoided in formal styles (for reports of a similar pattern, see Macaulay, 1977; Reid, 1978; Romaine, 1975; Trudgill, 1974). Macaulay (1991) also provided evidence for the finding that glottaling is a male norm in Ayr, Scotland.

However, we find that the pattern of variation reported by these early studies, which is reflected by a long-standing negative social evaluation, is not found where glottalization seems to be either emerging as an innovation or increasing. Although Trudgill (1988) did not report on gender-related variation or change, his finding—that glottalization had increased in Norwich in formal styles since 1968—suggests a change in patterns of social evaluation, as well as an overall increase in glottalization. Newbrook (1986) noted that in Britain generally the glottal stop seems to be gaining ground. He presented evidence from his sociolinguistic study of West Wirral that young women are leading in the introduction of the glottal stop, which he characterized as "young RP" (186). He further reported that the more general pattern of change in the Wirral is in the direction of the urban accent of Liverpool, where glottal stops are not historically well established and are a recent innovation. In a study of the speech of adolescents in Cardiff, Mees found that glottalization (including the use of the glottal stop) is most advanced in middle-class, rather than working-class, speech. There is a slight tendency for young females to favor glottal (as opposed to glottalized) variants of (t).

Mees's work raises important methodological issues and forms an important background to Hartley's analysis of Tyneside glottalization. In 1981, Mees described in some phonetic detail variation in the speech of 36 children in Cardiff, aged 13 to 15, six children of each sex being represented in three social classes. The range of phenomena which have been described as glottaling/glottalization were treated by Mees as variant realizations of post-tonic (t), and she listed a wide range of pronunciation types: [t], [ʔt], [ʔ], [tv] (this variant covering various types of flap and voiced realization) and [0]. Frequency was strongly conditioned by a range of lexical and phonological factors. For example, the zero variant was restricted to a small set of high frequency, but very salient words: *it*, *bit*, *get*, *let*, *at*, *that*, *got*, *not*, *what*, *put*, *but*, *might*, *right*, *quite*, *out*, *about*. This lexical rule operates at a very different level from glottalization; the latter appears to be a post-lexical rule, potentially affecting all eligible phonological contexts. Realizations of (t) in word-final position were separately examined in three different contexts: before a vowel, before a consonant, and before a pause. Mees commented that in previous work (t) variation had been treated much more simply by, for example, Macaulay (two variants), Romaine (five variants, but conflated as two for quantification purposes), and Trudgill (three variants on a continuous scale, [t], [tʔ], and [ʔ]). Whereas all of these investigators had also been quite clear that glottalization was a general low-status characteristic of British speech, Mees's more phonetically detailed work suggests that what is loosely described as glottalization in fact covers a number of articulatory and (as it turns out) sociolinguistically distinct phenomena.

Her quantitative results, as set out in Tables 2 and 3, of reflexes of (t) in prevocalic contexts in Interview Style and Reading Passage Style are extremely interesting. Apart from obvious differences in style shifting behavior,

TABLE 2. (t) *indices in Cardiff in prevocalic contexts by social class: Four variants*

	Social Class		
	1	2	3
[t]	19	15	10
[ʔ]	45	34	10
[tv]	29	44	63
[0]	7	7	17

Source: Adapted from Mees (1987).

TABLE 3. (t) *indices in Cardiff in prevocalic contexts by sex of speaker: Five variants*

	All boys	All girls
[t]	11	18
[ʔ]	17	26
[ʔt, tʔ]	10	6
[tv]	49	42
[0]	13	8

Source: Adapted from Mees (1987).

we can note that among these Cardiff children glottalized variants generally are a prestige feature in the sense that they occur more frequently in *higher* status speech (i.e., in Social Class 1, as shown in Table 2). In Table 2, all glottal and glottalized variants were counted together, and the slight preference of girls specifically for the glottal stop emerges, interestingly, only when glottal and glottalized variants are considered separately as in Table 3. Later, we will consider this small but possibly important gender-related preference further, in light of parallel patterns of variation in Tyneside.

Mees interpreted these data—the reverse of the class- and sex-related pattern reported by earlier investigators—by suggesting that Cardiff English is modeled on RP, where various glottalization phenomena are now quite evident. However, there is no evidence that RP has directly influenced Cardiff English, and there seems to be no reason to make this assumption, given that RP itself has for some time been undergoing quite radical changes, which have had the effect of diminishing its linguistic distinctiveness. In Wells's terms it has been subject to "invasion" from the urban accents of Britain. In view of the rapid spread of glottalization, it seems reasonable to interpret Mees's findings not as reflecting a direct influence from RP, but as the prod-

uct of a more general ongoing supra-local change in British English. This change is affecting not only the urban dialects of British cities, but also RP.

Given that glottal realizations are often seen as stereotypical of low-status speech, the changing social meaning of socially sensitive phonological variants emerges very clearly from Mees's analysis. In 1976 Romaine and Reid published an article on Scottish urban speech whose title, "Glottal sloppiness," indicated the prevailing opinion about glottalization. Several studies of British English cited in the present article confirm the change in evaluation evident in Mees's work. As we noted earlier, similar changes in social evaluation have taken place in the past, the classic example being (r) in New York City, as analyzed by Labov (1966).

Kingsmore (1995) provided further evidence of the changing status of the glottal stop in the English of the British Isles. In Coleraine, Northern Ireland, it is again females who favor this variant. Kingsmore described a regular gender-related pattern of alternation between a flapped variant of (t) and the glottal stop (in final position in words of the type *not*, *what*), with males favoring the flap and females the glottal stop in several different age groups. However, her data suggest that in Coleraine the use of the glottal stop is increasing, as younger male scores are relatively high for the glottal stop (Kingsmore, 1995:164).

To interpret Kingsmore's data, quite a lot of information is required about the distribution of glottal and flap consonants in Northern Irish rural dialects. The glottals are in fact associated with Ulster Scots dialects (Coleraine is located in a predominantly Scots area) and the flaps with the predominant Mid-Ulster dialect (see Kingsmore, 1995:Ch. 2). The glottals, however, are geographically more widespread in the British Isles generally (again supra-local) and are less marked than the flaps as local "Ulster" variants. This historically and regionally complex distribution of alternative variants of an underlying variable like (t) highlights the limitations of a binary analysis presented in terms of a continuum between local vernaculars and a single prestige norm.

