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# Apparent time and network effects on long-term cross-dialect accommodation among college students

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## **Abstract**

College is believed to be a time of linguistic change, particularly due to cross-dialect mixing (Bigham 2010, Evans and Iverson 2007). We examine apparent time change in the read speech of 109 white college students from Ohio in three features of the Northern Cities Shift: TRAP fronting/raising (F2-F1), LOT fronting (F2) and lowering/backing (F2-F1) of KIT and DRESS. We also examined the monophthongization of PRICE, a feature of Southern speech.

We find two results that suggest tentative support for long-term accommodation: an effect of self-reported regional network on TRAP in northern Ohioans and an interaction between year of school and self-reported regional network on PRICE among southern Ohioans. However, no effects of apparent time through college are observed, leaving open the possibility that the effects observed, if real, are triggered by identity factors rather than exposure.

# Apparent time and network effects on long-term cross-dialect accommodation among college students

Kathryn Campbell-Kibler, Abby Walker, Shontael Elward and Katie Carmichael\*

## 1 Introduction

A key research area for both sociolinguists and phoneticians at present is understanding the mechanisms through which hearing the speech of others influences speech production. While the short-term effects of such exposure have been repeatedly studied, less work has been done on accommodation over the course of months or years. A solid understanding of long-term accommodation is needed, however, to assess the extent to which interpersonal accommodation contributes to language change effects, both within the individual (Sankoff and Blondeau 2007) and within communities (Trudgill 2008).

College students are an ideal population in which to investigate long-term accommodation. College is a common, though by no means universal, relocation experience for young adults, often involving moves to new dialect regions, or interaction with others who have come from other regions. In addition, college students undergo significant development and change of social identity (Arnett 2000, Larose and Boivin 1998), allowing us to probe the competing or cooperative effects of exposure and identity in language change.

This study examines the role of years in school and self-reported interactional networks on the regional speech of white undergraduate students at the Ohio State University from northern, central and southern Ohio. We find preliminary evidence suggesting effects from self-reported interactional networks on the TRAP productions of northern Ohioans and on the PRICE productions of southern Ohioans. These effects provide potential support for models of long-term accommodation, although they do not rule out identity factors.

## 2 Short and Long-term Accommodation

A strong literature has shown that speakers are directly influenced in their phonetic productions by the speech of their interlocutors. Early work on this topic emphasized the socially useful aspects of accommodation (Giles and Powesland 1975), demonstrating that shifting speech to resemble that of an interlocutor is an effective way of increasing liking (Street and Brady 1982) and that speakers diverge in the face of disagreement or dislike, particularly ethnolinguistic threats (Bourhis, Giles, Leyens, and Tajfel 1979). This tradition has flourished and been extended theoretically to explain not only the effects of an interlocutors' actual speech patterns, but their imagined traits, or even effects accommodating to speakers not physically present, for example, those invoked in the discussion (Bell 1984).

Another thread of work has sought to understand accommodation in light of automatic processes resulting from the perceptual processing of specific forms (Goldinger 1998, Bock, Dell, Chang, and Onishi 2007). This work has proposed that perception and production processes are at least partially linked, allowing the perception of a given form to leave an imprint or activation of some kind, declining over time, which makes it easier for the hearer/reader to perceive subsequent instances of that same form or related forms and more likely to produce tokens of the same form or related forms. Where this tradition differs from the other is in focusing on instances where the effects do not seem to be explainable by conscious social strategizing. These effects do not seem strategic based on the small size of the phonetic adjustments, the rapidity of the effects, and their appearance in laboratory tasks like shadowing, where a desire to appeal to an interlocutor is not a likely immediate social goal (Goldinger 1998, Shockley, Sabadini, and Fowler 2004). Despite the apparent lack of strategic

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benefit in these laboratory tasks, the effects nonetheless are mediated by social attitudes towards the speaker (Abrego-Collier, Grove, Sonderegger, and Yu 2011) and their speech variety (Babel 2010).

