

## CHANGE ACROSS THE LIFESPAN IN GOAT: EVIDENCE FROM A PANEL STUDY OF TYNESIDE ENGLISH

Lea Bauernfeind, Carina Ahrens & James Grama

Sociolinguistics Lab, University of Duisburg-Essen  
lea.bauernfeind@uni-due.de, carina.ahrens@uni-due.de, james.grama@uni-due.de

### ABSTRACT

This study investigates changes in GOAT over time in two sets of panel speakers (old and young) from Tyneside, North-East England. Data were collected at two or three timepoints between 1971 and 2019. We observe a general preference for the incoming Northern monophthong and standard diphthong, while localized variants lose ground over time. Speakers also show evidence of lifespan change. In the old panel, middle-class speakers show a preference for the standard closing diphthong that follows a U-shaped curve, while working-class speakers exhibit a similar preference for the back monophthong. The young panel, by contrast, shows no clear class-based patterns. Acoustic analysis of a single young panel speaker reveals further changes in the phonetic realization of GOAT variants over time. Together, these results suggest that GOAT is mediated across the lifespan by class and linguistic marketplace pressures, both of which are highly dependent on speaker age.

**Keywords:** panel study, lifespan change, Tyneside English, auditory and acoustic methods, GOAT

### 1. INTRODUCTION

A notable quality of many Northern varieties of British Isles English is the monophthongal realization of the mid-vowels FACE and GOAT [1-3]. Work on the English spoken on Tyneside, an urban conurbation in the North-East of England, has demonstrated that these vowels have undergone a shift in apparent time towards pan-northern monophthongs, mainly at the expense of localized inglides [4-6]. Real-time longitudinal work by Buchstaller et al. [7] found that speaker participation in changes to FACE was highly contingent on mobility, sex, and marketplace pressures. However, no studies have as of yet investigated whether (and if so, to what extent) GOAT shows similar lability over the lifespan.

In Tyneside English (TE), GOAT can be realized as one of four variants (see Table 1). Each variant (except [ə:]) has a corresponding variant in FACE with similar socio-indexical meanings (see [4-6] for the bulk of the work in this area). The pan-northern monophthong has been described as the default form

in TE, resulting from a leveling process towards a general, supra-local northern variety [6, 8]. The closing diphthong, then, serves as the prescribed standard variant. Evidence from style shifting suggests that TE speakers associate this form with ‘correctness’, and its use is largely restricted to young middle-class speakers and women [5]. The inglide and central monophthong are both favored by working-class men, and are connected to local orientation and regional pride. And while the inglide is slowly abating, the central monophthong remains a prominent male variant across social class and age.

Type	Phonetic form
Pan-northern monophthong	[o:]
Localized central monophthong	[ə:]
Localized ingliding diphthong	[ʊə]
Standard closing diphthong	[oʊ]

**Table 1:** GOAT variants in Tyneside English.

Thus, while GOAT is well-described in TE in apparent time, and FACE has been investigated using real-time panel data, no work to our knowledge has examined how individual speakers pattern across their lifespan with respect to GOAT. The current study explores this by using two samples of panel speakers. Variability and change in GOAT realizations over the lifespan provide insight into how niched marketplace pressures and age bear on a variable undergoing change in progress.

### 2. DATA AND METHODS

Data come from interviews conducted with an old and young panel. The old panel includes the same six speakers investigated in [7], who were first recorded in 1971 in their early twenties, and again in 2013, when they were near- or immediately post-retirement. Half of the old panel were interviewed a third time in 2019, when they were well into retirement. Six younger speakers form the young panel, first recorded between 2007 and 2010 when they were students at university, then again in 2014 when they had recently entered the workforce. These panel samples combined provide real-time evidence of how age-stratified cohorts behave with a variable undergoing change in the broader speech community. The panel

speakers are listed in Table 2, along with their social trajectories. All speakers were broadly classified into three social types: stably working class, upwardly mobile (moving from working to middle class), or stably middle class. Class designations were based on occupation (or parent's occupation for young speakers at T1 who were still at university, following recommendations in [9]).

Panel	Speaker	YOB	Trajectory
Old	Rob	1948	Stable WC
	Edith	1939	Stable WC
	Anne	1948	Stable WC
	Aidan	1946	Upward
	Fred	1950	Upward
	Nelly	1942	Stable MC
Young	Jane	1990	Stable WC
	Paul	1990	Stable WC
	Charlotte	1990	Upward
	Lynn	1990	Upward
	Jake	1985	Upward
	Amelia	1989	Stable MC