GLOTTALIZATION PHENOMENA IN TYNESIDE ENGLISH

The sociolinguistic variable and its variants

Earlier we reported some findings of Rigg's (1987) study of glottalized and non-glottalized variants of (p), (t), and (k) in word-medial and word-final positions in the speech of 16 adult Tynesiders in two contrasting social classes. Rigg followed the early sociolinguistic studies of glottal or glottalized variants of (t) in English in avoiding phonetically detailed specification of variants; particularly, she did not distinguish glottal from glottalized variants. Moreover, following Trudgill (1974), she treated the variants [t], [tʔ] [ʔ] as points on a *single phonetic continuum*. Thus, the figures in Table 1, which summarize patterns of variation with respect to all three glottalized stops on

Tyneside, do not discriminate between glottal and glottalized realizations, both being treated as glottalized variants of the stops. Recall that phonological accounts within various frameworks, such as those by Harris and Kaye (1990) or by Carr (1991), simplify the phonetic details in a similar way. Mees (1987) argued that realizations of (t) in Cardiff could (and indeed should) be specified in greater phonetic detail. Her results suggest that sociolinguistically interesting and possibly significant patterns of variation might be concealed if surface patterns of variation are submerged in a generalized and relatively abstract analysis of an underlying variable. Such an analysis abstracts away from phonetic detail in a manner quite similar to the analyses of phonologists such as Harris and Kaye and Carr.

An important point of principle for sociolinguistic theory and methodology is involved here, which has recently been discussed by Wolfram (1993). Wolfram pointed out that in mainstream American sociolinguistics the conception of the linguistic variable has changed with the advent of the variable rule (Labov, 1969). The original conception of the variable was "largely motivated by a desire to reveal the most clearcut patterns of social and linguistic co-variation" (Wolfram, 1993:197). This underlying sociolinguistic unit was not necessarily co-extensive with any underlying linguistic unit (such as the phoneme), and variants of a single variable might in a phonological analysis be assigned to different phonological units. However, the variable rule started with the notion of a conventional optional linguistic rule, expanding the notion of optionality to include both linguistic and social constraints on variability. As a consequence, the identification of underlying variants is constrained by the need to capture variability by means of the formal apparatus of a linguistic rule. Wolfram pointed out that this change entailed a redefinition of the linguistic variable from a sociolinguistically motivated construct to one that was linguistically based. Such a change might well produce insights of a linguistically interesting character, although this is in itself a controversial issue (see, e.g., Kiparsky, 1994); but, as Wolfram noted, it might grant less insight into the relationship between social structure and linguistic variation. J. Milroy (1992) showed a similar concern in his comment that a linguistically based account does not primarily address the question of how linguistic change is actuated, "and the question why (and how) *speakers* initiate changes is not central to the linguistic context in which [the variable rule] is conceived" (25).

One effect of a description of variability in terms of variable rules has been to abstract away from phonetic details that cannot readily be encompassed within a single linguistic rule. Wolfram cited his own work on English among young Puerto Rican and Black males in East Harlem, where he identified a morpheme-final variable (th) (as in *tooth*, *both*). He identified five variants of this variable: [θ], [f], [t], [0], [s]. Of these [θ] was realized by two "subvariants" ([θ], [tθ]), [t] by four ([t], [ʔt], [ʔ], [ɾ]), and [s] by two ([s], [z]). Wolfram reported that, although he was able to characterize this complex pattern of variation in terms of phonological rules (he formulated 10, including 4

classic variable rules), this enterprise is not particularly sociolinguistically revealing. He concluded that "the most straightforward sociolinguistic profile in East Harlem derives from the correlation between the variants of (th) as set forth above and an independently defined set of social variables such as ethnicity, interethnic contact, and so forth" (1993:199).

These remarks were made in an American context. But sociolinguists working in the British Isles have, on the whole, continued operating with what Wolfram described as the original definition of the variable, seeking to achieve a maximally sociolinguistically revealing account of variation and sometimes displaying a preoccupation with the problems of accurate specification of phonetic detail (see, e.g., Kerswill & Wright, 1990). Wolfram's list of variants and subvariants of (th) is reminiscent in its attention to phonetic detail to Mees's list of variants of (t).

Recall that, when Mees conflated all glottal and glottalized realizations as a single variant of (t), a class-related pattern emerged that associated this variant with higher-status speakers. However, a more phonetically detailed specification of variants, where glottalized and glottal variants are distinguished, further suggests a preference by males for the former and by females for the latter kind of realization. The two investigations of glottalization phenomena in Tyneside English we describe here followed Mees in distinguishing variants of (t) in as much phonetic detail as possible, distinguishing particularly between glottal and glottalized variants. In designing the research in this way, we were motivated by the same conviction as Wolfram that the most sociolinguistically revealing account of the community is likely to be derived from a correlation between sociolinguistic variants specified in considerable phonetic detail and an independently specified set of social variables. As far as we are aware, Wolfram provided the only published discussion of the methodological and theoretical issues arising from the change in the conception of the linguistic variable in American sociolinguistics.

Glottalization phenomena in the speech of Tyneside children

Hartley (1992) studied a group of 16 children made up of equal numbers of 5- and 10-year-olds, with four boys and four girls in each age group. All attended the same primary school in Blakelaw, a low income, working-class area of Newcastle. Peer-interaction styles of all children were recorded as they spoke with each other, and the word-list reading style of the older group was also recorded. This corpus of data formed the basis of a quantitative analysis of the linguistic and social distribution of variant realizations of the plosive stop variables (p), (t), and (k). Hartley attempted to extract from the tapes 60 tokens per child for analysis, 10 for each of the three variables in within-word contexts and 10 in word-final contexts. In practice, this was not always possible, particularly with respect to (p), which is the lowest frequency of the three in the language system as a whole. However, the group scores,

shown in Tables 4 through 12, are based on the distributions of not less than 40 and not more than 80 tokens per speaker. Percentage scores are provided in Tables 4 through 12, and corresponding frequencies may be found in the Appendix. Statistical analysis has been carried out on tabulated data where a substantive claim about language variation is made which has implications for arguments developed in this article. Each test of significance involves the analysis of a 2×2 contingency table, in each case the point of interest is whether there is an association between row and column variables. The p value quoted, followed in parentheses by the significance level category, is the result of a two-sided Fisher's exact test (implemented by the statistical package StatXact) and thus represents the precise significance providing evidence for such an association, which could be in either direction. Because many of the cell counts are low (see Appendix for details) Fisher's exact test is appropriate.

Here, we describe Hartley's most general findings, moving on to a more detailed account of the variants of (p), (t), and (k) used by the children. (A little later, we examine contextual constraints on the distribution of these variants.) Next, we focus specifically on variants of (t), and then we describe the glottaled and glottalized variants of (t) in the speech of a group of 32 Tyneside adults.