Due largely to practical constraints, work in both these traditions has focused on short term effects, over the course of seconds, as in a shadowing task, or minutes or hours, in the case of dialogue-based data (e.g., Pardo 2006). While such effects are of inherent interest regardless of their longer-term consequences, their role in language change depends on accommodation effects accumulating over time, leading ultimately to changes in the speaker independent of the presence of a triggering interlocutor. Some work on long-term accommodation has been carried out, and it has in general terms supported the findings of the short-term accommodation, namely that accommodation seems to occur, but is relatively small in terms of effect size and somewhat idiosyncratic. For example, Sonderegger and colleagues have taken advantage of the “natural experiment” created by the British reality TV show *Big Brother*, in which participants are isolated in a house together and recorded continuously. They find some evidence of long-term accommodation among the participants, albeit of a complex and intermittent type (Sonderegger, Beltrama, Chatzikonstantinou, Franklin, Kirken, Lee, Nelson, Nicoletto, Penslar, Provenza, Rothfels, Bane, Graff, and Riggle 2012). Similarly, Pardo, Gibbons, Suppes, and Krauss (2012) found some evidence in a small study suggesting that first year college students’ tendency to converge over months toward their roommates may be predicted by their self-reports on the strength of the relationship.

Second dialect acquisition provides another case of natural experiment, where individuals move from one dialect region to another, leading to changes in their regular linguistic interlocutors predictable in the broad case, if not a narrowly controlled experiment. Studies in this tradition likewise support an effect of accommodation, showing effects of the new dialect region, but also suggesting that adults do not consistently become native-like in the new variety, but rather settle at some point in between the two (Munro, Derwing, and Flege 1999, Nycz 2011, Sankoff 2004, Shockey 1984, Tagliamonte and Molfenter 2007). More recently, Walker (2014) suggests that relative attractiveness or prestige of the two varieties may play a role, with American ex-patriots more likely to converge toward UK norms than their British counter-parts living in the US. Like Babel’s work on short-term accommodation, this finding suggests that a discussion of accommodation effects is not complete without understanding the social positioning of the varieties and/or features in question. This is further supported by Carmichael (2014), who examined speakers of a locally salient variety in the greater New Orleans area who had been permanently or temporarily displaced by Hurricane Katrina. She found that speakers’ orientation to the world outside their community correlated with some (but not all) local features, while displacement status correlated with none of them, again underlining the role of social perception over experience in accommodative processes.

### 3 Sociolinguistics in College

College students undergo changes to social identity ranging from the relatively simple redefinitions of life-stage as they transition from in and out of college, to more massive overhauls related to sociopolitical affiliation, sexual identity, future career and other changes to key facets of identity. High school students have been well studied in sociolinguistics; indeed, many of the core insights of the third wave of variation are based on studies of high school students (e.g., Eckert 2000, Mendoza-Denton 2008), including the observation that the relationship between “social address” features like socioeconomic background and linguistic behavior is mediated by speaker’s positioning in locally meaningful social categories, positioning which they agentively contribute to, in interaction with their interlocutors.

While college has been under-studied as a life stage relative to its theoretical promise and the ease of accessing individuals in it, some sociolinguistic work has investigated it. Some of this work has looked at subpopulations of college students for reasons not related to accommodation, for example Kiesling (1998). Others have examined questions similar to ours. Evans and Iverson (2007) found that the exposure to and ideological privileging of southern English varieties had an impact on the perceptual, but not production systems of northern English university students. Wagner (2012) found no change in regional vowel variables, but some in (ING) usage, although her college stu-

dents were, by and large, still embedded in and loyal to their home neighborhood social networks. In contrast, Bigham (2010) did find evidence of changes in regional vowel systems, among southern Illinois residents attending Southern Illinois University at Carbondale (SIUC), a school located in southern Illinois but sociolinguistically dominated by Chicagoans and their Inland North vowel patterns.

We report here on preliminary results of a large-scale investigation into the relative strength and interaction between these two general contributors to college students' speech changes: exposure to other forms on the one hand and identity changes on the other. In the current study, we examine a corpus of read speech from students at the Ohio State University for changes in regionally relevant vowel production based on two primary predictors: year of school of the speaker, intended to represent an apparent time approach to tracking change through college years, and self-reported regional make-up of social networks.

