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Stable Variation in Apparent Time: Coronal Stop Deletion in East Anglian English

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Abstract

The linguistic variable (t,d) – word-final /t,d/ deletion in consonant clusters C(C)T/C(C)D – is widely investigated in US dialects (e.g. Guy 1980, Patrick 1991). Conversely, little research on this phonological variable has been carried out in the UK, where (t,d) was mainly researched in Northern varieties of British English, as in York (Tagliamonte and Temple 2005), Manchester (Baranowski and Turton 2020) and in Tyneside English (Woolford 2018). Conflicting results were found with respect to the morphological effect among British English varieties: in York, morphological class failed to reach statistical significance, whereas findings from Manchester and Tyneside exhibit the usual robust morphological effect. This paper investigates (t,d) deletion in the South East of England and sets out to (a) shed light on the unsolved problem of morphological effect in British English; (b) propose a more fine-grained analysis of the following phonetic segment. Despite contributing the greatest effect on (t,d) in most American and British studies, stops, fricatives and nasals are not examined separately in the following phonetic environment, yet they are commonly grouped as obstruents. This distinction is commonly made in the preceding environment even though it is considered a "tertiary constraint" (Guy 1980:20). In the fine-grained analysis of the following environment that we propose, we break down the obstruent category further and we also split fricatives distinguishing between sibilants and non-sibilant fricatives.

Stable Variation in Apparent Time: Coronal Stop Deletion in East Anglian English

Carmen Ciancia and Peter L. Patrick*

1 Introduction

(t,d) deletion, also referred to as coronal stop deletion (CSD), is one of the oldest sociolinguistic variables investigated on variationist grounds. It occurs in word-final consonant cluster C(C)t/C(C)d, as in (1):

(1) a. […] she was jus*[Ø]* calling her friend […]
b. […] during the *weeken[Ø]* we'll usually go into town […]
c. […] she is *concern[Ø],* you see? […]
d. […] she *didn'[Ø]* like the view […]

This phonological variable has been explored in AAVE (Labov et al. 1968), in US English dialects, such as Philadelphian English (Guy 1991, Tamminga 2016), in Chicano English (Santa Ana 1996), in Jamaican Creole (Patrick 1999), in Tejano English (Bayley 1994), and in language acquisition (Labov 1989, Roberts 1997, Lacoste 2012). It is a classic example of stable variation.

While extensive research has been carried out on both empirical and theoretical grounds in US dialects, comparatively little research has been conducted in British English varieties. Some UK studies have treated (t) and (d) separately (e.g. Amos et al. forthcoming, Pavlík, 2017), while others have conventionally treated the two apical stops /t/ and /d/ as one variable (e.g. Tagliamonte and Temple 2005, Woolford 2018, Baranowski and Turton 2020). Labov (1989:90) reports that the rule application is largely favoured in the following linguistic contexts:

(2) a. syllable stress: unstressed > stressed
b. cluster length: CCC > CC
c. by certain preceding phonetic segments, yielding the segmental order:
/s/ > stops > nasals > other fricatives > liquids
d. by morphological classes, with the order:
n't > monomorphemes > semi-weak verbs > regular past verbs
e. by certain following phonetic segments, yielding the segmental order:
obstruents > liquids > glides > vowels > pause
f. by voicing agreement: homovoiced > heterovoiced.

Empirical findings suggest that some conditioning factors mirror speech community rules, while others have "a basis in phonetic, functional or phonological universals" (Patrick 1999:124). (t,d) was commonly found to be highly conditioned by the following phonological environment, whereas the preceding phonological context is typically considered a "tertiary constraint"[1] (Guy 1980:20). The pan-English effect shows a notable agreement in internal ordering among US English dialects, whilst in British English varieties conflicting results have been found with respect to the morphological class. The latter failed to reach statistical significance in York (Tagliamonte and Temple 2005), whereas data from Manchester (Baranowski and Turton 2020) and Tyneside English (Woolford 2018) exhibit the usual robust morphological effect.

*Thanks to the attendees of ICLaVE-10 and NWAV-48 for their thoughtful comments.