Hartley began her analysis by examining the age and gender distribution of all glottalized variants (i.e., both glottalized and glottaled) of (p), (t), and (k) in the speech of the 16 children described earlier. The patterns which emerged initially showed general agreement with Rigg's (1987) findings and with earlier sociolinguistic findings that in British English males use glottalized variants of all kinds more frequently than females. However, Hartley followed Mees in distinguishing glottaled from glottalized variants. Interestingly, this phonetically more detailed analysis suggests a gender-related preference parallel to the finding tentatively reported by Mees in Cardiff, with girls preferring glottal stops and boys preferring glottalized variants (see also Milroy et al., 1994:18–19).

Table 4 sets out the relative frequencies of glottal realizations of the three stop consonants (p), (t), and (k). As might be expected, (t) is in both styles by far the most likely to be realized as a glottal stop (significantly more so than (p) and (k) at the 1% level).

Table 4 also suggests that girls of both age groups are more likely than boys to realize (t) as a glottal stop—a gender-related pattern similar to those reported by both Mees (1987) and Kingsmore (1995). The evidence for this in peer-interaction style is not strong; when both age groups are combined, we find a marginally significant effect at the 10% level ($p = .0957$). However, the girls' preference for the glottal stop is clearer in word-list style, and the gender-related difference is significant at the .1% level ($p = .0005$). Note also that 10-year-old girls realize (p) with a glottal stop in almost one-fifth of the cases in peer interaction, but glottal stop realizations of (k) are much rarer.

TABLE 4. *Percentage use of glottal replacement for individual variables by age, sex, and style*

		Style					
		Peer Interaction			Word-List		
Age	Sex	(p)	(t)	(k)	(p)	(t)	(k)
5 yrs	Male	11	35	4			
	Female	8	43	6			
10 yrs	Male	5	36	4	5	12	6
	Female	21	43	1	6	31	4

TABLE 5. *Percentage use of glottalization for individual variables by age, sex, and style*

		Style					
		Peer Interaction			Word-List		
Age	Sex	(p)	(t)	(k)	(p)	(t)	(k)
5 yrs	Male	56	28	73			
	Female	40	14	61			
10 yrs	Male	55	25	73	43	21	41
	Female	48	21	52	37	16	20

Table 5 provides further details of the boys' preference for glottalization. Interestingly, (k) emerges as most susceptible to glottalization (significantly more than both (p) and (t) at the 1% level), with an extremely high frequency of 73% for boys of both ages in peer interaction. In fact, the figures reflect for (k) a highly significant difference at the 1% level between male and female rates, for both peer-interaction and word-list styles. Thus, an analysis that distinguishes between glottaling and glottalization illuminates interesting differences in relative susceptibilities of (p), (t), and (k) to these two processes.

It is worth commenting here on the relatively low percentages for glottalized variants of (t) evident in Table 5. These are partly accounted for by the fact that (t) is the prime candidate for glottaling; thus fewer tokens are available for glottalization. However, if we subtract the glottal replacement figures for (t) (shown in Table 4) from the total and calculate glottalization scores using this smaller number as our total, the relative frequencies for glottalization are correspondingly increased (in 5-year-old males to 43%, for instance). Interestingly, (t) nevertheless remains the least susceptible of the three plosives to glottalization.

TABLE 6. *Percentage use of glottal variants by sex for peer interaction*

	Variants of (p)				
	[p]	[p?]	[?]	[p′]	
Male	37	55	8	0	
Female	41	44	13	1	
	Variants of (t)				
	[t]	[t?]	[?]	[tv]	[t′]
Male	23	26	35	12	3
Female	25	17	43	12	3
	Variants of (k)				
	[k]	[k?]	[?]	[k′]	
Male	18	69	7	6	
Female	33	59	4	4	

With respect to the social and stylistic distribution of variants evident in Tables 4 and 5, there is little difference in the incidence of glottalization and glottal replacement between the 5- and 10-year-old groups; style shifting moves generally in the expected direction, with less glottalization and glottal replacement in word-list style than in peer interaction. Girls style shift more than boys and in different ways. Girls reduce their glottal replacement of (p) (Table 4) and glottalization of (k) (Table 5) in word-list style, whereas boys use fewer glottal stops for (t).

We conclude this general account of patterns of distribution by setting out in more phonetic detail the various realizations of (p), (t), and (k). Four variants were distinguished for (p) and (k) and five for (t). Table 6 shows the distribution of these variants in the peer-interaction context, according to gender. We can see that glottal replacement affects this natural class of fortis stops in the order t > p > k; however, the order for glottalization is k > p > t. Note the voiced variant that occurs as a reflex only of (t).

The effect of syllable structure on patterns of variation

To explore the effect of linguistic context, we now present analyses derived from spontaneous speech data recorded in the peer-interaction situation. Table 7 shows that glottaling of (t)[1] within words (mainly in intervocalic position following tonic syllables, as in *water*, *butter*) is preferred by girls in both age groups, with an overall significance level of 1% (5 years: $p = .058$;

TABLE 7. *Percentage use of glottal replacement of* (t) *in peer interaction by age, sex, and phonetic context*

		Within-word	Word-final
5 yrs	Male	34	35
	Female	55	35
10 yrs	Male	25	40
	Female	51	39

TABLE 8. *Percentage use of glottalization of fortis plosives in peer interaction by age, sex, and phonetic context*

		Within-word			Word-final		
		(p)	(t)	(k)	(p)	(t)	(k)
5 yrs	Male	56	43	88	55	17	60
	Female	29	15	69	44	14	54
10 yrs	Male	80	46	75	40	13	73
	Female	48	29	59	48	17	58

10 years: $p = .031$; combined age groups: $p = .003$). In contrast, there is little difference in word-final position between male and female norms; thus, the intervocalic context chiefly accounts for the high levels of use of the glottal stop by girls.

Table 8, which shows patterns of glottalization for all three stops, supplements these findings in an interesting way. Boys use glottally reinforced variants at higher levels than girls, and indeed, the boys' and the girls' figures for (p), (k), and (t) are consistently sharply differentiated in both contexts. Glottalization of (k) is particularly favored by boys. Note also the contrast between male and female patterns with respect to realization of (t) intervocalically. Table 7 reveals a clear preference by the girls for glottal stop realizations, but Table 8 shows much higher levels of use by the boys of glottalization in this position: (p) is significant at the 5% level, (t) is significant at the 1% level, and (k) is significant at the 5% level.

We now turn to (t) glottaling in particular. Recall that this has been extensively discussed as a salient characteristic of contemporary British English. It is clear from the patterns that emerge in Table 7 that glottaling of (t) in the speech of these Tyneside children (as distinct from glottalization of all three stops, as shown in Table 8) is worth a closer look. We therefore turn to a more detailed consideration of the phonetic contexts for (t)-glottaling.