Ohio boasts a sociolinguistically diverse population ideal for this study, even considering only, as this study does, white, native Ohioans. Its geographic position and migration history means that examples of all three of Labov's (1991) "three dialects of English" are represented. Central Ohio, in which the university is located, features an accent considered by many Americans to be regionally unmarked or unaccented (Bonfiglio 2002, Campbell-Kibler 2012). Northern areas of Ohio are part of the Inland North region (Labov, Ash, and Boberg 2006), which Ohioans are to some extent becoming aware of as a "northern accent" or "Cleveland accent" (Campbell-Kibler 2012). Despite this growing awareness, both central and northern Ohioans are widely seen as unaccented (Bonfiglio 2002, Campbell-Kibler 2012). The upper or inland south (Carver 1987, Labov et al. 2006) is also represented within Ohio, in the southeast especially, but also, due to internal migration, in pockets throughout the state (Flanigan 2000, 2005). Due to the regional localization of this accent in Appalachia, this variety is widely stigmatized (Campbell-Kibler 2012). In this paper we examine these three groups at OSU, focusing in the case of the central and northerners on the raising and/or fronting of TRAP<sup>1</sup>, the lowering and/or backing of DRESS and KIT and the fronting of LOT, all features of the Northern Cities Shift and key distinguishing features between Midland and Inland North varieties (Labov et al. 2006). In the case of southern Ohioans, we focus here on the monophthongization of PRICE.

## 4 Methods

Our data is drawn from the OhioSpeaks corpus, an integrated research and teaching project at the Ohio State University (Wanjema, Carmichael, Walker, and Campbell-Kibler 2013). The project aims to increase undergraduate interest and experience in research by inviting them to view their own recorded voices as objects of scholarly inquiry. In modules placed in courses across multiple departments, students complete a background questionnaire and record themselves reading a prepared word list and, in some cases, passages and/or sentences. These data are used to enhance their learning of course content, and are then, with their consent, added to the research corpus.

Because students were tasked with recording themselves, a range of audio tools were used, primarily laptop built-in microphones and cellphone microphones. In some cases, students were asked to read the same material multiple times, first in their "regular voice" and again in a variety of guises, ranging from a simple repetition to performances like sounding as masculine as possible or performing radio ads to appeal to a specific demographic. Foreign language students were given material in both English and their target language to read. The current study is based only on the "self" guise, the first reading of English material performed in what the participants consider to be their own normal reading voice.

In our study, the effect of accommodation is included in two ways: by time spent in school and in the self-reported regional make-up of social networks. While the tradition of social network analysis in sociolinguistic variation has focused on the character of the networks themselves, for ex-

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<sup>1</sup>We base our vowel class terms on the labeling conventions of Wells (1982), but for simplicity use TRAP to refer to the combined TRAP/BATH class, which is collapsed in the varieties under discussion here. In this case, we limit our analysis to tokens not appearing before nasals.

ample their density (Milroy and Milroy 1992), our data do not enable such sophisticated approaches. Instead, we asked participants to report where their most common interlocutors were from, offering choices of regions within and outside of Ohio. The checkbox options listed were *Central OH*, *Southeast OH*, *Northeast OH*, *Southwest OH*, *Northwest OH*, *US North*, *US South*, *US West*, *US Northeast*, *US Midatlantic*, *International*, and *Somewhere else*. Participants were able to check as many items as they liked. The region of the speakers themselves was collected by two methods. For 20 of the participants, who used the first version of the demographic questionnaire, region was coded based on their reported regional history, with northern speakers from north of Mansfield, southern speakers from south of Lancaster and central speakers from between the two. Subsequent speakers were self-described, selecting from the options: *Central Ohio*, *Northern Ohio*, *Southern Ohio*, *Outside Ohio*, *in the US*, *Outside the US*, and *I moved around*. These participants also provided a full residential history, which is not used in the current analysis.