[1] However, in some other studies, the effect of the preceding phonological environment was greater than the following phonological one (e.g. Santa Ana 1996).

Research on theoretical grounds has examined the morphological effect of (t,d) under the Lexical Phonology approach (Guy 1991); (t,d) was also explored under the light of Competing Grammars to explain whether semi-weak verbs (e.g. *left*) undergo phonological deletion or morphological absence (Fruehwald 2012). Morphological absence (i.e. non-marking of past tense) was found in Jamaican Creole (Patrick 1991) where past tense marking surfaced approximately 50% of the time in semiweak verbs, whereas regular verbs showed 79% of deletion and thus ranked higher than monomorphemes. The most common finding, in the US data, is that (t,d) is governed by a sonority hierarchy: less sonorous preceding segments tend to favour deletion, whereas more sonorous preceding segments tend to disfavour it (Santa Ana 1996). However, there seems to be no explanation as to why nasals rank higher than other fricatives in most studies:

(3) /s/ > stops > nasals > other fricatives > liquids
(Labov 1989).

The sonority hierarchy is re-ordered in Jamaican Creole (Patrick 1999), as shown in (4), whereas in UK dialects sonority appears not to be an explanatory factor (see Tagliamonte and Temple 2005, Baranowski and Turton 2020)

(4) sibilants > stops > fricatives > nasals > laterals.

Since (t,d) has been mostly explored in northern UK dialects, this paper aims at investigating the cluster simplification in the South East of England - precisely in East Anglia - where no previous published research on this variable has been carried out. The main goals of this paper are to (a) shed light on the unsolved problem of morphological effect in British English; (b) provide a more fine-grained analysis of the following phonetic segment. The latter has been conventionally coded as: obstruents (stops, fricatives and nasals), glides, /r/, /l/, vowels and pause. However, since the greatest effect on /t,d/ reduction, across English varieties, is contributed by the following phonetic segment, we believe that it is worth breaking down the obstruent category further and to split fricatives. This is also conceptually validated as sibilants and non-sibilant fricatives were consistently found to behave differently in the preceding phonological context (e.g. Patrick 1999, Tagliamonte and Temple 2005), hence they might also behave differently in the following phonological environment.

2 Methods

Following Trudgill's (2001:10) definition of Linguistic East Anglia which "consists of all of Norfolk and Suffolk apart from the Fens, and part of northeastern Essex", data has been gathered in: Colchester (Essex), Ipswich (Suffolk) and Norwich (Norfolk).

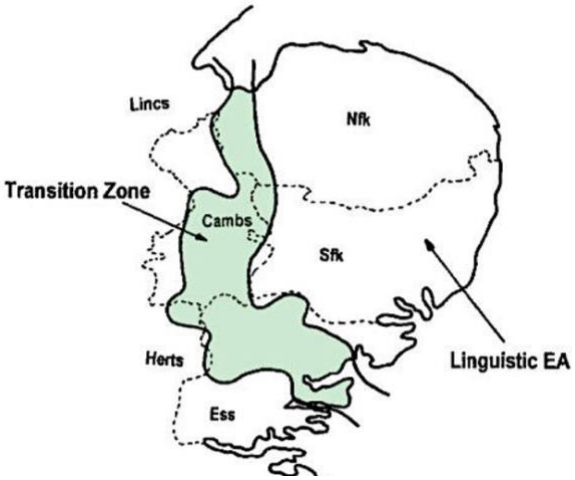

Figure 1: Map representing linguistic East Anglia and the transition zone (Trudgill 2001).

36 participants equally distributed across the three communities have been recorded. 4879 tokens (for a mean of 135 per speaker) were transcribed in Elan and coded auditorily. Praat was employed for acoustic analysis in critical cases (e.g. before a following pause) to determine whether /t/ was realised as a plain stop, glottal(ised) or deleted. In most cases, the dependent variable is categorically coded as [t,d] presence vs. deletion of /t/ and /d/. Unlike other English varieties, in British dialects /t/ can be frequently glottal(ised); thus, in (t,d) studies, the glottal variant is normally coded as a case of [t,d] presence. In this survey, however, word-final /t/ tokens realised with the glottal stop (e.g. *different* [ˈdɪfrənʔ]) were excluded from the analysis as this study is part of a bigger project which investigates in detail the intersection between (t) deletion and (t) glottaling in word-final consonant cluster (see Ciancia and Patrick 2019, Ciancia forthcoming).