Contexts for (t)*-glottaling*

Following Mees (1987), this more detailed analysis of (t) was carried out in the following range of contexts: realizations of word-final (t) before a following pause, consonant, and vowel, respectively; and realizations of intervocalic (t) word-internally. The results are set out in Tables 9 through 14.

Non-glottalized forms are preferred before a pause; the frequencies for each variant are almost identical for both sexes. However, as Table 10 clearly shows, glottal stops are preferred in preconsonantal contexts, especially by boys. This is the only context in which these Tyneside boys use glottal stops at higher frequencies than the girls, and it is probably significant that glottal variants (including glottal stops) are a well-established characteristic of many dialects of English in this context, including RP. Hence, the children's behavior here probably reflects a well-established British norm, rather than a localized pattern.

Realizations of (t) in prevowel word-final contexts are set out in Table 11, and these data are of particular interest in showing the comparative distribution of glottal and voiced variants. This environment favors voiced and/or tapped realizations, particularly in northern dialects, including Tyneside; Hartley's figures for voiced realizations also include realizations with continuant [r]. Wells (1982:370) described this localized process as "the T-to-R rule" (*go*[r] *a book*; *a lo*[r] *of people*). Such realizations are apparently rare word-internally in intervocalic contexts, although a continuant has been attested in Newcastle in, for example, the items *bottom* and *matter* (the latter example is cited by Wells, 1982:370). Although the commonest output of this rule appears to be a continuant [r], we have followed Mees here in grouping together a range of audibly different realizations as voiced variants. Table 11 shows that the most frequently used variants in this context are not [ʔ] or [tʔ], but voiced variants of (t) (including [r]), with boys using them at the highest frequency—68% of the time.

What is of interest here is that these two variants (glottalized and voiced) are competing for the same or similar territory. However, Carr's claim (1991)—that glottaling and weakening (as he described the T-to-R rule) are in complementary distribution, with glottaling inhibited in the word-final prevocalic position—cannot be correct. Table 11 shows that, although voiced variants (including T-to-R) are indeed strongly favored in a specific context, glottalized variants are also used approximately one-quarter of the time by boys and one-third of the time by girls.

The last context we consider for glottaling is the within-word intervocalic context. This is particularly interesting for our analysis of gender-related variation. Table 12 confirms the boys' preference in word-medial intervocalic position for glottalization, in contrast with the girls' preference for glottaling. Differences between male and female patterns for [t] are nonsignificant; for [ʔt] they are significant at the 1% level, and for [ʔ] significant at the 5% level. In fact, gender differences in the use of glottaling and glottalization are

TABLE 9. *Percentage use of variants of word-final* (t) *before a pause* (t^p), *by males and females*

	[t]	[ʔt]	[t']	[ʔ]
Males	57	10	14	19
Females	56	10	13	21

TABLE 10. *Percentage use of variants of word-final* (t) *before a consonant* (t^c), *by males and females*

	[t]	[ʔt]	[ʔ]
Males	8	20	71
Females	15	27	58

TABLE 11. *Percentage use of variants of word-final* (t) *before a vowel* (t^v), *by males and females*

	[t]	[tʔ]	[ʔ]	[tv]
Males	6	11	17	69
Females	12	9	23	53

most clearly evident in this context, with the boys preferring glottalization and the girls glottaling.

Note also that girls use the unmarked or standard variant (fully released [t]) at higher levels than boys, although the difference between boys and girls in their use of [t] is not statistically significant. Thus, high scores for the glottal stop do not entail low scores for the standard form or any general increase in glottalization along a continuum; the girls use the glottal stop at higher frequencies than the boys, without a corresponding decrease in their use of [t]. These data cast doubt on assumptions of a nonstandard-to-standard continuum that aligns with a phonetic hierarchy of increasing glottalization or lenition, in this case from [t] > [tʔ] > [0]. The organization of these linguistic variants into a linear series (sociolinguistic or phonetic) may indeed sometimes be appropriate, as in Norwich, for example. However, the sociolinguistic evidence from Tyneside suggests that the assumption of such a lenition hierarchy may sometimes be misleading. Glottaling and glottalization are more plausibly presented in this community as different choices available to speak-

TABLE 12. *Percentage use of variants of* (t) *within-word, in intervocalic contexts, by males and females*

	[t]	[ʔt]	[ʔ]
Males	23	63	14
Females	34	26	40

ers, who systematically prefer one to the other. Because, as we have seen, a lenition scale is generally assumed in phonological accounts of glottalization, this seems to be an example of a mismatch between a linguistic account and a sociolinguistic account of variable phenomena, such as is discussed by Wolfram (1993). The situation with respect to the [t], [tʔ], and [ʔ] variants in Tyneside seems also to be parallel to the pattern reported by Cedergren (1973) with respect to alternation in Panama City among Spanish [s], [h], and [0] in syllable-final contexts in such items as *tosta*, *los dos*. Much as Hartley's boys tend to alternate between [t] and [tʔ] and the girls between [t] and [ʔ], working-class speakers and males in Panama City tend to alternate between [s] and [0], whereas middle-class speakers and women alternate between [s] and [h].[2]

Glottalization phenomena in the speech of Tyneside adults

We now turn to consider some relevant findings from Tyneside that have emerged from the early stages of a current research project[3] on variation in British English, confining our report to results that bear on the conclusions suggested by Hartley's smaller scale study. The data described in this section are taken from peer-interaction sessions recorded with 32 adults, half of whom are drawn from working-class areas of Newcastle and half from slightly more prosperous middle-class areas, giving two contrasting status groups. Each of these groups of 16 is divided into two age groups (16–24, 45–65), and men and women are equally represented. These early findings thus supplement Hartley's analysis of the speech of working-class children. Here, we examine the interacting effects of age, social class, and gender.

Following the argument developed earlier that attention to phonetic detail is likely to be important in providing a clear sociolinguistic profile of the speech community, we initially identified 10 variants of (t), including the types of glottalization phenomena, voiced variants, and a range of tapped, flapped, and continuant variants that emerge as the output of the T-to-R rule. For clarity of presentation, these are here conflated as five variants:

1. [r] (occurring chiefly in this word-final prevocalic context as the output of the T-to-R rule);
2. a fully released variant, with or without frication or aspiration;
3. a variant [tv] with varying degrees of voicing/tapping;
4. a glottalized variant [t?] identified acoustically where there is evidence of a supra-laryngeal gesture; and
5. a glottal stop with no supra-laryngeal gesture.

Note that (1) and (3) are conflated in Hartley's analysis (see Table 11). Rather than focusing on these voiced variants, which are discussed elsewhere (Docherty, Milroy, & Milroy, 1994), we examine the distributions of (4) and (5) (italicized in Tables 13 and 14)—glottaled and glottalized variants of (t), respectively.