Recordings were processed automatically, with no hand-correction at any stage. They were first phonetically aligned using the p2fa forced aligner (Yuan and Liberman 2008). The resulting textgrids were loaded into Praat to extract acoustic information. In the subsequent discussion, F1 and F2 measurements are based on stressed tokens of each vowel class, measured at the highest intensity point between 20 and 80 percent of the vowel. Degree of diphthongization is measured with Euclidean distance in F1/F2 space between the 20 and 80 percent points of the vowel.

Due to the lack of hand correction, outliers were calculated conservatively and excluded, to minimize contributions from measurement errors to the final results. Outliers were identified for each subject and each vowel class individually. First the median and the median absolute deviation were calculated, because these measurements, of central tendency and variability respectively, are more robust to outlier influence than mean and standard deviation. For each vowel class within each speaker, points more than twice the median absolute deviation from the median were excluded.

The measurements of interest for each vowel were determined on the basis of the variable in question. For TRAP, DRESS and KIT, the trajectory of interest includes both the F1 and F2 dimensions, so a z-score normalized (Lobanov 1971) F1 was subtracted from normalized F2 as a combined measure of raising and/or fronting. The fronting of LOT was measured using normalized measurement of F2 only. Diphthongization of PRICE was measured based on the Euclidean distance in non-normalized F1/F2 space between the 20% and 80% measurements of each vowel.

In each case, the measurement of interest was fitted to a mixed effects linear regression model using the lme4 package of R. Fixed effects tested were all speaker characteristics, aside from vowel duration which was included in each model:

- Gender, coded as male or female, with speakers identifying otherwise excluded for small numbers
- Region, coded as southern, central or northern Ohio
- Year of school
- Regional network self-report relevant for the variable in question (central and northeast Ohio for TRAP, DRESS and LOT and southeast Ohio for PRICE)

In addition, the three two-way interactions between year of school, region and network were tested. Random effects were included for the grouping factors of preceding segment, following segment, speaker, word, course (e.g., Language and Gender, Spanish, etc.) and course instance (e.g., with a specific instructor and term). Ideally, these grouping factors would be included for random intercepts and also random slopes for each of the fixed effects tested for which a slope is meaningful, following the exhortation by Barr, Levy, Scheepers, and Tily (2013) to “keep it maximal”. The size of the data set and complexity of the models prevent this, however, and the model-fitting algorithms fail to converge (i.e., fail to produce a model at all) when the full structure is included. Accordingly, the random effects structure was reduced as necessary to achieve a model that converged, by eliminating the theoretically least important elements as well as those which appeared in the non-converging models to contribute the least variability. The actual model structures for each variable will be given in Section 5.

The current study is based on data from 109 speakers, all white Ohioans for whom self-reported network data were available and who had spent their lives entirely within a single region of Ohio,

whose assigned word list included the relevant tokens. 44 of these were from central Ohio, 32 from northern Ohio and 34 from southern Ohio.

## 5 Results

Our results offer tentative support for long-term accommodation, in the form of an effect of self-reported regional network on TRAP in northern Ohioans and an interaction between year of school and self-reported regional network on PRICE among southern Ohioans. They do suggest a correlation between common interlocutors and speech production. We present here the details of these results, then discuss possible interpretations.

The first observation is that none of the variables investigated showed a consistent decrease of regional features over time. We saw neither a drop from the first to the second year only (as we might expect if accommodation to a local norm occurred rapidly within the first year) nor did we see dropping from year to year (as we might expect if the primary influence on the regional speech behavior was repeated exposure to alternate forms). Three of the variables investigated, DRESS, KIT and LOT, showed no effects of network or year. Indeed, LOT and KIT showed no effects of any kind, including regional variation. DRESS in contrast showed only regional variation in the expected direction, but no apparent time or network effects.

Two variables did show significant interactions involving networks, and it may be useful to note that the two that did so are the stereotypes (Labov 1972) of our set: TRAP and PRICE. The TRAP model compares northern and central Ohioans, two varieties with opposing trends in the production of the TRAP vowel. Northern Ohio falls within the Inland North and as such has been raising and fronting TRAP (Labov et al. 2006), while central Ohio, in the Midland area, has not. Indeed, some reports suggest that young Columbus speakers, like young Californians (Podesva 2011), are lowering and/or backing these productions (Durian 2012).

