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Multiple Mergers: Production and Perception of Three Pre- /l/ Mergers in Youngstown, Ohio

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Abstract

Mergers have been a much-researched topic in sociolinguistics (e.g., Baranowski 2013, Thomas and Hay 2005, Hall-Lew 2013), including in pre-lateral contexts (Bowie 2000, Faber & Di Paolo 1995, Thomas 2001). However, aside from Thomas and Bailey's (1992) study on "competing mergers" in Texas, little work has been done on the interaction among several mergers involving some of the same phonemes and occurring in the same contexts when they coexist in a given community. Even less research has addressed the role of perception in competing-merger contexts.

This study examines the status of mergers among /ul/, /ol/, and /Ul/ in Youngstown, Ohio. Although at least three forms of the merger have been cited in this community—/ul/-/Ul/, /ol/-/Ul/, and /ul/-/ol/-/Ul/—not all speakers in the community are merged, and those who are merged do not all merge the same phonemes. Using acoustic analyses and multiple-forced-choice perception task results from 26 speakers from the Youngstown area ranging from ages 9-81, this project examines 1) whether these mergers are all progressing in production and/or perception (and at the same rate) in this region and whether production directly correlates with perception, 2) whether they are motivated by the same internal linguistic forces, 3) how the presence of multiple patterns of pre-/l/ merger affects both the realizations and progression of these variants in the community, and 4) whether there is evidence to suggest that alternative patterns of distinction are maintained in cases of qualitatively merged vowels.

Acoustic analyses of F1 and F2 measured 25% into the vowel-liquid sequence, as well as multivariate statistical analyses, suggest that the /ol/-/Ul/ merger is progressing in apparent time, mainly with respect to F1, while the /ul/-/Ul/ merger is remaining relatively steady. Additionally, the /ul/-/Ul/ merger appears to exhibit features unique to Youngstown in that it is realized more closely to /ul/, unlike what has been typically described of this merger throughout the United States (Labov, Ash and Boberg 2006). Triple mergers, on the other hand, are so scarce in the community that generalizations about the merger's progression cannot be made. However, those who are triple merged realize the merger closer to /Ul/ than those merged only between /ol/ and /Ul/ or /ul/ and /Ul/. Initial analysis of perception data suggests that production does not directly correlate with perception, perhaps as a result of exposure to multiple patterns of merger. Though this region does not show a simultaneous progression of the three "competing mergers," it does exhibit considerable inter-speaker variation that, though puzzling, allows for another angle from which to examine sound change.

Multiple Mergers: Production and Perception of Three Pre-/l/ Mergers in Youngstown, Ohio

Lacey R. Arnold*

1 Introduction

The linguistic phenomenon of merger, in which one language variety lacks a contrast between two or more phonemes that another variety distinguishes, has been the focus of many recent sociolinguistic studies (e.g., Hall-Lew 2013, Baranowski 2013, Dinkin 2011, Thomas and Hay 2005). However, aside from Thomas and Bailey's (1992) work on competing mergers in Texas, little research has been done on the interaction of several mergers involving some of the same phonemes and occurring in the same phonological contexts when they coexist in a given community. Such occurrences bring into question whether and how Herzog's Principle (Labov 1994), which suggests that mergers expand at the expense of distinctions, applies in these contexts. Even less research has addressed the role of perception in competing-merger contexts even though perception plays a key role in the spread of phonemic mergers; this is especially true in cases of "near-merger," in which a speaker produces subtle, consistent distinctions he or she cannot consciously perceive (Labov 1994, Labov, Karen, and Miller 1991). This phenomenon raises questions about the impact of language variation and change on speech processing, including how speakers can learn to produce a distinction they do not seem to realize exists. This is further complicated by the existence of competing mergers within a community, since several variants may inform production and perception, though these may not necessarily be the same variants.

Through a combined production/perception framework, this paper investigates a three-way conditioned vowel merger among /ʊ/, /u/, and /o/ in pre-/l/ contexts in Youngstown, Ohio in order to address 1) whether these mergers are all progressing in production and/or perception (and at the same rate) in this region and whether production directly correlates with perception, 2) whether they are motivated by the same internal linguistic forces, 3) how the presence of multiple patterns of pre-/l/ merger affects both the realizations and progression of these variants in the community, and 4) whether there is evidence to suggest that alternative patterns of distinction are maintained in cases of qualitatively merged vowels.