Before turning to the data set out in Tables 13 and 14, we comment briefly on some methodological issues emerging from reliance on the phonetically detailed type of auditory analysis described earlier (see also Kerswill & Wright, 1990, for a relevant discussion). One obvious question that arises with respect to these data—and, indeed, with respect to any account of glottal variants of English stops—is whether the auditory/perceptual categorization of variants as glottaled or glottalized matches up with the phonetic characteristics of those variants as revealed instrumentally. Previous accounts of glottalization phenomena, such as those described earlier, have adopted the glottaled/glottalized classification largely without question, and there has been very little instrumental work carried out on this aspect of English phonology. Accordingly, an important part of this research project is an instrumental acoustic study of glottaled and glottalized variants of /p,t,k/ collected in the field in order to ascertain whether the phonetic events observed instrumentally can be reliably matched to our percepts of these two variants. The detailed results of this work will be reported in a future article. However, early findings, as reported by Docherty (1994), indicate that there are cases where there is clearly *no* supra-laryngeal articulatory gesture and others where there *is* such a gesture, and that these two cases match up closely with our percepts of stops as glottaled or glottalized, respectively.

At the same time, however, acoustic analysis reveals a pattern of phonetic events that is considerably more complex than suggested by either a simple replacement of [t] with [?] or an addition of a glottal stop to the articulation of [p,t,k] to give [p?,t?,k?]. This complexity has implications both for our description of these variants and for phonological accounts of this variation (Docherty, Milroy, & Milroy, 1994). These are matters to be pursued upon completing a full acoustic analysis of a systematic sample both of the Tyneside data and of data collected elsewhere in Britain. We would hope also to investigate acoustically the phonetic characteristics of the type of preglottalization described by Wells (1982), which is auditorily different from the glottalization found in Tyneside. However, it is sufficient for the moment to note

TABLE 13. *Speakers aged 16 to 24:* (t) *realization by class and gender in word-final intervocalic contexts*

	Working Class		Middle Class	
	Male	Female	Male	Female
[r]	6	166	2	9
[t]	9	29	12	21
[tv]	135	211	139	159
[ʔt]	**52**	**112**	**82**	**64**
[ʔ]	**28**	**59**	**70**	**130**
Total	230	577	305	383

TABLE 14. *Speakers aged 45 to 65:* (t) *realization by class and gender in word-final intervocalic contexts*

	Working Class		Middle Class	
	Male	Female	Male	Female
[r]	26	163	24	44
[t]	12	111	21	144
[tv]	62	74	128	97
[ʔt]	72	**47**	**209**	**73**
[ʔ]	**4**	**8**	**16**	**8**
Total	176	403	398	366

that the auditory glottaled/glottalized distinction that is so important to the work reported in this article is supported by instrumental corroboration.

The analysis presented in Tables 13 and 14 is based on the 2,838 tokens of word-final (t) in intervocalic word-final contexts (as in *get it*). We present details of all realizations of (t) in this context, although our chief concern here is with the glottal and glottalized realizations.[4] It is immediately evident that young speakers use many more glottal stops in this word-final intervocalic context; the 16 younger speakers have 287 tokens of [ʔ], contrasting sharply with the figure of 36 for the 16 older speakers. Furthermore, 200 of these glottal stop tokens are produced by young middle-class speakers, and young females are responsible for 130 of this subtotal. Young middle-class speakers are thus much more likely to use glottal stops than their working-class counterparts, and this variant is very rare indeed among older speakers. These data seem to confirm the observations of other sociolinguists working in Britain, such as Mees and Newbrook, who associated the spread of the glottal stop in British English with middle-class and to some extent female speakers.

Because the data in Tables 13 and 14 suggest complex interaction effects among the speaker variables of age, class, and gender, a statistical analysis was carried out of the distribution of [ʔt] and [t] using a log-linear modeling procedure for contingency tables, implemented by the London Royal Statistical Society's program GLIM. Age emerged as the strongest individual effect ($\chi^2 = 209.9$, $df = 1$, $p < .001$), followed by class ($\chi^2 = 25.06$, $df = 1$, $p < .001$), and gender ($\chi^2 = 12.45$, $df = 1$, $p < .001$).

After these three individual effects are fitted, the model can be further improved by adding an Age × Class interaction ($\chi^2 = 6.608$, $df = 1$, p approx. = .01; this value falls very slightly below the 1% significance level, but is still clearly significant). No further additions to the model lead to significant improvement. There is a suggestion of an additional interaction between Class × Gender ($\chi^2 = 3.102$, $df = 1$, p approx. = .08), but a residual analysis of the model without this suggests a good fit. The final model is therefore composed of the following effects, in decreasing order of importance: age, class, gender, Age × Class.

To elucidate this conclusion further in terms of the distribution of glottal and glottalized variants, we first consider age and class with attention to the nature of the interaction. It is clear from Table 14 that in the older age group there is little difference between working-class and middle-class speakers. If we total all glottal and glottalized variants, the proportions of glottalized variants used by each group are 91% versus 92%. However, among younger speakers, there is a clear discrepancy between working-class and middle-class distributions (65.3% vs. 42.2%), with middle-class speakers using a significantly smaller proportion of glottalized and a higher proportion of glottal variants than working-class speakers. Marginal effects are also visible, with working-class speakers using a higher proportion of glottalized variants overall than middle-class speakers (74.2% vs. 65.6%). More clearly, however, older speakers use a higher proportion than younger speakers of these variants in both classes (working class: 91% vs. 65.3%; middle class: 92% vs. 42.2%). Recall that, although both these effects are significant in their own right, age has a far more significant effect than class. The gender effect does not involve any interactions, and the men use a much higher proportion of glottalized variants than women (77.9% vs. 59.1%). Thus, glottalized variants are associated generally with older speakers and with males. In the younger group, working-class speakers use them more frequently than middle-class speakers, and overall males more frequently than females. On the other hand, glottal variants are, as we have seen, particularly associated with young middle-class speakers, especially females.[5]

The very large age effect appears to reflect in Tyneside the rapidity of the spread of glottalization phenomena, which we have already noted as a supralocal change in British English. However, to understand the trajectory of this change that is evident in the span of two generations, we need to look more closely at class and gender (as Labov, 1990, in particular has done). Before attempting to draw conclusions from the results presented in Tables 13 and

14, note that the same gender-related pattern—where glottal variants are associated with females and glottalized variants with males—is evident also in the speech of Hartley's school children (cf. also the findings of Newbrook, 1986, in West Wirral). With respect to the association of the glottal stop with middle-class speakers, we find in Tyneside a similar pattern to that reported by Mees in Cardiff.

