Changes in the Timber Industry as a Catastrophic Event: BAG-Raising in Cowlitz County, Washington

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Abstract

Sometimes, an external or catastrophic event causes a very sudden change in a speech community, often resulting in the loss traditional linguistic features and the spread of innovative speech patterns. This paper shows that changes in the timber industry in the late 1970s in Cowlitz County, Washington triggered the sudden loss of pre-velar raising, an innovative feature elsewhere in Washington State. Data was collected primarily through reading tasks with 42 natives of Cowlitz County, and by comparing a large set of piecewise regression models, it was found that those born after 1973 were much less likely to have the raised variant. In addition to a clear a shift around this time in census data, the older generation was generally nostalgic and had strong, positive feelings towards the area while the opposite was true of the younger cohort. These patterns, together with an examination of those who were exceptional within their generations, suggest that the raised variant is a marker of identity, signaling positive feelings towards Cowlitz County and the Pacific Northwest. This paper shows that the speech of Cowlitz County is more like that of Oregon than rest of Washington and that catastrophic events may in fact trigger the loss of an innovative feature when strong local identity is associated with the traditional variant.

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1 Introduction

1.1 Catastrophic Change

Linguistic change is not yet fully understood. Historical linguists and sociolinguists have approached the topic with a variety of methods and have brought us closer to understanding how and why language changes, but many questions remain, particularly in actuation and diffusion through time and space. One particularly difficult question to answer is the rate at which this might happen. Sometimes, a change is so gradual that it takes centuries to complete, while others spread quickly and simultaneously across many speech communities (Tagliamonte, D'Arcy, and Louro 2016). It appears then that the rate of change is specific to the community and the linguistic feature.

It generally takes a relatively long time for a linguistic change to come to completion. However, sometimes an external event causes a very sudden change in a speech community. For example, Wolfram, Hazen, and Schilling-Estes (1999:30) explain that high schoolers on Harkers Island previously attended school on the island itself, but in 1949 they started attending school on mainland North Carolina (cf., Schilling 2017). As a result, there was a drastic decline in the traditional subject-verb concord between the oldest generation and middle-aged group—around the time the teenagers started attending school on the mainland. Similarly, the unique "hoi toider" variant of /aj/ on Okracoke was being lost to the more mainstream [aj] or Southern American English [a:] realizations.

Bailey *et al.* (1996) explain that the linguistic consequence of these catastrophic events is that old features die out while new features spread into the community. In Texas and Oklahoma, there was a massive population dislocation as a result of World War II. In 1940, the majority of residents lived in rural region, but by 1950 over half of the people in these states were in urban areas, which had complex consequences on the English. Traditional features such as r-lessness, intrusive /r/ in *Washington* and *wash*, and the unrounded [ɑ] in *forty* were being lost while innovative features such as *fixin to* as a quasi-modal and the loss of the tense-lax distinction before laterals spread. Thus, the pattern of losing traditional features and spreading of innovative ones appears to be an effect of sudden increased contact with neighboring varieties of English.

Finally, Herold (1990) describes the development of the low back merger in Eastern Pennsylvania, showing that it was restricted to just the mining towns in the region. While most cities in the region grew rapidly between 1890 and 1920, the catastrophic event that triggered this merger in these specific towns was the mining boom, which caused a large influx of foreign-born immigrants, particularly those that spoke Polish or other Slavic languages. This is a clear case where the spread of an innovative variant, a merged low back vowel, and the decline of a traditional feature, the distinction between /ɑ/ and /ɔ/, occurred because of a catastrophic event, the mining boom and the shifting demographics that followed.

It is unlikely that these examples of the speech of a community being affected by significant external events are the only of their kind. In fact, Labov states that "catastrophic events have played a major role in the history of all languages, primary in the form of population dislocations, migrations, invasions, conquests, and massive immigrations" (Labov 1994:24). The magnitude of these catastrophic events need not be large: in Southeastern New England, a gradual influx of newcomers to an area reached a certain threshold and caused a sudden change, resulting in some older siblings in some families using a traditional variant and younger siblings using the innovative one (Johnson 2010). As will be seen in this paper, some procedural changes in the timber industry in Cowlitz County, Washington appear to have been an event of this type, ultimately leading to long-lasting effects on the variety of English spoken there.

*I am indebted to Cathy Jones for help in finding participants for this study and I humbly acknowledge the support of the University of Georgia Graduate School Dean's Award for funding the fieldwork. Thanks also to Scott Bailey for help acquiring and interpreting census data.

1.2 Cowlitz County, Washington and Pacific Northwest English

Cowlitz County can be found in southwestern Washington State, straddling Interstate 5 about an hour north of Portland and two hours south of Seattle. While the first English-speaking people settled in the area in the mid-nineteenth century, the population grew in earnest in the 1920s when Weyerhaeuser and Long-Bell Lumber companies each established logging and lumber-milling operations—the two largest in the world at the time—in the newly-founded city of Longview (Barrier and Froyalde 1998). This brought in job-seekers from across the United States, and the population of the county nearly tripled from 1920 to 1930 to roughly 30,000 residents (U.S. Census Bureau 1995). The county's largest city is Longview, with an estimated population of approximately 37,000 in 2017. With about a third of the population of Longview, the county seat is Kelso, adjacent to and separated from Longview by the Cowlitz River. With these two cities, the smaller cities of Castle Rock, Kalama, and Woodland and various unincorporated communities bring the population of Cowlitz County to about 105,000 people (U.S. Census Bureau 2017).