1.1 Pre-/l/ Mergers

Pre-/l/ mergers are widespread in North American English and are some of the most common mergers due to the strong coarticulatory effects coda /l/ exerts on preceding vowels (Hickey 2004, Thomas 2001). This is particularly true among back vowels, which tend to drop before /l/, reducing vowel space. Merger between /ɔl/ and /ʊl/ has been reported sporadically across the United States, including in Utah (Di Paolo and Faber 1990, Faber and Di Paolo 1995), Waldorf, Maryland (Bowie 2000), and areas of Ohio (Thomas 1996). According to the Atlas of North American English (2006), the only region in which the /ɔl/-/ʊl/ merger has been consistently found, though, is Western Pennsylvania, specifically surrounding the city of Pittsburgh (Labov, Ash and Boberg 2006). Merger between /ɔl/ and /ol/ has also been reported in Waldorf, Maryland (Bowie 2000), as well as central Ohio (Thomas 1996). Three-way mergers among /ɔl/, /ʊl/, and /ol/, while less common, have been found in younger speakers from Ohio as early as 1996 (Thomas 1996, 2001). It is no surprise, therefore, that three competing patterns of pre-/l/ merger are present in Youngstown, a city in Northeastern Ohio.

1.2 Mergers in Perception

The case of competing mergers in Youngstown offers an excellent opportunity to investigate the role of perception in competing merger contexts, which has been a relatively untouched topic in

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sociolinguistics. When speakers are exposed to multiple variants, including in cases of changes in progress or competing merger contexts, perceiving distinctions is obviously a more complicated task. If speakers are to be accurate in disambiguating between vowel classes, they must take into account information other than vowel quality, including social information. Recent studies have shown that speakers are in fact able to extract social information in vowel identification tasks, providing evidence for an exemplar model of speech perception (e.g., Hay, Warren and Drager 2006), in which detailed information, including social information, is extracted from the speech signal and stored as a representation of the perceived sound. For instance, Hay, Warren and Drager (2006) found that, in New Zealand, where the near-square merger is relatively new, a speaker's supposed age influenced participants' choices when discriminating between vowel classes. Similarly, Koops, Gentry and Pantos (2008) found that in Texas, where the pin-pen merger is receding, speakers had more trouble discriminating between the two classes accurately when they thought the speaker was older.

Another instance in which language variation and change offers insight into speech processing is when production does not line up precisely with perception, which is often the case. Bowie (2000), for instance, problematizes an instance in which one of his participants exhibited a merger in perception but not in production, suggesting that the phenomenon constituted a "failed attempt" at hypercorrection. Other studies refer to this phenomenon as a "near-merger" or "apparent-merger," generally marked by a subtle, consistent distinction in production but a merger in perception (Hickey 2004, Bowie 2000, Labov, Yaeger and Steiner 1972, Labov, Karen, and Miller 1991, Di Paolo and Faber 1990). The opposite pattern—merger of production but distinction in perception—has been cited in the sociolinguistic literature on mergers as well, though it is not as common. For example, in Thomas and Hay's (2005) study of the Ellen/Allan merger among younger speakers in New Zealand, participants showed almost uniform production of the merger, though all participants were able to distinguish between the two phonemes in a perception task. They attributed this occurrence to young speakers' exposure to distinct productions.

Examining alternative cues for maintaining and perceiving distinctions may also offer some insight into these apparent incongruities between production and perception in instances of merger. First and second formant values, while often used to determine whether two classes are merged or distinct, are not the only dimensions in which distinctions can be maintained. If speakers are classified as "merged" based on first and second formants alone, this leaves out the possibility that distinctions can be maintained in other dimensions. For instance, in their examination of pre-/l/ mergers in Utah, Di Paolo and Faber (1990), suggest that "near-merged" speakers often show little to no distinction between vowel classes in F1 and F2 but maintain other subtle differences in phonation, though they typically do not make perceptual distinctions. This brings up the question of how speakers can consistently maintain these distinctions if they oftentimes are unable to utilize these differences in perception tasks. However, when the reverse pattern is the case—a participant is merged in production but not in perception—it may be the case that these participants are picking up on cues other than vowel quality.

