

Consonantal Variation in Utah English *

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Abstract In this paper, we analyze the frequency of three consonantal variables in Utah English: the glottal stop in words like *mountain*, [t]-epenthesis in words with /s/ clusters like *salsa*, and word-final velar nasals (NG+). Using Amazon Mechanical Turk to collect audio, we gathered 2,795 tokens of these variables. Though relatively few nonmainstream variants were found in our sample, we find indications of phonetic conditioning and that women and younger speakers used some nonmainstream variants more. Ultimately, further work and a larger dataset is required to more fully describe these variables in Utah English.

1 Introduction

Research on and documentation of North American varieties of English is an ongoing effort. The western United States has not been given the same kind of attention as the Eastern part of the country, and only recently has it been the topic of rigorous sociolinguistic study. While the *Atlas of North American English* (Labov et al. 2006) broadly describes speakers in the western states as having a similar, albeit heterogeneous dialect, more recent and more focused work has uncovered differences between states in the West (Fridland et al. 2016, 2017). In this study we focus on Utah, and because of its heavy Mormon influence in its settlement patterns and present population, we expect to find a combination of linguistic features not found in other states.

Like much sociolinguistic work, the research that has been done on Utah English has been primarily focused on vowels, and in particular, vowel mergers. Such features of Utah English include the *cot-caught* merger, the *cord-card* merger, and prelateral mergers like the *feel-fill*, *fail-fell*, and *pool-pull* mergers (Baker & Bowie 2010, Baker et al. 2009, Bowie 2003, 2008, 2012, Di Paolo 1992, Faber & Paolo 1990, Helquist 1970, Labov et al. 1972, Lillie 1998, Petersen 1988, Reeves 2009, Sarver 2004, Stanley & Renwick 2016). There has also been some work done on features more

*The authors acknowledge the support of the Innovative and Interdisciplinary Research Grant from the University of Georgia Graduate School which funded the data collection. They would also like to thank Jim Stanford and Chaeyoon Kim for help in using Amazon Mechanical Turk and the audience of the 4th Annual Linguistics Conference at UGA for their feedback and comments.

common in Southern American Englishes like /aɪ/ monophthongization (Morkel 2003, Skyes 2010) and the pin-pen merger (Lillie 1998). Finally, recent work has analyzed the development of the Western Vowel Pattern (Bowie 2017) in Utah, using archival recordings of religious sermons (Bowie 2017).

In this study, we focus on three consonantal variables in Utah English. The first is the pronunciation of the unstressed syllables in words like *mountain*, *cotton*, and *Latin*. The second is [t]-epenthesis in words like *false*, *Wilson*, and *salsa*. The third is the presence or absence of stops after velar nasals in words like *going*, *talking*, or *doing*. In the following sections we will provide a more thorough description, a summary of previous work, and our results for each of these variables separately and will demonstrate that there is consonantal variation in Utah, some of which may be unique to the state.

2 Methods

For this study, we collected audio using Amazon Mechanical Turk. This is a crowdsourcing platform that allows researchers to recruit and pay participants to complete small tasks. In linguistics, Amazon Mechanical Turk has been used numerous times for distributing surveys, but recently it has been used to collect audio for sociolinguistic analysis. Kim et al. (2016) collected audio from hundreds of participants across New England and found that sociolinguistic variation known to exist in the region through in-person recordings was also found in their sample, despite substandard sound quality. We likewise use Amazon Mechanical Turk under the assumption that it serves as a relatively good proxy for audio collected using traditional methods.

As a part of a larger project on English in the West, we set up two similar tasks that asked participants to record themselves reading a lengthy list of sentences and a long word list. The sentences, which included words containing the variables we are interested in, were taken from the Corpus of Contemporary American English (Davies 2008–) to distract participants from the research questions and so that they would appear natural-sounding. The word list was pseudorandomly ordered such that adjacent words did not target the same feature. Some workers completed just one of the two tasks and others did both, so there is some differences in how many tokens were collected from each participant. However, between the two tasks there were 186 sentences and 87 tokens in the word list that targeted the three linguistic variables in this study, so we were able to collect many tokens from each participant, even if they completed only one task. No meaningful differences were found between the sentences and the wordlist, so they will be pooled together as one style for this study.