BrE Variety	**Dependent Variable**
North	
York (Tagliamonte and Temple 2005)	[t,d] + ʔ vs. /t, d/ deletion
Manchester (Baranowski and Turton fc)	[t,d] + ʔ vs. /t, d/ deletion
Southeast	
Colchester	[t,d] vs. /t, d/ deletion
Ipswich	[t,d] vs. /t, d/ deletion
Norwich	[t,d] vs. /t, d/ deletion

Table 1: Coding of the dependent variable in British English (t,d) studies.

Tokens followed by /t/, /d/, interdental fricative /θ/, /ð/, post-alveolar fricatives /ʧ/, /ʤ/ as well as the lexical item *and* were excluded from the analysis. The approximant /r/ was only accounted for in the following phonological environment as preceding /r/ (e.g. *card*) is non-consonantal (i.e. non-rhotic) in East Anglian English. Preceding /l/ (e.g. *bold*) was coded as a lateral if it was consonantal, whereas tokens in which /l/ shared vocalic features were excluded from the analysis. Following /h/ (e.g. *can't help*) was coded for both the underlying phonological and the surface phonetic feature.

The linguistic predictors included in the model encompass: preceding and following phonological segment, morphological class, voicing agreement, syllable stress, and word-frequency. To account for word-frequency we have adopted the SUBTLEX-UK corpus (van Heuven et al. 2014).

In coding morphological class, we distinguished between negative contractions (e.g. *n't* morphemes)[2], monomorphemes (e.g. *mist*), semi-weak verbs (e.g. *left*), and regular verbs (e.g. *called*).

The external factors include social class (18 working class vs. 18 middle class speakers) age (young 18-28; middle-aged 35-50; old 60+), sex (18 males, 18 females), and style (sociolinguistic interviews, reading passages, word lists). Mixed-effects Rbrul regression analysis was carried out with speaker and word as random effect. The most complex model tested included the interaction between following phonetic segment and morphological class by speaker as random effect.

[2] Few studies have included *n't* morphemes in the morphological class (e.g. Labov 1989; Patrick 1999), yet they are relevant to account for the sonority hierarchy.

Constraints	*N* Tokens
Social class	
working class	2388
middle-class	2491
age	
young	1595
middle	1631
old	1653
sex	
males	2617
females	2262

Table 2: Distribution of tokens across social variables.

3 Results and Discussion

Overall results (the three localities together) show that (t,d) deletion is nearly equally distributed among social factors despite the relatively low rate of (t,d) absence among middle class females in both middle (22%) and old (19%) age cohorts.

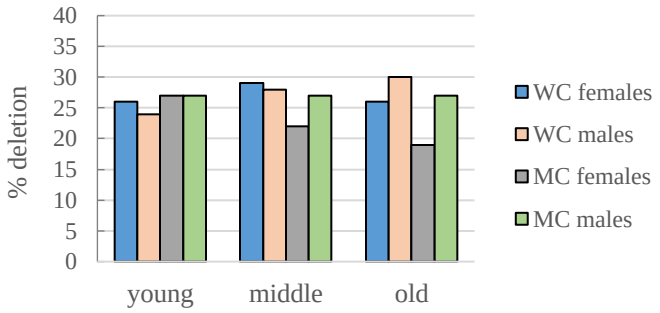

Figure 2: Rates of (t,d) deletion in the East Anglian sample

None of these social variables surfaced in the regression analysis. The fact that age is also marked as a non-significant factor suggests that (t,d) has probably been stable over years, at least in apparent time. This finding aligns with previous American studies, yet it is in contrast with results found in some northern UK research where social factors played a remarkable role, as in Manchester (age) and Tyneside English (social class, age and sex). The independent variables which reached statistical significance in the multivariate analysis include following environment, voicing agreement, morphological class, style and preceding environment suggesting that the explanatory factors for (t,d) are linguistic rather than social. Each predictor will be individually discussed in the sections to follow in order of statistical significance.