In addition to the first three formants, some of the dimensions examined include f_0 (Faber and Di Paolo 1995), spectral slope (Faber and Di Paolo 1995), and duration (e.g., Fridland, Kendall and Farrington 2014, Ainsworth 1972, Wassink 2006). For the most part, studies that have looked at the role duration plays in distinguishing between vowel classes have found that its effects are minimal, though slightly more influential in perceiving distinctions between otherwise merged classes (Ainsworth 1972, Hillenbrand Clark and Houde 2000). More recently, Fridland, Kendall, and Farrington (2014) have suggested that duration may play a larger role in vowel identification, particularly in cases of merger. They found that duration preserves the low back vowel distinction, especially in cases of considerable spectral overlap between the two classes. Likewise, Labov and Baranowski (2006) found duration plays a role in disambiguating / ϵ / and / α /, which show spectral overlap in Northern-Cities-Shifted speech. Such findings suggest that duration may play a larger role in disambiguating qualitatively merged sounds than previously thought.

2 Methods

The following study was conducted with 27 participants from the Youngstown metropolitan area. While most participants completed all three tasks—a production task and two perception tasks—

due to time constraints, some speakers only completed one or two. Twenty-five speakers participated in the production task, while 16 participated in the first perception task and 24 participated in the second perception task. Gender is represented almost evenly, with 15 males and 12 females, and participants' birth years range from 1933–2006. All participants in the study are Caucasian and have comparable socioeconomic statuses and education levels, though these factors will not be addressed in this study.

2.1 Production Task

Participants were administered four readings tasks containing tokens of /ɔl/, /ul/, and /ol/ in postlabial contexts. These contexts were chosen, despite coarticulatory effects of lowered F2 after labials, because they allowed for suitable minimal pairs (*pull/pool/pole*, *full/fool/foal*, *bull/bowl*). The reading tasks were administered in the following order: 1) reading passage 2) list of sentences with tokens of interest placed at the end of each sentence 3) word list, and 4) minimal pair list. Each participant was recorded with a Marantz digital recorder, either in the home of the participant or the researcher.

In total, approximately 35 tokens of interest were elicited from each speaker, 921 tokens in total. Tokens in which participants clearly mispronounced the word (e.g., foul for foal), stumbled over the word, or skipped the word, were omitted. The primary data used in determining the distinct or merged status of each participant came from the minimal pairs list, since this task elicited the highest number of tokens. However, tokens from the minimal pairs task were compared with those from the reading list for each speaker to ensure context did not have a significant effect on merged/distinct production. Additionally, pre-lateral /o/ tokens are somewhat underrepresented because this vowel was not initially of interest and because of the common mispronunciation of the word “foal” due to unfamiliarity. Conversational speech was not elicited because of the difficulty in gathering sufficient numbers of appropriate tokens from conversational speech. Though reading tasks are not where we would typically expect to see mergers, they allow us to elicit sufficient numbers of tokens and control for phonological context. If a speaker is merged in read speech, it is likely that he or she will be merged in conversational speech as well.

Praat was the primary acoustic analysis software used for all measurements. LPC settings were adjusted for each speaker, and sometimes for individual tokens, for more accurate measurements. No attempt was made to demarcate the boundary between the vowel and coda /l/ due to the vocalic quality of coda /l/ (Hickey 2004, Thomas 2010). Each token of interest was measured in Praat with a script that took measurements at 25%, 50% and 75% into the vowel-liquid sequence, and all tokens of interest were checked by hand afterwards. All analyses here are based on measurements at the 25% mark, as this is where distinctions among vowel classes were greatest, and a distinction at any point throughout the trajectory of the vowel means a distinction is made between vowel classes. The first two formant values were normalized for each speaker using the Lobanov method in R.

Several types of statistical analyses were then conducted in R. Analysis of Variance (ANOVA) models were used, with duration and context as fixed effects, to determine whether individual speakers were merged. In cases of merger, /ɔl/ generally overlaps with either /ol/ or /ul/, though /ol/ and /ul/ may sometimes overlap in cases of a triple merger. For this reason, /ɔl/ is used as the reference level in all analyses. If there was a significant difference (at $p < .05$), in either F1 or F2 between /ɔl/ and /ul/ or between /ɔl/ and /ol/, the participant was considered distinct between those pairs. Only if both formants showed no significant difference between vowel classes was a participant considered merged. Linear mixed effects models, using the lme4 package in R were also used.