CONCLUSIONS

In this article, we have reviewed sociolinguistic analyses of glottalization phenomena in British English, along with material drawn from the descriptive phonetic literature. We have also referred to some theoretical phonological accounts of glottalization. It is clear from this work and from our own series of studies in Tyneside reported here that a complex interaction of linguistic and social factors is associated with varying frequencies of variants of (p), (t), and (k) in the speech of individuals. The explanations for varying patterns of glottalization (and indeed of alternation between various types of glottal/glottalized and non-glottalized variants) are complex on both social and linguistic dimensions. These complications reflect to some extent the difficulties in phonetic description and analysis of segments described as "glottal" or "glottalized." Wells (1982:260–261) emphasized the difficulties involved in describing glottalization phenomena both in RP and in Tyneside, where there is an auditory difference between the two which is not clearly understood and follows a rather different phonological pattern. He stressed the intricate and variable pattern of constraints on glottalization, an issue addressed by phonologists such as Carr (1991, 1993) and Harris and Kaye (1990). The relevant constraints have not yet been adequately identified in Tyneside, nor do we yet have an accurate idea of how they operate in different dialects in the British Isles. However, it is clear from a number of independent reports that glottalization phenomena are currently involved in rapid linguistic change in locations in different parts of Britain, and that British English is rather generally affected by this change.

Satisfactory accounts of the trajectory of the change must take into account its embedding in the local dialects of different regions and the histories of those dialects. For example, we know that glottalization has been perceived as characteristic of the Tyneside dialect for some time. It was described by O'Connor (1947). Very elderly people can be heard regularly to use glottalized stops; for example, they were very salient in the speech of elderly Tyneside relatives of the second author, who were born, respectively, in 1886, 1907, and 1909. Glottalization (as opposed to glottaling) is also characteristic of Northumbrian and conservative southern Scottish rural dialects. Therefore, unlike the glottal stop and preglottalization phenomena described by investigators such as Newbrook, Mees, Roach, and Wells in various urban locations, Tyneside glottalization seems not to be an innovation, but a well-established feature of the urban and local hinterland. A parallel situation is

described by Trudgill in Norwich. A particular challenge facing sociolinguistic work on glottalization phenomena in Tyneside is to tease out the differences between patterns of use associated with well-established glottalization and the innovatory patterns associated in Britain generally with the spread of the glottal stop (although other glottalization phenomena may also be associated with this innovatory pattern).

The disjunction between glottaling and glottalization in Tyneside that emerges from a sociolinguistic analysis is, we suggest, likely to be associated with the disjunction between well-established and innovatory glottalization. Such a disjunction does not align well with phonological accounts that treat glottal stops and glottalized segments alike as part of a general process of lenition. Nor is it clear whether the various studies of London English reported by Wells (1982:322ff), which associate glottaling/glottalization with male working-class speech, have implemented the kind of quantitative analysis that seems to be required to illuminate the different social distributions of these two types of glottalization phenomena. In other words, we do not know if the phonetically detailed kind of analysis carried out in Tyneside following the example of Mees in Cardiff would reveal a similar sociolinguistic disjunction between glottaling and glottalization if it were repeated elsewhere.

Turning now specifically to the glottal stop, which seems still to be rapidly spreading in contemporary urban British English and is still overtly stigmatized, evidence from a number of reports suggests quite strongly that, far from reacting against this stigmatized form (cf. Labov, 1990), females are instrumental in its diffusion and spread. Several of the studies reviewed in this article have associated the spread of the glottal stop with middle-class speakers; there is also evidence from the work of Newbrook in The Wirral, our own work in Tyneside with both adults and children, and (to a limited extent) that of Mees in Cardiff that associates it particularly with young middle-class females. This leads to a consideration of the notion of sociolinguistic prestige and of how supra-local social prestige becomes associated with particular linguistic variants. One interpretation of the evidence presented here is that females are leading in the spread of the glottal stop in British English, and that its establishment as a middle-class norm, as noted by a number of investigators, is contingent on its establishment in the speech of females. Female patterns of use may thus be seen as instrumental in bringing about a reversal of the traditional low evaluation of the glottal stop.

The generalization suggested by such an interpretation is not that females favor prestige forms, as has been previously suggested, but that they create them, in the sense that the forms females favor become prestige forms. Both social class and gender are therefore, as Labov suggested, implicated in linguistic change, but gender in this interpretation would be viewed as prior to class, as suggested by the evidence presented from a number of places that young middle-class women use the incoming glottal variant more heavily than men. This point is by no means proven; for although it is clear that young

women of both social classes in Tyneside are more likely to use glottal stops than their male counterparts, statistical modeling of the data in Tables 13 and 14 identified significant effects of age, class, and gender in descending order of magnitude. Further quantitative analysis of data in other phonological contexts than the limited one shown in Tables 13 and 14 will be helpful in clarifying the relative contributions of class and gender, as will quantitative analysis of comparable data in other urban locations where the glottal stop is emerging as an innovation.

A further observation may be made with respect to both the Tyneside data and Kingsmore's (1995) Coleraine data. In both these locations, it is the more localized variants that are more frequently used by males (in Ulster, the flapped variant of (t); in Tyneside, glottalized variants of (p), (t), and (k)). The glottal stop—the variant favored by females—has become supra-local and apparently quite generalized in its distribution in contemporary British English. Thus, we may propose that females are instrumental in the diffusion of supra-local changes, which include, but are not necessarily isomorphic with, changes in the direction of a supra-local prestige norm. Males, on the other hand, are associated with more localized patterns of variation and change. This generalization is thus inclusive of what might now be described as the traditional sociolinguistic association of women with prestige norms.

There is some support for this generalization in the sociolinguistic literature on gender-based variability. For example, Chambers (1992) concluded that women characteristically use a wider range of variants and control a wider range of styles than men from the same social group. He linked this behavior to gender-related social patterns; mobility norms for men and women differ in that men tend to be locally oriented, while women tend to have more social and geographical range and breadth (194). He also linked it to a neurological verbal advantage. Research reports from both the Western industrial world and the Arab world, which suggest apparently different patterns of behavior in the two types of culture, can be related by assuming the orientation of women to a standard norm. In the Arab world this is a supra-local norm rather than a prestige norm; thus, gender-related language behavior in the two different cultural contexts is in fact very similar. The traditional generalization on gender-related variability is improved if women are seen as orienting to a supra-local norm rather than a prestige norm. The problem is that only in some cultures does the standard language and the prestige language amount to the same thing; the partial identity of supra-local and prestige norms in Western industrial countries may have led us to the wrong generalization.