**Table 2:** Speaker sample with class trajectories.

Data were transcribed in ELAN [10], and two methodological pipelines were used: one for auditory and another for acoustic analyses. The auditory analysis pipeline aimed to capture proportional changes in GOAT variants over time (see Section 3.1-3.2). The first and second authors auditorily coded GOAT tokens from all 12 speakers; variants fell into one of four possible categories, outlined in Table 1, and only five tokens were coded for any one lexeme. This resulted in 2,484 tokens for analysis. Second, an acoustic analysis pipeline was used to investigate phonetic changes in a single young woman, Charlotte (see Section 3.3). This analysis draws from all content words across timepoint, and includes a third timepoint. To facilitate acoustic analysis, these tokens ( $n=540$ ) were also coded auditorily by the second author. Acoustic measurements were extracted from force-aligned segments in LaBB-CAT [11], boundaries were hand-checked in Praat [12], and F1 and F2 were extracted from 20-80% of the vowel's duration at 10% intervals. Overlapped or noisy tokens were excluded from all analyses. Statistical analysis was conducted in R [13], and linear mixed-effects models were built using `lme4` [14].

### 3. RESULTS

#### 3.1. Old panel

Figure 1 shows the proportional distribution of GOAT variants for the old panel speakers across timepoint. In general, working-class speakers show higher

proportions of local forms, while upwardly mobile and stably middle-class speakers produce more standard forms. The pan-northern monophthong is the most frequent variant overall, particularly for working-class speakers (compare [5, 6]).

Crucially, we observe individual instability over the lifespan that is mediated by social class. Rob, an engraver, shows the highest rates of localized variants of any speaker. However, at T2, he shifts away from the central monophthong in favor of the inglide. Alongside this, he exhibits an increase in the pan-northern monophthong and a reduction in the standard closing diphthong. By contrast, Edith, a local shop assistant and home help, shows a much less differentiated system. She increases her use of the pan-northern monophthong across timepoint at the expense of the closing variant, and produces no localized variants. These two speakers nicely mirror findings from apparent time (compare [5, 6]) in that they both register an increase in the pan-northern monophthong. Anne, for whom we have a third timepoint, shows the most complex patterns. Her proportion of the pan-northern monophthong increases from T1 to T2 at the expense of both the closing and the inglide variant. However, at T3, she reverts to a distribution that mirrors her system at T1, a pattern that is reminiscent of the U-shaped curve postulated in sociolinguistic theorizing [15].

Changes in middle-class speakers are strikingly different. Nelly and Fred, both educators, show clear evidence of a U-shaped curve. From T1 to T2, they exhibit retrenchment towards the closing form, with only marginal examples of localized variants. This time span represents polar ends of when Nelly and Fred worked in professional settings that uphold pervasive standard language ideologies (see recent critical school research in the UK [16, 17]). While the effect of such 'correction' towards the standard varies across the two speakers, both show renewed uptake of the pan-northern monophthong at T3, well into retirement. This relaxation is particularly stark for Nelly, who shows a nearly categorical shift away from the closing variant. Aidan, an upwardly mobile lecturer, exhibits somewhat more complex patterning from T1 to T2. While he, too, displays an increase in the standard closing variant during his teaching career, he exhibits commensurate upticks in local forms, both at the expense of the pan-northern monophthong. This seemingly contradictory pattern can partly be explained by Aidan's social profile. He emphasizes that he is a proud Geordie with a working-class heritage. Moreover, as a lecturer at a welding college, he reports feeling connected with blue-collar workers. Thus, his use of local forms can be viewed as an expression of working-class solidarity, despite his position as an educator. While

we lack a third recording for Aidan, we hypothesize that he would show similar behavior to Fred and Nelly, and move towards more vernacular forms.

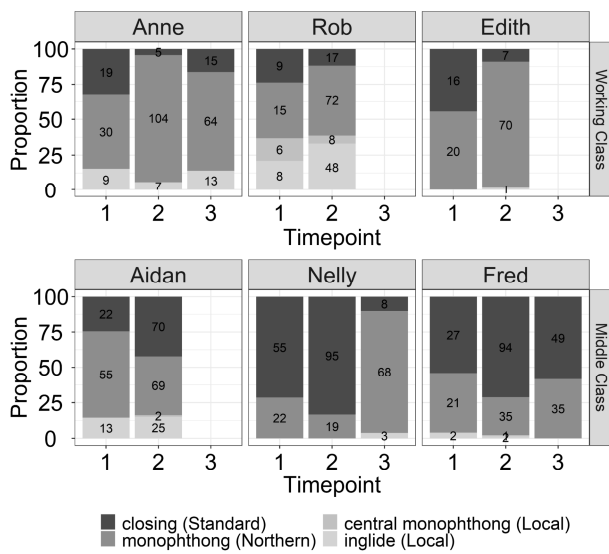


Figure 1: Proportional distributions in the old panel.

### 3.2. Young panel

Figure 2 shows the distribution of GOAT variants for the young panel. In contrast to the old panel, variants in the young cohort are functionally restricted to just the pan-northern monophthong and the standard closing diphthong (the lone inglide is produced by Jane). Furthermore, changes across timepoint are not clearly delineated by social class.