2.2 Perception Tasks

It is important to define “perception task” here, as perception of linguistic mergers has been investigated in several different ways, such as with minimal pair tasks, which can be problematic because they are based on speakers' often flawed self-judgment (Labov, Ash and Boberg 2006), or with multiple-forced-choice or abx discrimination tasks (Thomas and Hay 2005, Hay, Warren and Drager 2006, Bowie 2000). Two perception tasks were administered, and both were multiple-forced-choice discrimination tasks, though speakers were also asked about their own self-

judgments of minimal pairs. The first task included stimuli from both merged and distinct speakers and was intended not to gauge whether a perceptual merger was present in the community, but rather to determine whether apparently merged productions could be perceived with above-chance accuracy, perhaps suggesting a maintenance in distinctions other than in F1 and F2 values. The second task was a more conventional commutation test, for which participants heard stimuli from only distinct speakers. This task was intended to investigate participants' abilities to accurately distinguish between distinct vowel classes. The perception tasks were administered several months apart, and both tasks were administered in participants' homes. Stimuli for both tasks were compiled from participants' auditory recordings from the production task. The first perception task consisted of 50 tokens, 22 of which were of interest for this study, and 28 of which were simply filler words. For this first task, participants were given three options to choose from for each stimulus, and they recorded their answers on a worksheet. The second perception task consisted of 24 target tokens and 32 filler words. This task was administered using a Praat multiple-forced-choice experiment script. Listeners were given two choices for each target stimulus: always a word in the /ɔl/ class and a second word from either the /ul/ or /ol/ class.

Responses were tallied by hand for the first perception task, as this task was administered on paper, while Praat automatically tallied results and saved them in a spreadsheet for the second perception task. Logistic and linear mixed effects models were used to determine correlations between perception task responses and production or vowel duration.

3 Results

3.1 Merger in Production

A linear mixed effects model between formant and vowel class with speaker as a random effect and duration as a fixed effect suggests that, in the community as a whole, all three vowel classes are distinct in both formants, with the exception of /ɔl/ and /ol/ in F2 ($t = 1.28$, std. error = 5.636). However, since a distinction is maintained between /ɔl/ and /ol/ in F1, merger is not present in the aggregate. Still, individual speakers exhibit much variation in that they display various combinations of merger among /ul/, /ɔl/ and /ol/, warranting a look at individual speakers.

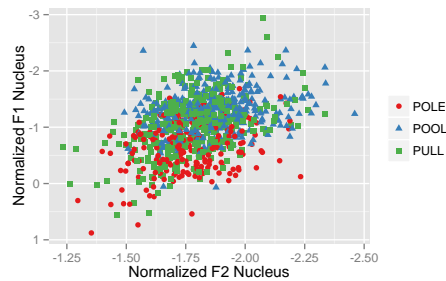


Figure 1: All normalized tokens of /ɔl/, /ul/, and /ol/.

Though it is possible to maintain distinctions among these vowel classes in either F1 or F2 (or both), among the participants in this study, distinctions are maintained predominantly in F1 (see Figure 1) and distinctions in F1 are more salient than those in F2. However, focusing on changes in both formants over time will provide a clearer picture of the movement of the phoneme in apparent time. As Figure 2 illustrates, /ul/ has remained relatively steady in F1 in apparent time, while /ol/ and /ɔl/ are converging due to a simultaneous lowering of /ɔl/ and slight raising of /ol/. A linear mixed effects model confirms that an interaction between vowel class and birth year significantly correlates with F1 both between /ɔl/ and /ol/ ($t = -7.217$, std. error < .01) and between /ɔl/ and /ul/ ($t = -4.815$, std. error < .01). Though there is much more overlap among vowel classes in F2, a similar pattern arises: /ul/ is remaining steady in apparent time while /ɔl/ fronts and begins to converge with and even surpass /ol/ while unmerging with /ul/. An interaction between vowel class and birth year significantly correlates with F2 between /ɔl/ and /ol/ ($t = -4.545$, std. error < .001) and between /ɔl/ and /ul/ ($t = -3.167$, std. error < .001).

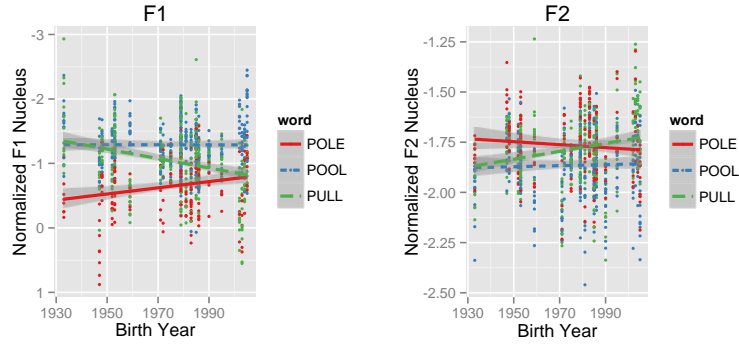


Figure 2: Progression of F1 and F2 in apparent time.