Of the 212 participants in the West, we gathered 5.5 hours of audio from 14 Utahns. We acknowledge that this is a relatively small amount of audio for a sociolinguistic study and that the speakers were relatively homogeneous demographically: they were between the ages of 20 and 44 and they all self-identified as Caucasian. However, they are relatively diverse geographically (11 came from the Wasatch Front and 3 were from central and southern Utah), they are roughly balanced for sex (6 women and 8 men), eight self-identified as being Mormon and six as non-Mormon, and their education levels range from some high school to completing a four-year degree. In total, we gathered 2,795 tokens containing the variables in question for this study.

After being transcribed orthographically, each of the targeted tokens was impressionistically transcribed by the two authors. This is admittedly a low-tech, unscientific data extraction technique, which, particularly in the case of (NG+), may have had an impact on the results. However, we consider this a useful technique as a proxy for listener perception and leave a more phonetic analysis for future studies.

3 MOUNTAIN

The first variable in this study is the pronunciation of the unstressed syllable in words like *mountain*, *cotton*, and *Latin*. Formally, it is an unstressed syllable that contains /tVn/ (where the vowel is a reduced) following a stressed syllable. This particular syllable occurs word-finally as in *mutant*, *kitten*, and *button*, but can also occur word-medially as in *botany*, *maintenance*, *arytenoid*, and *hootenanny*. We will refer to words containing this syllable as the MOUNTAIN lexical set.

There are two main realizations that alternate for this variable in North American English. The most common uses a glottal stop and a syllabic nasal *moun*[ʔŋ] and is frequent across North American English. We will refer to this realization as the MAINSTREAM variant. This alternates with *moun*[t^hin], which retains the vowel and uses an aspirated alveolar stop instead of a glottal stop. This realization, which we refer to as the HYPERARTICULATED form, is less frequent and is presumed to occur in more careful speech.

In addition to these two, a third variant occurs in Utah, which Eddington & Savage (2012) describe as an “orally-released glottal stop” (*moun*[ʔin]). Baker et al. (2009) were perhaps the first to mention this variable in Utah English, and though it was not a focus of their study, they found that this orally-released glottal stop was relatively common for men and women of all ages. However, Savage (2014) found that it is highly stigmatized and it was rated as the least friendly and least intelligent of all Utah features studied. In the first study dedicated to this variable in Utah,

Eddington & Savage (2012) elicited tokens of MOUNTAIN using a reading passage and found that it occurred about 17% of the time in their dataset, particularly among younger females who had lived the majority of their lives in Utah.

Of the 697 tokens of MOUNTAIN words in our sample, we heard 432 (62.2%) of them as the mainstream realization (*moun*[ʔŋ]), particularly in the words *certainly*, *eaten*, *retina*, *threatened*, and *titan*. The orally-released glottal stop occurred in 86 tokens (12.4%), which is a little less than the 17% in the data collected by Eddington & Savage (2012), with the words *satin*, *certain*, *gotten*, *Patton*, and *whiten* being the most frequent. It is interesting to note that the word *certain* usually had the orally-released glottal stop while *certainly* usually had the mainstream pronunciation, suggesting a possible stress-related condition, though more data is required for a fuller analysis.

Interestingly, we heard the hyperarticulated form, *moun*[t^hɪn], 176 times (25.4%) in our sample, which is just more than double the frequency of the orally-released glottal stop. The words *bulletin*, *sentence*, *fountain*, *mountain*, *Scranton*, *Clinton*, and *titan* were those that had this form the most. The first word, *bulletin*, is probably an outlier because it was the only word in our dataset where the /t/ was not immediately following the stressed syllable. This sheds some light on the environments in which the glottal stop variants can occur and suggests that the syllable in question must immediately follow the stressed syllable. The next five words were the only five in the dataset where the /t/ was followed by a nasal, which suggests some additional phonological conditioning of this rule: /t/ is less likely to be realized as a glottal stop when it is preceded by a nasal. Finally, it is curious that *titan* was usually *ti*[t^hɪn] while *tighten* was usually *ti*[ʔŋ]. We know of no other minimal pair like this within the MOUNTAIN lexical set where the two words are homophonous but differ in morphological structure, so we cannot extrapolate any more from this, but it hints at a morphological conditioning of this variable as well. Specifically, it may be that monomorphemic words tend to get the hyperarticulated forms more. Generally though, the fact that none of the men in our sample used this form at all supports Eddington & Savage (2012) finding that women tended to use this variant more. However, as Table 1 shows, not all women used the variant, and certainly not to the same degree. There are no clear demographic patterns that could suggest why Chelsea used the form the majority of the time and the other women did not. Clearly these words show intra-state and intra-sex variation, the explanation for which was not captured with the demographic questions in our survey.