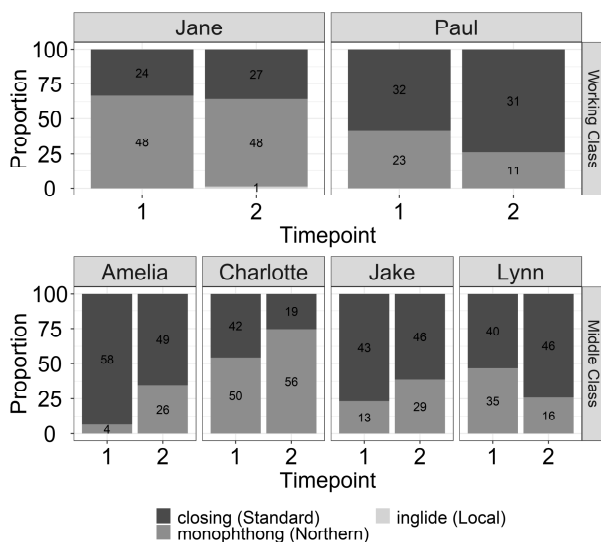


Figure 2: Proportional distributions in the young panel.

Three distinct patterns emerge when comparing individual trajectories across timepoint. First, a single speaker, Jane, is stable. Second, we observe a shift towards the pan-northern monophthong for one middle-class and two upwardly mobile speakers,

Amelia, Charlotte, and Jake. Finally, the opposite pattern characterizes Lynn and Paul's behavior, who register an increase in the standard closing variant at the expense of the pan-northern monophthong. These latter two patterns are difficult to square with results from apparent time, which find that the closing variant is on the rise in middle-class speakers [5, 6]. If this is indeed the case, then movement away from standard forms would constitute retrograde change among the middle class. Working-class speakers, too, differ; in [5, 6], young working-class women strongly favor the pan-northern monophthong, and men produce more localized forms. In the present analysis, localized forms are all but absent, and lifespan uptake of supra-local and standard forms is variable.

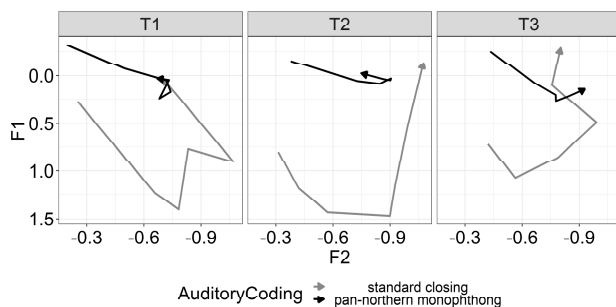
### 3.3. Probing acoustic patterns: A case study

While auditory coding can capture changes in the variable use of sociolinguistically relevant forms, acoustic data enables us to investigate changes in the phonetic implementation of those variants. We focus here on Charlotte, whose changing career path (university student at T1, PhD student at T2, and lecturer at a university in the North-East at T3) allows us to explicitly test the impact of marketplace pressures on GOAT. We treat age as categorical, rather than chronological, to capture non-linear behavior as the speaker ages. When considering a broader range of content words (see discussion of methods in Section 2), Charlotte's use of the pan-northern monophthong increases substantially. This form is near-categorical at all timepoints, but Charlotte nevertheless shows an increase from T1 (159/171, 93%) to T2 (179/186, 96%), while the added T3 (167/183, 91%) shows rates parallel to T1.

Figure 3 plots the trajectories of the variants Charlotte produces: the pan-northern monophthong and the standard diphthong. Linear mixed-effects models (with T2 as the baseline) fit to the Euclidean distance of both variants reveal that monophthongal GOAT has a shorter trajectory at T2 than T1 ( $\beta=77.90$ ,  $t=2.24$ ,  $p<0.05$ ) or T3 ( $\beta=112.52$ ,  $t=3.33$ ,  $p<0.01$ ). We observe similar changes in the position of monophthongal GOAT in F1/F2 space. Specifically, linear mixed-effects models reveal a higher midpoint at T2 than at T1 ( $\beta=0.22$ ,  $t=2.08$ ,  $p<0.05$ ) or T3 ( $\beta=0.24$ ,  $t=2.33$ ,  $p<0.05$ ). A preceding coronal also motivates significantly fronter monophthongal GOAT midpoint values over non-coronals at T3 ( $\beta=0.43$ ,  $t=2.80$ ,  $p<0.01$ ), but no significant differences at either T1 ( $\beta=-0.05$ ,  $t=-0.44$ ,  $p=0.66$ ) or T2 ( $\beta=0.14$ ,  $t=-1.18$ ,  $p=0.24$ ). No effects were found to bear significantly on closing GOAT in either trajectory length or position in F1/F2 space. This null effect might be expected with low token numbers, but it

may be that infrequent variants are less susceptible to lifespan change.