The progression of the /ɔl/-/ol/ merger in apparent time is reinforced by individual speaker Analysis of Variance (ANOVA) tests. The resultant F-statistics, a measure of the ratio of between-group variance to within-group variance, are used as a means of illustrating gradation in the degree of merger/distinction of individual speakers. The logs of these F-statistics are used below. When looking at the highest F-statistic (either F1 or F2), which represents the highest degree of distinction, the same pattern is revealed (Figure 3). Between /ɔl/ and /ol/, when taking into account both F1 and F2, there is a smaller distinction between the vowel classes among younger speakers. Though several of the youngest speakers produce distinctions among all three vowel classes, as confirmed by ANOVA tests, the significance of distinctions between /ɔl/ and /ol/ is closer to $p = .05$, suggesting the distinction is only borderline significant. Notably, the merger between /ɔl/ and /ol/ does not appear in speakers born before 1975 in this data set.

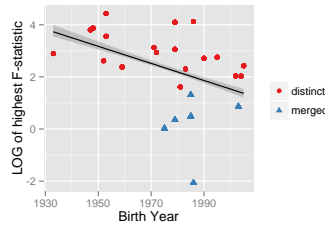


Figure 3: Log of highest (F1 or F2) F-statistic from ANOVA models.

Though the /ɔl/-/ul/ merger has been reported as being realized more closely to /ɔl/ (e.g., Labov, Ash, and Boberg 2006 in various areas, Di Paolo and Faber 1990 in Salt Lake City, Utah), the tense pronunciation seems to be favored in Youngstown. As Figure 4 shows, the majority of merged /ɔl/-/ul/ tokens fall above the -1 mark, which is a clear cutoff point between /ɔl/ and /ul/ for distinct speakers. It makes sense then, that as the /ɔl/-/ul/ merger unmerges and the /ɔl/-/ol/ merger progresses in apparent time, the shift would occur primarily in /ɔl/ (Figure 2). It is difficult to make generalizations, though, about the /ɔl/-/ol/ merger, though it appears that the distribution of merged /ɔl/-/ol/ tokens is more centralized between /ɔl/ and /ol/.

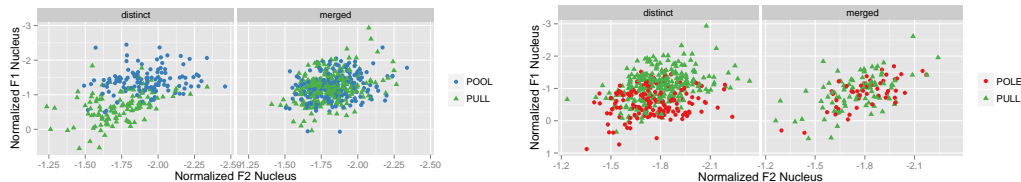


Figure 4: Realizations of merged and distinct /ɔl/, /ul/, and /ol/.

Moreover, the tense pronunciation also appears to be favored by speakers who merge all three classes, though there are only four speakers in this data set who are triple merged, as confirmed by ANOVA tests. While there is no difference between realizations of the triple merger and /*o*l/-/*o*l/ merger in F2, there is a notable difference in F1. Figure 5 shows that triple-merged tokens overlap in F1 with the /*u*l/ tokens of both /*o*l/-/*u*l/ merged speakers and /*o*l/-/*o*l/ merged speakers, rather than a midway point between /*u*l/ and /*o*l/, which would be closer to /*o*l/, as might be expected.

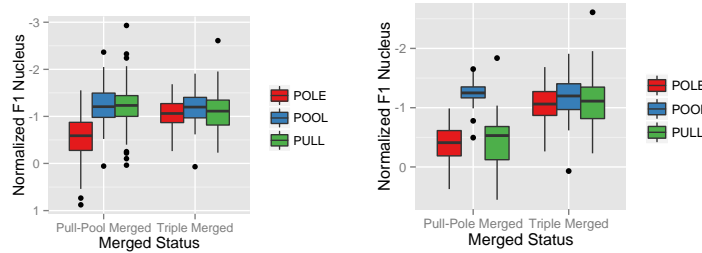


Figure 5: Distribution of normalized F1 by /*o*l/-/*u*l/, /*o*l/-/*o*l/, and triple merged speakers.