While the orally-released glottal stop was only used by women in our sample, both men and women used the hyperarticulated *moun*[t^hɪn] variant. In fact, all 14 speakers in our sample used this variant at least once. Table 1 shows the frequency of

Pseudonym	YoB	Sex	City	Education	Religion	total	<i>moun</i> [ʔin]		<i>moun</i> [tʰin]	
							n	%	n	%
Ben	1987	M	Midvale	Some college	Agnostic/None	69			6	8.7%
Chelsea	1992	F	Provo	Bachelor's degree	Mormon	68	57	83.8%	7	10.3%
Dylan	1991	M	St. George	Bachelor's degree	Catholic	69			12	17.4%
Heather	1993	F	Salt Lake City	Bachelor's degree	Mormon	68	3	4.4%	25	36.8%
Jamie	1984	F	American Fork	Associate degree	Mormon	27			1	3.7%
Jared	1991	M	Cedar City	High School	Agnostic/None	68			66	97.1%
Joel	1985	M	Salt Lake City	Less than a high school	Mormon	40			2	5.0%
Justin	1991	M	Salt Lake City	Some college	Agnostic/None	69			2	2.9%
Maddy	1993	F	South Jordan	Associate degree	Mormon	27	8	29.6%	17	63.0%
Mandy	1977	F	Ephraim	High School	Mormon (non-practicing)	38	18	47.4%	1	2.6%
Michelle	1983	F	American Fork	Associate degree	Agnostic/None	27			4	14.8%
Sam	1995	M	Cedar Valley	Some college	Agnostic/None	69			6	8.7%
Tim	1978	M	Cedar Valley	Bachelor's degree	Mormon	28			1	3.6%
Zach	1988	M	Provo	Bachelor's degree	Mormon	27			26	96.3%

Table 1 Distribution of MOUNTAIN variants by speaker

this variant as accounting for 25.4% of all our observations, or about 1 in 4 tokens. Of the women who were users of the orally-released glottal stop, two of them, Maddy and Heather, were also among the users of the hyperarticulated form. Among the men, the most notable are Zach and Jared who were both near-categorical users of the hyperarticulated variant. It is noteworthy that only women were users of the orally-released glottal stop while it is men who are the most significant users of the hyperarticulated form.

To test the significance of these demographic factors, we ran three generalized linear mixed-effects using the R package *lme4* (Pinheiro et al. 2016). Each model predicted the usage of one variant (*moun*[ʔn], *moun*[ʔin], and *moun*[tʰin]) in relation to the other two. In each model, we included age and religion as fixed effects and speaker and word as random effects. We also included sex as a fixed effect except in the model that predicted the orally-released glottal stop because only women used that variant. However, given that men did not use the form at all, we conclude that sex is a significant factor even though it was not used in the model. The model outputs can be found in Appendix A.

The statistical tests suggest that age is the only significant predictor for this variable. When comparing the mainstream *moun*[ʔn] to the two nonmainstream variants, the younger people in our sample were more likely to use the nonmainstream forms than the older speakers. Similarly, the model that compared the hyperarticulated variant to the other two predicted that younger people were more likely to use that form than older people. When comparing the orally-released glottal stop to the other

two forms, age was not a significant factor. Pieced together, these results suggest that the hyperarticulated form, *moun*[t^hin] is more common in our sample's younger speakers. This is particularly interesting because our pool of participants was relatively shallow in age (running only from 20–44) suggesting that this is a recent and perhaps progressing change in Utah.

The fact that none of the other factors were being significant in our models likely indicates that this linguistic variable does not pattern with these demographic factors. However, it may be that our small sample size was not enough to allow the model to determine any patterns that might be present. We believe this to mean that we simply need a bigger dataset to suss out the relationships between the three variants and what is conditioning them, if anything.