3.1 Following phonetic environment

The greatest effect was contributed by the following phonetic segment with nasals, sibilants, stops and /l/ favoring deletion, whereas glides, /r/, non-sibilant fricatives, vowels and pause disfavor it.

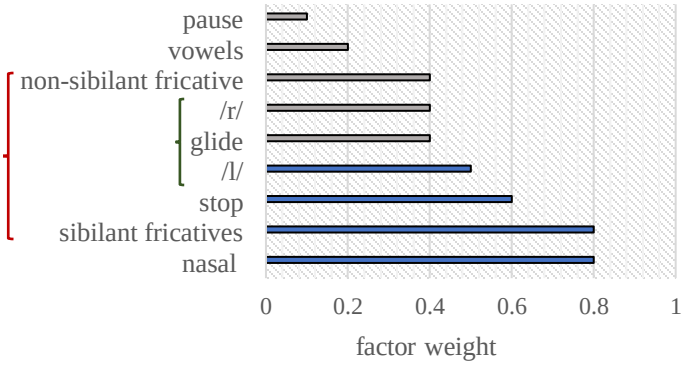

Figure 3: Effect of the following environment on the overall sample.

Following nasals trigger the most deletion suggesting that the following environment is not governed by sonority (i.e. where less sonorous following segments trigger the most deletion).

The behavior of sibilants and non-sibilant fricatives was found to differ greatly: sibilant fricatives are marked as the second most favoring predictor, whilst non-sibilants strongly disfavor the word-final cluster simplification. This indicates that previous research that merged these two predictors might have obscured this difference. A closer inspection as to why non-sibilant fricatives heavily disfavor deletion shows that it is mainly due to the presence of following underlying /h/: when /h/ is phonetically realized [h][3], [t] and [d] are retained at a rate of 84%; when /h/ is dropped even more /t,d/ retention occurs (95%). This findings was consistent in the three speech communities investigated, therefore we can conclude that, in East Anglia, (t,d) is more likely to be retained before a following /h/ - whether /h/ is realized or dropped.

Stops, as expected, trigger the cluster simplification along with preceding /l/. Liquids /l/ and /r/ started being treated separately when Guy (1991) found out that they behave differently: following /r/ (e.g. *can't rain*) tends to disfavor deletion as apical stops /t/ and /d/ can resyllabify onto the following segment, as /tr-/ and /dr-/ are possible English onsets (e.g. *can't rain* > *can train*). By contrast, following /l/ (e.g. *don't like)* tends to favor (t,d) deletion as the onset clusters */tl-/ and */dl-/ are blocked. The overall results from East Anglia match previous studies with /l/ patterning with other consonants.

Both vowels and pause were found to inhibit deletion: the former disfavors due to resyllabification processes, whereas the latter is an arbitrary factor (Patrick 1991) which varies across speech communities (Labov 1989). In New York City (Guy 1980), Jamaican Creole (Patrick 1991), Tejano English (Bayley 1994), and Manchester (Baranowski and Turton, forthcoming) following pause boosted (t,d) deletion; in other southern and southwestern US dialects (Santa Ana 1996), Philadelphia (Guy 1980, Tamminga 2016), York (Tagliamonte and Temple 2005) and East Anglia, however, pause behaved like a vowel in promoting retention.

3.2 Voicing agreement

Voicing agreement surfaced as the second most powerful predictor in the mixed-effects regression analysis. Common findings report a higher deletion rate of /t,d/ when they occur in a homovoiced cluster (e.g. *bold*), whilst heterovoiced tokens (e.g. *bolt*) tend to disfavor deletion (Labov 1989).

The overall results from East Anglia, however, do not match the usual pattern, yielding the following ranking: heterovoiced > homovoiced. This unconventional finding is due to interaction with the preceding phonetic segment: a high number of nasals dominate in the heterovoiced category for the CCt analysis (90%), hence there is massive overlap and the condition of orthogonality is not fulfilled.