There is no significant difference in the distribution of either merger among males or females. However, in this dataset the triple merger is only present in males in 1975 or later, though generalizations cannot be made because of the rarity of the triple merger. Additionally, there is no significant male or female lead in either the progression of the /*o*l/-/*o*l/ merger or the regression of the /*o*l/-/*u*l/ merger. Mixed effects models verify that an interaction between sex and birth year has no significant correlation with F1, F2, log of F-statistics, or merged/distinct status.

3.2 Merger in Perception

This section will present only the results of the second perception task, for which stimuli consisted of tokens from distinct speakers, as the aim of this section is to analyze whether a perceptual merger is present in the community, which could not be done with the task involving some merged stimuli. No participant discriminated between all stimuli in both classes correctly, though one triple-merged male born in 1975 accurately discriminated between all /*o*l/-/*u*l/ stimuli. There does appear to be considerable variation in accuracy on the perception task, with some participants correctly discriminating between vowel classes at a completely random rate (around 50%), with others nearing perfect accuracy at around 95% (Figure 6). Birth year does not significantly correlate with accuracy, and neither merger appears to be progressing or regressing in apparent time. Under the criterion that 100% is a passing score on a commutation test (e.g., Labov 1994), all speakers (except M1975 between /*o*l/ and /*u*l/) appear to be perceptually merged. It is unclear, therefore, whether either merger leads in production or perception.

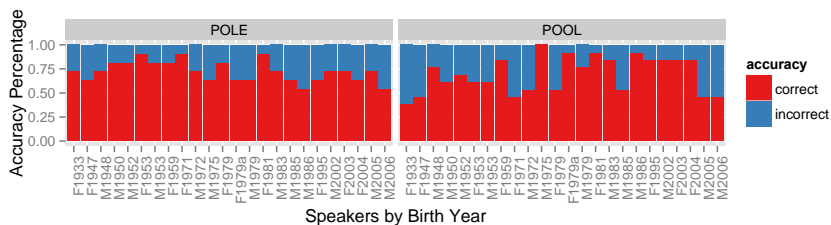


Figure 6: Accuracy by vowel-class response choices. Note that for stimuli in the “POLE” group, participants were given the option of choosing a word in the “PULL” class or “POLE” class. For stimuli in the “POOL” group, participants were given the option of choosing a word in the “PULL” class or “POOL” class.

Despite the lack of correlation between birth year and accuracy, binary classifications of mer-

ger/distinction based on individual speaker ANOVA tests do show a slight correlation with accuracy (Figure 7). Speakers who are distinct ($p < .05$) between either /ɔl/ and /ul/ or /ɔl/ and /ol/ have slightly higher accuracy levels when asked to choose between vowel classes they produce distinctly. However, this is only statistically significant in regard to /ɔl/-/ul/ distinct speakers' accuracy with /ɔl/-/ul/ stimuli ($p = .018$), and not in regard to /ɔl/-/ol/ distinct speakers' accuracy with /ɔl/-/ol/ stimuli ($p = .073$).

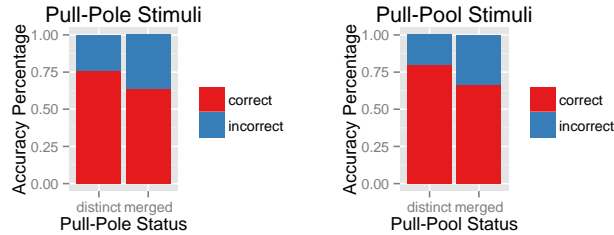


Figure 7: Accuracy by merged/distinct status.

Though merged/distinct status accounts for some of the variation in perception-task accuracy, it certainly does not account for all of it. Since perception does not follow the same age patterning as production, and since merged and triple merged speakers have relatively high accuracy rates, it is possible that alternative distinctions are maintained and perceived among qualitatively merged phonemes, which may impact accuracy.