Together, these results paint a picture of lifespan change in the acoustic realization of Charlotte's most frequent GOAT variant. At T2, Charlotte exhibits not only higher proportions of the pan-northern monophthong, but also realizes these variants as higher, and with a shorter trajectory length than at any other timepoint. In addition, there is some evidence that Charlotte innovates a phonological effect in real-time; monophthongal GOAT is fronter at T3 following coronals. Whether this is a broader change in the speech community is a question for future research.



**Figure 3:** Charlotte's trajectory for closing and monophthongal variants across timepoint.

#### 4. DISCUSSION

These results suggest that the realization of GOAT in both the old and young panels are socially- and occupationally niched. In the old panel, speaker behavior is tied to socio-economic trajectory, with working-class speakers showing a high incidence of localized forms and a preference for the pan-northern monophthong that increases (Rob and Edith) or follows a U-shaped curve (Anne). Middle-class speakers, by contrast, show a much clearer preference for standard closing GOAT, with both Fred and Nelly following U-shaped curves, as they register an increase in the standard variant during active teaching, followed by an increase in vernacularity in post-retirement. One way to interpret these patterns is via niched marketplace pressures [18]. Specifically, middle-class and upwardly mobile old panel speakers serve roles in education, occupations where overt valuation of standard language is particularly high [15, 16]. For old middle-class speakers, then, evidence points to some movement towards standard GOAT variants during times when these speakers would have had maximum daily exposure to such beliefs. At T3, Nelly and Fred show evidence of relaxation of these pressures, consistent with the oft-hypothesized 'tail' towards vernacular forms [15].

We can compare these findings with those of Buchstaller et al. [7] for FACE, noting that their analysis includes more tokens ( $n=1,922$ ) but lacks a

T3 recording for any speaker. Comparing their findings with ours, the two vowels do not follow the same trajectories over the lifespan. Edith and Anne's FACE show minor shifts away from monophthongal variants from T1 to T2, the precise opposite of what we observe here for GOAT. Nelly produces largely stable proportions of FACE across timepoint, with a clear preference for the pan-northern monophthong, but GOAT outside of T3 is dominated by the standard variant. Aidan exhibits an increase in his preference for the localized inglide for FACE, but GOAT shows the clearest increase in the standard closing form. Only Rob and Fred show parallel behavior in the two vowels. Thus, while FACE and GOAT are structurally and socio-indexically linked (see [4-6, 19]), this differential patterning may be evidence that they index slightly different meanings.

The young panel, by contrast, shows more individuated patterns, dominated by changing preferences for the pan-northern monophthong (Amelia, Charlotte, Jake) or the standard closing variant (Paul, Lynn), with a single case of stability (Jane). This makes it difficult to generalize across social trajectory or occupation; educators (Amelia, Charlotte, Lynn) exhibit both patterns. It is possible that these changes reflect more individualized relationships with marketplace pressures, or that these pressures act differently on younger speakers. What can be stated with some confidence is that variability in GOAT of younger TE speakers centers around the pan-northern monophthong and the standard closing form, both of which enjoy greater representation than any localized forms (cf. [20]).

Finally, we present evidence from a single speaker, Charlotte, of acoustic instability over the lifespan. Specifically, an increase in proportion appears to be correlated with more peripheral realizations of the pan-northern monophthong. This suggests a connection between the proportional use of variants and their phonetic implementation. Evidence also points to an emerging phonological contrast at T3, further accentuating speaker lability over the lifespan. These insights are afforded by the marriage of auditory and acoustic methods in the analysis of a complex phonological variable (cf. [19-21]).

Overall, our findings show that individual responses to changes in progress are heavily mediated by social trajectory and its associated marketplace pressures, as well as age. Moreover, we exemplify how the non-linear treatment of age as life-stage dependent (rather than chronological) can reveal changes in acoustic implementation. That GOAT's patterning differs from that of FACE suggests that change in variants of these vowels may not manifest as symmetrical over the lifespan of individual speakers as it does in the broader speech community.

## 5. ACKNOWLEDGEMENTS

We acknowledge funding provided by the Deutsche Forschungsgemeinschaft (#BU-2902/7-1). We are also grateful to: the transcribers in the Sociolinguistics Lab (Anabel Büscher, Paul Enninger, Anne-Marie Mölders, Marie Phillips, Hannah Sawall, and Deborah Veiter); Mirjam E. Eiswirth for project management and data curation; the on-site interviewers; and the DECTE team at Newcastle University for providing access to the original data. Additional thanks go to Isabelle Buchstaller and the anonymous reviewers for their helpful comments on an earlier draft. We are greatly indebted to our panel speakers for sharing their time and speech. All remaining errors are our own.

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