[3] East Anglia is a part of England where /h/ is retained especially in rural dialects, at least amongst older speakers (Trudgill 1974).

3.3 Style-shifting

(t,d) deletion, in East Anglian English, appears to be highly sensitive to style-shifting showing a strong linear effect - in line with previous research—with more deletion in informal style and less deletion in word lists.

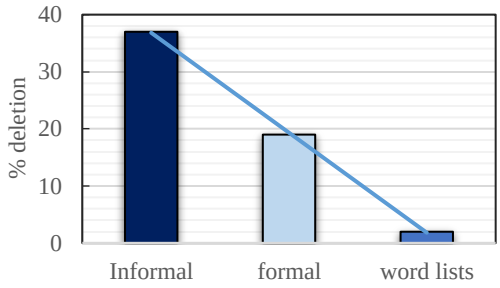

Figure 4: Rates of deletion across different speech styles.

A closer inspection reveals that East Anglian speakers treat *n't* morphemes and monomorphemes in a similar way in both informal and formal style. In semiweaks, by contrast, /t/ and /d/ are largely deleted in informal style, whereas the cluster simplification sporadically occurred in formal style. Regular verbs exhibit a comparatively lower deletion rate with the latter being even lower in more formal contexts.

Tongue tip raising in word list tasks has been recently explored by Purse (2019), who has examined stylistic variation of (t,d) in the articulatory domain using Electromagnetic Articulography (EMA), through prosodic factors, engagement with the interlocutor, and speaker fatigue.

3.4 Morphological class

Morphological class surfaced as the fourth most significant predictor in the logistic regression analysis, shedding light on the unsolved problem of morphological effect in British English. As mentioned earlier, contrasting results have been found in the UK: morphological class failed to reach statistical significance in York; conversely, Manchester and Tyneside English exhibit the usual 'robust morphological effect' with more deletion in monomorphemes (e.g. *mist*) than inflected forms (e.g. *missed*). Results from East Anglia align with Manchester, Tyneside English and previous US surveys.

Notably, the most deletion is triggered by *n't* morphemes despite their low number of tokens similar to the King of Prussia (Labov 1989) and the Jamaican Creole (Patrick 1999) studies. Negative contractions are excluded from some (t,d) surveys due to the predictable variation in frequency, however we argue that they are worth examining to account for a thorough morphological effect and to control for the sonority hierarchy in the preceding phonological segment. Monomorphemes (e.g. *most*), as expected, favour deletion in East Anglia, whilst semiweaks (e.g. *left*) and regular past tense verbs (e.g. *called*) are marked as disfavouring factors.

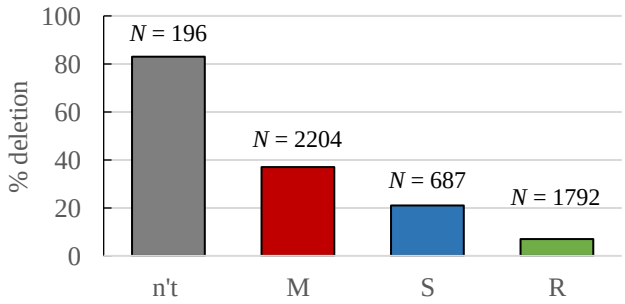

Figure 5: Deletion rates by morphological class.

The deletion rates illustrated in figure 5 were found to be consistent in Colchester, Ipswich and Norwich, yielding the following ranking:

(5) n't > monomorphemes > semi-weak verbs > regular past tense verbs.

The morphological pattern in the UK shows that, overall, Manchester (Baranowski and Turton forthcoming) exhibits a higher deletion rate of /t,d/; while monomorphemes show the highest rate of (t,d) absence in both north and southern British varieties, semi-weak verbs behave differently: they nearly pattern with monomorphemes in Manchester, yet they behave like regular verbs in York (Tagliamonte and Temple 2005). In East Anglia, however, there is a strong linear effect. If there is a pan-English effect, speaker differences should show consistent range across categories. Inter-speaker variation, among East Anglian speakers, is clustered for monomorphemes and regular verbs, whereas semiweaks exhibit interspeaker dispersion.