It has been well documented that vowels have intrinsic durations, with /ɔ/ being consistently shorter than /o/ or /u/ (e.g., Peterson and Lehiste 1960). Results of the perception task suggest that participants are able to use durational differences to distinguish between vowel classes. Figure 8 shows the duration of the vowel-liquid portion of each token in the perception task. As duration of /ol/ and /ul/ increase, accuracy also increases. Of course, longer tokens are less likely to be centralized due to undershoot, which may allow participants to more accurately identify these tokens. However, the opposite pattern emerges with /ɔl/ tokens. As duration of /ɔl/ increases, accuracy actually decreases, suggesting that participants expect /ɔl/ to be shorter in relative duration and categorize these tokens as /ul/ or /ol/ when they are not. Duration significantly correlates with accuracy for all three vowel classes at $p < .001$. This pattern is even clearer for the first perception task, in which stimuli consisted of both merged and distinct tokens, though only /ɔl/ and /ul/ classes were used (Figure 8). Again, duration significantly correlates with accuracy for both vowel classes at $p < .001$.

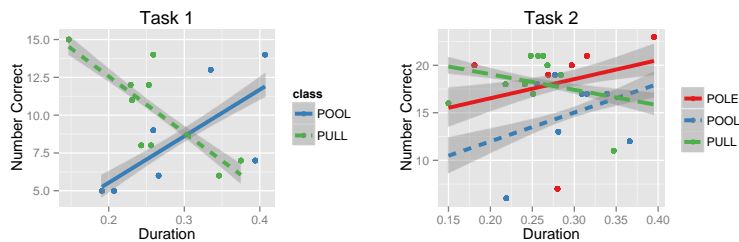


Figure 8: Correlation between duration and accuracy for both perception tasks.

4 Discussion

It appears that Youngstown is still in the midst of a “competition” among pre-/l/ mergers, and the resolution is not clear. In other words, changes are still in motion. It is possible that /ɔl/ will continue fronting and distinguishing itself from /ol/ primarily in F2, or perhaps even fronting until it merges with /ɛl/. It does appear, though, that younger speakers are becoming progressively more

near-merged, which as Labov (1994) notes, is characterized by a smaller than normal phonetic distinction that is often in just F2 rather than a combination of F1 and F2. This is exactly what we see in the younger speakers in this data set. Since the significance of most distinctions in F2 is borderline, it is also possible that the “distinction” made in F2 in younger speakers is a result of the small number of /ol/ tokens and should be interpreted with caution. If a distinction is in fact maintained in the form of a near-merger among younger speakers, another possibility is that the proximity of /ol/ and /ul/ in F2, combined with the loss of distinction in F1 will eventually lead to a complete merger among future generations of speakers. Since three out of five of the participants born after 2000 claim that they pronounce pull and pole the same, and all five accurately identified less than 75% of stimuli on the second commutation test, complete merger seems to be a likely next step. The /ol/-/ul/ merger, on the other hand, appears to be receding in apparent time, bringing into question Garde’s Principle (Labov 1994), which states that mergers cannot be reversed by linguistic means. Perhaps, then, the /ol/-/ul/ merger was never complete in the community, and the subtle distinctions maintained, perhaps in dimensions other than F1 and F2, allowed for the decline of the merger in younger generations.

It is unclear why the tense pronunciation is favored in Youngstown, while the lax pronunciation is favored in other areas of the country, though it may have something to do with the prevalence of competing mergers in the region. Since /ul/ is furthest in phonic space from the other vowels that typically merge with one another in pre-/l/ contexts, realizing the merged phonemes closer to /ul/ frees up space and allows for a larger distance between /u/ and other vowel classes, which may also be merged.

Though the /ol/-/ul/ merger is present in the oldest speakers in this dataset, the /ol/-/ol/ merger is relatively nascent, appearing only in speakers born in 1975 or later. It is unclear where this new merger came from, though it likely entered the community as a result of Youngstown locals’ outside contact with those in nearby Ohio communities, since there have been no significant migrations to Youngstown during this time. In fact, there has actually been more movement out of Youngstown after three of the city’s largest steel mills closed in the late 1970s, costing the area thousands of jobs (Lynd 1987).

While no participant identified all three classes correctly on the second perception task, which involved all distinct stimuli, one triple-merged participant (M1975) identified all /ol/-/ul/ stimuli correctly. Under the criterion that 100% is generally a passing score on a commutation test (Labov 1994), no other speaker received a perfect score, even though the data set contains a mixture of merged, near-merged, and distinct speakers. This apparent asymmetry between production and perception is similar to what Labov (1991) found in Philadelphia. Philadelphian speakers in the community also showed a mixture of merger, near-merger, and distinction, yet only two out of 21 passed the commutation test, while non-Philadelphians had much higher accuracy rates. Labov explained this phenomenon as a result of distinct speakers’ close contact with merged speakers. In other words, when communicating with merged speakers, distinct speakers find that the distinction is simply not needed, so they stop using it. The same process seems to have occurred among speakers exposed to variants of pre-/l/ merger in Youngstown.