Also relevant to our proposal is Labov's comment that

> male-dominated changes are all relatively isolated changes such as the centralization of /ay/ and /aw/ and the unrounding of /o/. They do not include chain shifts . . . that rotate the system as a whole. All those cases of chain shifting that we have been able to examine with quantitative means are dominated by women. (Labov, 1990:219)

Although he did not elaborate on this remark or express the generalization in these terms, it is reasonable to suggest that Labov is associating women with supra-local changes (the Northern Cities Chain Shift affects a number of American cities) and men with localized changes, much as we have done here. Indeed, an important question that has received little attention in the sociolinguistic literature is the social mechanism by which a localized change becomes more generally diffused. A re-examination of the role of gender-related variability on change may provide a way of addressing this question.

NOTES

1. Only glottaling of (t) is considered here because the number of instances of such realizations of (k) and (p) was too small for quantitative analysis.
2. Most analyses (including Cedergren, 1973) interpret this variation as a general weakening process also found historically. However, Cedergren (personal communication) suggested that the source segment may be better viewed as multidimensional (as is now assumed in Feature Geometry, where supra-laryngeal and laryngeal features are independent feature bundles associated to a segment node). In the production of both [h] and [0], reduction is involved in that the supra-laryngeal constriction necessary for the production of [s] is not executed. However, speakers may use different strategies in the reduction process; that is, the laryngeal feature of the source segment [spread glottis] may be maintained, giving rise to [h], or the entire feature bundle of the [s] may be deleted, giving rise to [0]. These different strategies correspond to the different sociolinguistic patterns noted by Cedergren in Panama City, and a comparable difference in speaker strategies in implementing the reduction process affecting [t] may account for the preference of the boys in Tyneside for alternation between [t] and [t?] and that of the girls for alternation between [t] and [?].
3. We gratefully acknowledge the financial assistance of the Economic and Social Research Council (grant number R000 234892: "Phonological variation and change in contemporary spoken British English") for their support of the work reported in this section, which constitutes the initial findings of a larger study of variation and change in contemporary spoken British English.
4. Although we do not discuss the distribution of the other variants here, it is clear that they are distributed in a sociolinguistically interesting way. For example, the heaviest users of the T-to-R rule are working-class women in both age groups, and voiced/tapped realizations occur generally at relatively high frequencies, but are less common in the speech of the older working-class group as a whole and of the older middle-class women.
5. The word-final intervocalic context examined here is the context in which Hartley found the least evidence in her smaller sample for gender-based variation. Therefore, it may well be the case that subsequent (as yet incomplete) analysis of the contexts found by Hartley to be more clearly associated with such variation will yield sharper results with respect to the gender variable.

REFERENCES

Abdel Jawad, H. (1987). Cross-dialectal variation in Arabic: Competing prestige forms. *Language in Society* 16:359–368.
Alahdal, H. (1989). *Standard and prestige: A sociolinguistic study of Makkan Arabic.* Doctoral thesis, University of Reading.
Carr, P. (1991). Lexical properties of postlexical rules: Postlexical derived environment and the Elsewhere Condition. *Lingua* 85:255–268.
_____ (1993). *Phonology.* London: Macmillan.
Cedergren, H. (1973). *The interplay of social and linguistic factors in Panama.* Doctoral dissertation, Cornell University.
Chambers, J. (1992). Linguistic correlates of gender and sex. *English World-Wide* 13:173–218.
Coates, J. (1986). *Women, men and language.* New York: Longman.
Cohn, A. C. (1993). Nasalization in English: Phonology or phonetics? *Phonology* 10:43–81.

Docherty, G. (1994). *Acoustic profiling of glottal and glottalized variants of English voiceless stops.* Paper presented at the Colloquium of British Academic Phoneticians, Manchester, England.
Docherty, G., Milroy, J., & Milroy, L. (1994). *Glottalling and glottalization: Phonological and sociolinguistic perspectives.* Paper presented at the Second Phonological Workshop: From Cognition to Romance, Manchester, England.
Eckert, P. (1989). The whole woman: Sex and gender differences in variation. *Language Variation and Change* 1:245–267.
Fasold, R. (1990). *The sociolinguistics of language.* Oxford: Blackwell.
Giegerich, H. J. (1992). *English phonology: An introduction.* Cambridge: Cambridge University Press.
Grant, W., & Dixon, J. M. (1931). Introduction to *The Scottish National Dictionary*. Edinburgh: The Scottish National Dictionary Association.
Gussenhoven, C. (1987). English plosive allophones and ambisyllabicity. *Gamma* 10:119–141.
Harris, J., & Kaye, J. (1990). A tale of two cities: London glottalling and New York City tapping. *The Linguistic Review* 7:251–274.
Hartley, S. (1992). *A study of the effects of sex and age on glottalization patterns in the speech of Tyneside schoolchildren.* Undergraduate dissertation, University of Newcastle upon Tyne.
Horvath, B. (1985). *Variation in Australian English.* Cambridge: Cambridge University Press.
Jabeur, M. (1987). *A sociolinguistic study in Rades, Tunisia.* Doctoral dissertation, University of Reading.
Kahn, D. (1976). *Syllable-based generalizations in English phonology.* Cambridge: Cambridge University Press.
Kerswill, P., & Wright, S. (1990). The validity of phonetic transcription: Limitations of a sociolinguistic research tool. *Language Variation and Change* 2:255–275.
Kingsmore, R. (1995). *Ulster-Scots speech: A sociolinguistic study.* Tuscaloosa: University of Alabama Press.
Kiparsky, P. (1994). *An optimality theoretic perspective on variable rules.* Paper presented at NWAV-XXIII, Stanford.
Knowles, G. (1973). *Scouse: The urban dialect of Liverpool.* Doctoral dissertation, University of Leeds.
Labov, W. (1966). *The social stratification of English in New York City.* Washington, DC: Center for Applied Linguistics.
_____ (1969). Contraction, deletion and inherent variability of the English copula. *Language* 45:715–762.
_____ (1972). *Sociolinguistic patterns.* Philadelphia: University of Pennsylvania Press.
_____ (1990). The intersection of sex and social class in the course of linguistic change. *Language Variation and Change* 2:205–254.
_____ (1994). *Principles of linguistic change: Internal factors.* Oxford: Blackwell.
Lodge, K. R. (1984). *Studies in the phonology of colloquial English.* London: Croom Helm.
MacAllister, A. H. (1963). *A year's course in speech training*, 9th ed. London: University of London Press.
Macaulay, R. K. S. (1977). *Language, social class and education: A Glasgow study.* Edinburgh: Edinburgh University Press.
_____ (1991). *Locating dialect in discourse.* Oxford: Oxford University Press.
Mees, I. (1987). Glottal stop as a prestigious feature in Cardiff English. *English World-Wide* 8:25–39.
Milroy, J. (1982). Some connections between Galloway and Ulster speech. *Scottish Language* 1:23–27.
_____ (1992). *Linguistic variation and change.* Oxford: Blackwell.
Milroy, J., & Milroy, L. (1978). Belfast: Change and variation in an urban vernacular. In P. Trudgill (ed.), *Sociolinguistic patterns in British English*. London: Edward Arnold. 19–36.
Milroy, J., Milroy, L., & Hartley, S. (1994). Local and supra-local change in British English: The case of glottalisation. *English World-Wide* 15:1–33.
Milroy, L. (1992). New perspectives in the analysis of sex differentiation in language. In K. Bolton & H. Kwok (eds.), *Sociolinguistics today: International perspectives*. London: Routledge 163–179.
Mugglestone, L. (1990). Ladylike accents: Female accents and perceptions of prestige in nineteenth century England. *Notes and Queries* 37:44–52.
Newbrook, M. (1986). *Sociolinguistic reflexes of dialect interference in West Wirral.* Frankfurt am Main: Verlag Peter Lang.