3.5 Preceding phonetic environment

The least significant predictor is the preceding phonetic segment. The East Anglian pattern resembles north American studies in the weak effect of this constraint, yet it differs in terms of phonological conditioning. In most American dialects, (t,d) is governed by a sonority hierarchy with less sonorous segments favoring deletion (Santa Ana 1996). In East Anglia, however, the pattern exhibits more (t,d) absence after preceding nasals and less deletion after a preceding non-sibilant fricative, yielding the hierarchy:

(6) nasal > sibilant fricatives > /l/ > stops > non-sibilant fricatives.

The high position of nasals could be predicted by the Obligatory Contour Principle (OCP) as suggested by Guy and Boberg (1997). They argue that preceding segments which share the same feature with /t,d/ are more likely to favor deletion creating OCP clashes. The bilabial /m/ and the alveolar /n/ do not share the same features with /t,d/: /m/ shares [-con], whereas /n/ shares [+cor, -con].

The high position of nasals could be explained by the high number of alveolar /n/ which occurred in the dataset. The high position of sibilant fricatives is also in line with the OCP as they share the features [+cor, -son]. What is surprising, in East Anglia, is the ranking order between stops and /l/. Stops share two features with /t,d/ [-son, -con], thus they should exhibit more deletion than /l/s which only shares [+cor]; however, the order is reversed: /l/ > stops.

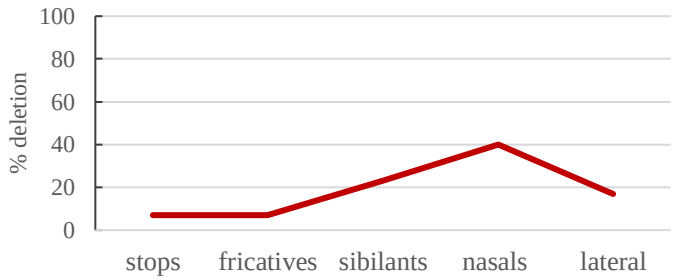

Figure 6: Rates of (t,d) deletion by preceding phonetic segment.

3.5 Non-significant predictors

Guy (2018) suggests reporting all independent variables tested, whether significant or not. Along this line, overall results from one-level Rbrul analysis show that unstressed syllables exhibit more deletion than stressed ones; working class speakers deleted /t,d/ more than their middle class counterpart; males delete more than females but not significantly. Sex reached statistical

significance only in Norwich were males were found to delete at a rate of 28%, whereas deletion rates among females equals 21%. These findings suggest that the profile of (t,d), in East Anglia, is that of a stable variable and that the explanatory factors are linguistic.
Lexical frequency typically influences the phonological conditioning of (t,d) (Bybee, 2002), with more deletion in high frequency words, yet it turned out not to be a significant predictor in East Anglia.

A positive correlation between (t,d) deletion and lexical frequency was found by Guy et al. (2008), who captured the frequency effect by using frequency counts taken over the corpus which they analysed. In sociolinguistics, lexical frequency is commonly measured by whole-word frequency; however, Purse and Tamminga (2019) propose a different measurement resulting in the Root frequency effect which best captured the (t,d) data from the Philadelphia Neighborhood Corpus (PNC) (Labov and Rosenfelder, 2011).

4 Conclusions

This paper has examined (t,d) deletion in East Anglian English in the speech communities of Colchester, Ipswich and Norwich. Overall results have demonstrated that, in East Anglia, the status of (t,d) is that of a stable variable as none of the external predictors surfaced in the mixed-effects regression analysis. Sex reached statistical significance only in Norwich. The fact that age is not marked as a significant predictor in any of the three communities suggests that (t,d) has probably been stable over years, at least in apparent time. This survey has revealed new phonological insights after proposing a more fine-grained analysis of the following phonetic segment, showing a markedly distinctive behavior between sibilants and non-sibilant fricatives, with /t/ and /d/ highly retained before underlying following /h/ (e.g. *can't help*). Results also exhibit the emergence of the expected morphological effect in East Anglia, whereas sonority appears not to be an explanatory factor.

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