Though there does appear to be some asymmetry between production and perception, results of the second perception task suggest that merged/distinct status does correlate with accuracy in perception; however, this is only significant in cases when participants are asked to choose between /ol/ and /ul/, not when the choice is between /ol/ and /ol/. This is likely because of the near-merged status of younger speakers categorized as distinct based on ANOVAs ($p < .05$) between /ol/ and /ol/. However, though one merger is progressing in production in apparent time while the other is receding, age does not correlate with accuracy on the perception task. This incongruity may be attributed to the fact that commutation tasks are largely dependent not only on the ability of the speaker to discriminate between stimuli, but also of the speaker to produce sufficiently distinct tokens (Labov 1994). Since the “distinct” speakers in this community produce subtle and oftentimes inconsistent distinctions, it is possible that the lack of similar age patterning between production and perception is due to imperfect stimuli. Additionally, since many speakers in the community possess or are exposed to various combinations of pre-/l/ mergers among back vowels, this may influence perception as well and result in an incongruity between production and perception. In other words, if one speaker’s /ol/ is distributed in a similar phonic space as another speaker’s /ul/, how would a listener know which pattern should guide his or her response on a percep-

tion task? This type of exposure to various patterns of merger likely describe the accuracy of the triple-merged speaker, M1975, who is triple merged yet able to discriminate between all /oɪ/-/uɪ/ stimuli correctly. He lives with a wife (F1979a) and daughter (F2004) who produce these two classes distinctly and his constant exposure to this pattern of distinction may very well impact his perception of these two classes.

However, the incongruities between production and perception present in both perception tasks might also suggest that participants are able to use cues other than vowel quality in discriminating between vowel classes. Duration seems to be an influential factor guiding perception task responses, and if the durational distinction has kept the /oɪ/ and /uɪ/ classes distinct among older speakers, this accounts for the apparent “reversal” of the merger in F1 and F2 in apparent time. However, the impact of duration on vowel class disambiguation appears to result, at times, in incorrect responses. As Faber and Di Paolo (1995) note, not only do speakers produce and perceive sounds in multiple different dimensions simultaneously, but these dimensions are weighted differently by different speakers, which explains why inaccurate responses are more prevalent when a vowel is longer or shorter than expected. In other words, since merged and distinct speakers may make use of durational distinctions in production and perception to different degrees, durational distinctions perceived by a participant that were not actually produced would result in an incorrect response. Notably, the first task, which included both merged and distinct stimuli, showed a much clearer correlation between duration and accuracy, perhaps suggesting that merged speakers make more use of duration as a contrastive element, or all speakers rely on durational distinctions when other distinctions, such as vowel quality, have fallen away. Of course, the reading task from which the stimuli were pulled has an effect on duration (i.e., for prosodic reasons), and since participants were not informed of the context in which each token was spoken, this may influence accuracy on the perception tasks as well.

5 Conclusion

This study has examined the case of competing mergers in Youngstown, Ohio. Findings have suggested that a change in progress among back vowels before /l/ is occurring in apparent time, production minimally correlates with perception, and speakers may be perceiving and maintaining distinctions among the three classes (/uɪ, oɪ, ɔɪ/) via duration. There are still several questions that remain, including why the tense pronunciation is favored among /oɪ/-/uɪ/ mergers and triple mergers and whether merged speakers use durational cues to a larger extent than distinct speakers. Due to the limitations of this study, including the relatively small number of participants, these questions have not been answered fully. Future studies should continue to monitor the community to see how the changes among back vowels before /l/ continue to progress, and whether a “resolution” to the case of competing mergers will emerge. Lastly, since duration has been found to be an influential factor in perception tasks involving potentially merged phonemes, future research should delve into the degree to which merged/distinct speakers use and perceive durational differences, perhaps by synthetically manipulating vowel duration. Pairing results on the effect of duration on perception with findings on durational distinctions maintained in production will contribute greatly to current knowledge on near-mergers and the relative influence of the multiple dimensions in which distinctions between vowel classes can be maintained.

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