When comparing the frequency of these variants to other regions of the West, it is clear that Utah patterns differently. The 14 participants from Utah were just a small sample of the full corpus of recordings from Amazon Mechanical Turk, which included over 200 speakers from across the West. Because the tasks were the same for each participant, it allows for meaningful comparison of linguistic variation across the region. These other recordings are still being processed, so a full analysis will be presented at a later date, but preliminary results suggest that both the orally-released glottal stop and the hyperarticulated form were quite uncommon in other regions. The former is somewhat unsurprising since *moun*[ʔin] is stereotypical of Utah only, but the latter is unexpected. In fact, in other states there was evidence of speakers' heightened awareness of speech, because /t/ was often an aspirated in word-final (*foot, carrot, mullet*) and other word-medial (*water, priority, duty*) positions, indicative of careful speech styles. Yet, in MOUNTAIN words, these non-Utahns realized it with the mainstream glottal stop and syllabic nasal over 95% of the time.

It appears therefore that there are two variants of MOUNTAIN that are characteristic of Utah speech, not just one. The orally-released glottal stop is a documented Utah variant (Eddington & Savage 2012) but we argue that the hyperarticulated form is also much more common in Utah than it is elsewhere. This creates an interesting three-way distribution of variants in Utah, whereas most of the rest of North American English has relatively little variation.

4 FALSE

The second variable for this study is the insertion of [t] in /ls/ clusters as in words like *false, Olsen, and salsa*, which we are calling the FALSE lexical set. Javkin (1978) explains that this only occurs when the fricative is underlyingly voiceless, such that

false [faɫts] is possible but *falls* *[faɫdz] is not. This type of epenthesis can also be found in /ns/ clusters across North American English (thus *prince* is synonymous with *prints*), but we feel that epenthesis in the postlateral environment is a more localized phenomenon.

To our knowledge, only two studies have included this variable as a feature of Utah English. Baker et al. (2009) included it as one of the variables in their dialect identification study, and found that listeners use it as a primary cue when identifying a speaker from Utah. It is noteworthy that with the exception of one word, the four Utahns over the age of 40 in their sample categorically had the epenthesized variant, while it was infrequent in the 20-year-olds and non-Utahns. Savage (2014) describes the attitudes that people have towards /t/-epenthesis and found that it was viewed as less friendly by listeners. However, the stimuli used in that study only included the words *Nelson*, *Chelsea*, and *Hanson*, which are all proper nouns with one of them being [t]-epenthesis in an /ns/ cluster. These two studies contribute to the social evaluation of the variable, but they base their results on relatively little data and assume the feature to exist in Utah without a solid description of its frequency.

Seeking to fill this void and to provide a clear description of the variable, our sample yielded relatively few tokens of [t]-epenthesis: in 435 FALSE words, a stop was inserted just 37 (8.5%) times. This was surprisingly infrequent, but suggests that the social evaluations found in Baker et al. (2009) and Savage (2014) are can be attached even to uncommon variants.

With such little data, a robust statistical analysis cannot be made, but there were some patterns found in the data that can be described qualitatively. There appears to be some phonetic conditioning that blocks [t]-epenthesis: the words *upholster*, *holster*, and *bolster* were among the few words that never had the epenthesized variant and were also the only three elicited words that had a /t/ immediately following the /ls/ cluster. It is possible that speakers disfavor a [ɫst] cluster (**hol*[t]*ster*) or that a dissimilation effect is in place. It is also noteworthy that *balsamic* was one that did not have any epenthesis, while *balsa* was one of the few that had multiple epenthesized tokens, perhaps suggesting some stress-related factor. No lexical frequency effects were found.

Turning to the speakers themselves, just 6 of the 14 had /t/-epenthesis in these FALSE words, though half of those did so only once. Mandy and Maddy, two of the speakers who used *moun*[ʔin], added a [t] twice and four times, respectively. Meanwhile, Heather, who also used *moun*[ʔin] used the form 16 out of 34 possible words (36.4%). The fact that three speakers who used the epenthesized [t] more than once are all women hints at another gender-related difference. The three of them

also were users of the *moun*[ʔin] variant, suggesting that nonmainstream forms of MOUNTAIN correlate with nonmainstream form of FALSE.