Predictor	Estimate	Std. Error	t-value
Vowel duration	-1.74617	0.26014	-6.712
Network incl. northeast OH (ref = no)	-0.13872	0.13397	-1.035
Northern speaker (ref = central)	-0.07492	0.22558	-0.332
Northern speaker; network incl. northeast OH	0.57499	0.21033	2.734

Table 1: Fixed effects for TRAP model. N = 1238, Speaker N = 75. Categorical predictors are coded for treatment contrasts. Model comparison to one without the network x region interaction:  $p = 0.007$ . Random effects: intercepts for preceding segment, following segment, speaker, word, course and course instance and slope of region for course.

Table 1 gives the final model for TRAP, which suggests that northern OSU students who report interaction with speakers from northeast Ohio show raised and/or fronted (i.e., more northern) productions (see Figure 1). No such effect is seen in among the central Ohioans and neither group shows an effect for network ties to central Ohio. Note the discrepancy between the categorization of the speakers (northern) and their networks (northeast). This is due to a combination of how this information was elicited from participants (network checkboxes were more detailed than region of origin checkboxes) and the possible complicating effect of urban vs. rural background, which is unevenly spread across northeast and northwest Ohio. As the corpus develops, future work will be able to tease these issues apart. For now, we note that the northern category is dominated by speakers from the urban areas of northeast Ohio.

Turning to the analysis of PRICE, Table 2 shows an interaction between year of school and networks among southern Ohioans. Only southerners are included in this model since we did not expect non-southerners to adopt this feature even with exposure, given the stigma of the feature, which is one of the most commonly known stereotypes of southern speech, which is in turn one of the most heavily stigmatized accents in the US (Lippi-Green 2011). Figure 2 shows the relationship between year of school (coded for simplicity as lower for first and second years and upper for third

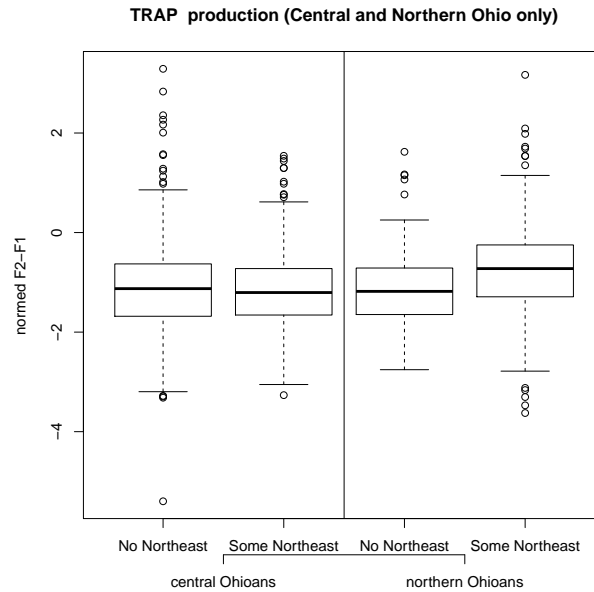


Figure 1: F2-F1 of TRAP class tokens for central and northern Ohioans with and without northeast Ohio networks.

and fourth) and self-reported networks including southeast Ohio. As above, the disconnect between region and network stems from the urban/rural divide, in this case with southeast Ohio showing predominantly rural communities, while many of the students from southwest Ohio come from Cincinnati and its suburbs. Southerners with and without reported southeast networks come from across southern Ohio, with a majority in the southwest area around Cincinnati.

We see that southern Ohioans in their junior and senior years who report links to southeast Ohio show less diphthongal (more southern) productions than their younger counterparts or those with no such links.