O'Connor, J. D. (1947). The phonetic system of a dialect of Newcastle-upon-Tyne. *Le Maître Phonétique* 87:6.
Reid, E. (1978). Social and stylistic variation in the speech of children: Some evidence from Edinburgh. In P. Trudgill (ed.), *Sociolinguistic patterns in British English*. London: Arnold. 158–171.
Rigg, L. (1987). *A quantitative study of sociolinguistic patterns of variation in adult Tyneside speakers*. Undergraduate dissertation, University of Newcastle upon Tyne.
Roach, P. J. (1973). Glottalization of English (p), (t), (k) and /ʧ/—a re-examination. *Journal of the International Phonetics Association* 3:10–21.
Romaine, S. (1975). *Linguistic variability in the speech of some Edinburgh schoolchildren*. Master's thesis, University of Edinburgh.
Romaine, S., & Reid, E. (1976). Glottal sloppiness: A sociolinguistic view of urban speech in Scotland. *Teaching English* 9:3.
Schatz, H. (1986). *Plat Amsterdams in its social context*. Amsterdam: P. J. Meertens Institut voor Dialectologie, Volkskunde en Naamkunde.
Selkirk, E. O. (1982). The syllable. In H. van der Hulst, & N. Smith (eds.), *The structure of phonological representations, vol. 2*. Dordrecht: Foris. 337–384.
Strang, B. M. H. (1970). *A history of English*. London: Methuen.
Trudgill, P. (1974). *The social differentiation of English in Norwich*. Cambridge: Cambridge University Press.
_____ (1983). *On dialect*. Oxford: Blackwell.
_____ (1988). Norwich revisited: Recent changes in an English urban dialect. *English World-Wide* 9:33–49.
Wells, J. C. (1982). *Accents of English* (3 vols). Cambridge: Cambridge University Press.
Wolfram, W. (1993). Identifying and interpreting variables. In D. Preston (ed.), *American dialect research*. Amsterdam: John Benjamins. 193–222.

APPENDIX

Fractions in Tables A1 through A9 represent actual occurrences of variants as proportions of possible occurrences. These correspond to the percentages given in Tables 4 through 12 in the text.

TABLE A1. *Frequency of glottal replacement for individual variables by age, sex, and style*

		Style					
		Peer Interaction			Word-List		
Age	Sex	(p)	(t)	(k)	(p)	(t)	(k)
5 yrs	Male	4/36	38/108	2/55			
	Female	4/53	51/118	4/69			
10 yrs	Male	2/40	36/101	2/56	5/100	14/119	6/104
	Female	10/48	46/106	1/87	7/108	37/121	4/103

TABLE A2. *Frequency of glottalization for individual variables by age, sex, and style*

		Style					
		Peer Interaction			Word-List		
Age	Sex	(p)	(t)	(k)	(p)	(t)	(k)
5 yrs	Male	20/36	30/108	40/55			
	Female	21/53	17/118	42/69			
10 yrs	Male	22/40	25/101	41/56	46/108	27/130	42/103
	Female	26/54	22/106	45/87	40/107	19/121	19/93

TABLE A3. *Frequency of glottal variants by sex for peer interaction*

	Variants of (p)				
	[p]	[p?]	[?]	[p']	
Male	28/76	42/76	6/76	0/76	
Female	44/107	47/107	14/107	1/107	
	Variants of (t)				
	[t]	[t?]	[?]	[tv]	[t']
Male	50/214	55/214	74/214	25/214	6/214
Female	56/225	39/225	97/225	28/225	6/225
	Variants of (k)				
	[k]	[k?]	[?]	[k']	
Male	21/117	81/117	8/117	7/117	
Female	44/133	79/133	5/133	5/133	

TABLE A4. *Frequency of glottal replacement of* (t) *in peer interaction by age, sex, and phonetic context*

		Within-word	Word-final
5 yrs	Male	15/44	23/65
	Female	26/47	25/71
10 yrs	Male	10/40	26/65
	Female	18/35	28/72

TABLE A5. *Frequency of glottalization of fortis plosives in peer interaction by age, sex, and phonetic context*

		Within-word			Word-final		
		(p)	(t)	(k)	(p)	(t)	(k)
5 yrs	Male	9/16	19/44	22/25	11/20	11/64	18/30
	Female	4/14	7/47	22/32	17/39	10/71	20/37
10 yrs	Male	12/15	17/37	12/16	10/25	8/64	29/40
	Female	14/29	10/35	20/34	12/25	12/71	25/43

TABLE A6. *Frequency of variants of word-final* (t) *before a pause* (t^p), *by males and females*

	[t]	[ʔt]	[t']	[ʔ]
Males	24/42	4/42	6/42	8/42
Females	22/39	4/39	5/39	8/39

TABLE A7. *Frequency of variants of word-final* (t) *before a consonant* (t^c), *by males and females*

	[t]	[ʔt]	[ʔ]
Males	4/49	10/49	35/49
Females	9/59	16/59	34/59

TABLE A8. *Frequency of variants of word-final* (t) *before a vowel* (t^v), *by males and females*

	[t]	[tʔ]	[ʔ]	[tv]
Males	2/35	4/35	6/35	24/35
Females	5/43	4/43	10/43	23/43

TABLE A9. *Frequency of variants of* (t) *within-word, in intervocalic contexts, by males and females*

	[t]	[ʔt]	[ʔ]
Males	8/35	22/35	5/35
Females	12/35	9/35	14/35