With such little data, it is difficult to make generalizations regarding the demographic distribution and the realization FALSE words in Utah. However, we have demonstrated that variation does occur in the state and that at least some people (like Heather) seem to use the epenthesized more often than would be expected for a random speech error.

5 (NG+)

The last variable we analyzed was word-final velar nasals, which are sometimes pronounced with a stop after the nasal so that talking is realized as *talk*[ɪŋk] or *talk*[ɪŋg]. These realizations, hereafter referred to as (NG+), have only been the topic of two studies in Utah. [Alzoubi et al. \(2013\)](#) found this was an innovative pronunciation and that a stop was epenthesized starting around the early 1970s. However, a recent reanalysis of that data concludes that the opposite is true that that it is indeed a holdover the dialects of from early immigrants from England to Utah in the 19th century ([Di Paolo & Johnson 2018](#)) and is therefore, strictly speaking, not word-final epenthesis (or paragoge). In addition, [Di Paolo & Johnson \(2018\)](#) find that while (NG+) was found in interviews, it was much more common in careful speech styles, with some speakers using the variant 100% of the time. This is in stark contrast to [Baker et al. \(2009\)](#) who had to exclude this variable from analysis because none of their speakers produced it, despite their data coming from a reading passage.

Our sample also comes from a careful speech styles (reading passages and word lists) but we found that these word-final stops were virtually nonexistent in our data. Out of 1663 word-final velar nasals, we only found 16 tokens with stops (<1%). This is so low that it would be reasonable to dismiss it as random noise in the data. Statistical analysis is not feasible with such little data, and any patterns that might be seen cannot be generalized to the population as a whole.

This is a surprising finding, considering the abundance of tokens found in [Di Paolo & Johnson's \(2018\)](#) data. One explanation is that because our tokens were simply judged impressionistically as “containing a word-final velar stop” or not, we overlooked the subtler phonetic cues such as glottal stops, duration of closure, stop bursts, creaky voice, and formant structure of the release phase, which [Di Paolo & Johnson \(2018\)](#) used. It may also be that speakers who record themselves reading sentences and word lists on Amazon Mechanical Turk may not be as careful in their speech as when the interviewer is present. Audience Design ([Bell 1984](#)) may

therefore be an important factor in this type of data collection. Clearly, (NG+) is a feature of at least some Utahns based on Di Paolo & Johnson (2018) sample; we just happened to not capture in our data.

There is another intriguing absence in our sample: we also found very few tokens realized as [m] or what is commonly referred to as “g-dropping” (18 out of 1663, or about 1%). The alternation between [ɱ] and [m]—the (ING) variable—and particularly the social perceptions of the alveolar variant, is one of the more well-studied sociolinguistic variants (Fischer 1958, Campbell-Kibler 2006, Hall-Lew & Stephens 2012, Hazen 2008, sources within, and many, many others). Wolfram & Christian (1976) report speakers who ranged from 84.4% to 100% of their (ING) tokens with an alveolar nasal and Hazen (2008) reports an overall rate of roughly 50% in his nearly 7,000 tokens. Though these Appalachian-based reports do not directly predict (ING) usage in Utah, they show that it is a very common variant for many speakers. To our knowledge, (ING) has not been studied in Utah, so we do not have a baseline to compare our sample to. However, we expect the alveolar variant to be more common than what our sample suggests. If it was suppressed for some reason because of elicitation procedure, it is possible that (NG+) was also suppressed. We suspect both “g-dropped” and (NG+) variants to be more common in Utah English than our data suggests, but additional work is required in order to describe the frequency of these variants and to uncover the reasons why they were so sparse in our sample.

6 Conclusion

This paper has discussed the frequency and possible factors that motivate the usage of three consonantal variables in Utah English. In general, we find support for the orally-released glottal stop as a feature of Utah English (Eddington & Savage 2012), particularly among women. However, we find that the hyperarticulated form with an aspirated stop is twice as common, especially among men. Age and sex were shown to be significant in predicting these variants and suggest that both nonmainstream forms (*moun*[ʔin] and *moun*[t^h in]) are becoming more common, with women leading the change. We show that it is not just the orally-released glottal stop that is unique to Utah but that the hyperarticulated form is characteristic of the region as well.