Predictor	Estimate	Std. Error	t-value
Vowel duration	1408.111	237.480	5.929
Network incl. southeast OH (ref = no)	94.377	46.621	2.024
3rd or 4th year (ref = 1st/2nd yr)	2.295	35.067	0.065
3rd or 4th year; network incl. southeast OH	-278.948	83.193	-3.353

Table 2: Fixed effects for PRICE model.  $N = 310$ , Speaker  $N = 34$ . Categorical predictors are coded for treatment contrasts. Model comparison to one without the network  $\times$  region interaction:  $p = 0.003$ . Random effects: intercepts for preceding segment, following segment, speaker, word, course and course instance and slope of year of school (collapsed) for course.

Two network effects thus emerge, while only one effect of time-in-school is seen, and that only as an interaction with self-reported network. If these network effects are supported in future work, we will still need to understand the causal relationships prompt them. Previous work offers some potential explanations. One possibility is that the linguistic interaction directly influences linguistic production, so that northern and southern Ohioans both exhibit these stronger regional features due to more frequent exposure. In this case, additional explanations are needed to account for the lack of network effect among the younger southerners.

Another possibility is that both the linguistic effects and the network patterns are tied to a personal stance regarding place of origin. It may be, for example, that maintaining close ties to home inspires speakers socially to maintain their home accents, or that those most inclined to maintain



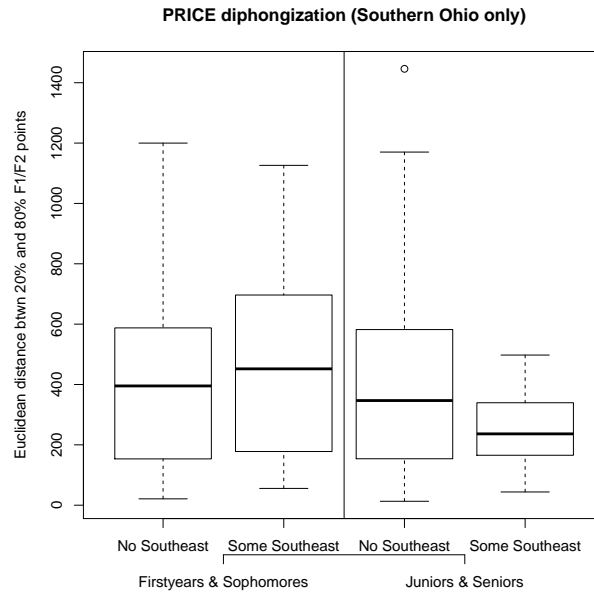


Figure 2: Euclidean distance between F1/F2 measurements at 20% and 80% of PRICE class tokens (up = more diphthongal) for newer and older southern Ohioan students with and without southeast Ohio networks.

contact with their home communities are those whose accents are the strongest in any case. Indeed, the collection itself may be a factor, if, for example, those most regionally identified are most likely to think of their contacts as coming from the region, regardless of their actual interactional patterns. The fact that year of school interacts with network for southern speaker's productions of PRICE such that older students are *more* Southern sounding also raises the possibility that regional identities might strengthen, not weaken, as students progress through college. As more data are available, the additional information about college experiences may be able to help clarify these issues, for example by providing measures of college engagement through living patterns (commuter, off-campus, dorm) and involvement with student clubs.

## 6 Conclusion

This study has provided a first glimpse at the OhioSpeaks corpus, an ongoing linguistic corpus created through pedagogy-enhancing data analysis tools. Our larger goal is to untangle the various competing or cooperating factors which influence sociolinguistic development through college. In particular, we consider here accommodation to new interlocutors, which we link to both self-reported network and to years of school, on the assumption that students are exposed to speech from outside their home region at school more than they were in their home regions. We in the future we will also be able to consider the effect of social identity factors, including school major, housing choices and participation in school resources such as clubs or Greek life.

In the current preliminary analysis, we have asked whether white Ohioans from three different regions (north, central and south) change their regional vowel productions during their time at OSU and whether their self-reported regional networks predict these productions. We find no pattern of alteration in regional speech through apparent time at OSU, but find two effects which provide tentative support for network effects. These effects, if real, are ambiguous as to whether they support a story of change through exposure or one of social identity as a major driver of change in the individual.

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