We also looked [t]-epenthesis in /ls/ clusters and found that it is a much less common variant than the nonstandard variants in the MOUNTAIN lexical set, with only half of the speakers using the form and just 8.8% of possible tokens being realized with the epenthesis. We did not have enough data to run a robust statistical

analysis but qualitatively we did find that epenthesis never occurred with words that would make an [ɫst] cluster and that one pair of words, *balsa* and *balsamic*, suggested that it might be motivated by stress.

Finally, this study looked at stops in word-final velar nasals (NG+). While we found even very few tokens with stops, we also had only a few observations of “g-dropping,” which is known to be very common in other dialects of American English. Since [Di Paolo & Johnson \(2018\)](#) found (NG+) to be an extremely common variant in Utahns, our lack of these tokens may be found with a more detailed phonetic analysis or with a different data collection procedure.

In this study, we have provided a preliminary description of MOUNTAIN, FALSE, and (NG+) in Utah English. Many open questions remain, most of which could be answered with a larger dataset, but we have shown emerging patterns with these three variables. We encourage further research on these variables in Utah English and on consonantal variation generally in order to more fully understand regional variation in Western American English.

Appendix A: Statistical Models

A.1: Nonmainstream variants of MOUNTAIN

This table shows the model output for a generalized linear mixed-effects model fit by maximum likelihood. The response variable was the realization of nonstandard variants of MOUNTAIN (*moun*[ʔin] or *moun*[t^h in]) was opposed to the mainstream form (*moun*[ʔn]). “Male” was the reference level for sex and “non-Mormon” was the reference level for religion. This shows that while sex and religion were not significant, older speakers were significantly less likely to produce nonmainstream variants than younger speakers.

Formula: *realization* ~ *age* + *sex* + *religion* + (1|*name*) + (1|*word*)

	Estimate	Std. Error	z-Value	p-Value
Intercept	11.014	5.5356	1.99	0.0466*
Age	-0.4701	0.1864	-2.522	0.0117*
Sex (=female)	3.1971	2.153	1.485	0.1376
Religion (non-Mormon)	0.6583	2.022	0.326	0.7447
Random Effects				
	Variance	Std. Dev.		
Word	6.588	2.567		
Name	12.359	3.516		

A.2: Hyperarticulated MOUNTAIN

This table shows the model output for a generalized linear mixed-effects model fit by maximum likelihood. The response variable was the realization of *moun*[ʔŋ] or *moun*[ʔin] was opposed to the hyperarticulated form (*moun*[t^h in]). “Male” was the reference level for sex and “non-Mormon” was the reference level for religion. This also shows that while sex and religion were not significant, younger speakers are more significantly more likely to produce the hyperarticulated form than older speakers.

Formula: *realization* ~ *age* + *sex* + *religion* + (1|*name*) + (1|*word*)

	Estimate	Std. Error	z-Value	p-Value
Intercept	-9.10263	5.46757	-1.665	0.0959
Age	0.42227	0.18601	2.27	0.0232*
Sex (=female)	-0.08801	2.10856	-0.042	0.9667
Religion (non-Mormon)	-0.71949	1.99562	-0.36	0.7184
Random Effects				
	Variance	Std. Dev.		
Word	6.588	2.567		
Name	12.359	3.516		

A.3: Orally-released glottal stop MOUNTAIN

This table shows the model output for a generalized linear mixed-effects model fit by maximum likelihood. The response variable was the realization of *moun*[ʔ̞] or *moun*[t^h in]) was opposed to the orally-released glottal stop variant (*moun*[ʔ̞in]). “Non-Mormon” was the reference level for religion. Sex was not included in the model because men did not use the form. This model shows that neither religion nor age were significant, suggesting that women of all ages in Utah use the form and that some other factor predicts its usage.

Formula: *realization* ~ *age* + *sex* + *religion* + (1|*name*) + (1|*word*)

	Estimate	Std. Error	z-Value	p-Value
Intercept	11.9148	9.3215	1.278	0.201
Age	-0.0199	0.3096	-0.064	0.949
Religion (non-Mormon)	-2.5316	3.4531	-0.733	0.463
Random Effects				
	Variance	Std. Dev.		
Word	1.496	1.223		
Name	63.010	7.938		

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