While the speech in this region of Washington has not been specifically studied, it is assumed those who live there sound like their neighbors and speak a variety of Pacific Northwest English. Of the various aspects of English spoken in Washington, perhaps the defining feature that makes Washington stand out among other western states is a phenomenon known as BAG-raising: the raising of /æ/ before voiced velars, as in words like *bag*, *flag*, and *dragon*, to [ɛ] or even as high as [e]. While it is characteristic of other northern US states (Labov, Ash and Boberg 2006) and can also be found among older Oregonians (Becker et al. 2016, McLarty, Kendall, and Farrington 2016) and to some degree in San Francisco (D'Onofrio et al. 2016) and Montana (Bar-El et al. 2017), among western states it is common only in Washington. It is widespread among ages and ethnicities in Seattle and eastern part of the state (Wassink 2016) as well as British Columbia (Swan and Becker 2018, Mellesmoen 2018). It can be reasonably assumed then that residents of Cowlitz County, Washington exhibit some degree of BAG-raising in their speech.

1.3 Hypotheses

In this paper I show that changes in the timber industry had a lasting effect on the language in Cowlitz County. Specifically, the restructuring and modernization of the mills in the late 1970s led to sudden changes in the phonetic realizations of BAG, with the older generation using a raised variant and the younger generation using a lowered form. While correlation is not causation, evidence to support this hypothesis would come in the form of a statistically significant difference in the speech of the older and younger generations, where the generation is defined close to when these changes happened in town.

2 Data and Methods

2.1 Data

To answer these questions, sociolinguistic interviews were conducted in the summer of 2016 with self-identified natives of Cowlitz County, Washington. The interviews mostly contained conversation and narratives, but because of the relative infrequency of words containing BAG, a sufficient number tokens for a robust statistical analysis using natural discourse alone was not possible. Instead, I draw from the reading passages, word lists, and minimal pair tasks at the end of the interview which all included tokens of BAG. However, because not all participants participated in these reading tasks (due to time, illiteracy, or impaired vision), this paper reports on only 42 participants of the 54 interviewed. Of these 26 women and 16 men, the median birth year was 1966, and as seen in Figure 1, there were fewer men sampled in the earlier decades and in the 2000s. In total, 476 tokens of BAG were collected.

Audio containing these tokens were transcribed manually and subject to force-alignment using a version of DARLA (Reddy and Stanford 2015) that uses an acoustic model trained in ProsodyLab-Aligner (Gorman, Howell, and Wagner 2011). The alignment for every token was then hand-checked for accuracy and formant measurements were extracted using a Praat script.

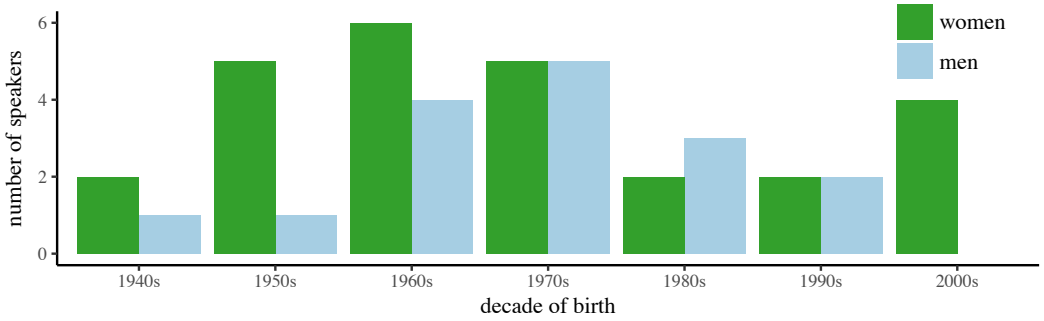

Figure 1: Distribution of speakers by decade of birth and sex.

Of the various ways to normalize measurements across speakers, the Bark difference metric was chosen for this study. With this technique, vowel height is measured as the difference between the Bark-transformed F3 and the Bark-transformed F1, with greater differences indicating a higher vowel. The main advantage to this vowel-intrinsic method is that it does not depend on data from the full vowel space for a proper calculation, unlike the Lobanov method or some other vowel-extrinsic formula (Thomas and Kendall 2015). Not all speakers completed all the tasks, and because the word list and minimal pairs were focused on specific sounds, there was an uneven distribution of vowels per person. Thus, in order to mitigate differences in what tasks were completed by each speaker, the Bark difference metric seemed most appropriate. However, not all physiological differences between speakers are filtered out using this technique and the men systematically had higher values than the women, so speaker sex was included in the regression models to account for these differences.

Format measurements for BAG were taken at the midpoint of the vowel and vowel height was calculated as described above. The height of BAG was then fit to separate linear mixed-effects models using the lmer function in the R package lme4 (Bates et al. 2015), with speaker and word as random effects, and speaker sex and some factor of age (see next section) as fixed effects.

2.2 Regression on Discontinuous Data

A simple linear regression model fits a straight line to data. If the response variable contains measurements of a vowel's height and the predictor variable is year of birth, the slope of the line is interpreted as the predicted amount of change per year, which is constant throughout the range of birth years represented in the sample. The top left plot in Figure 2 shows artificially generated, idealized data representing this type of language change.

However, if there is a catastrophic change, a straight-line model would not be the most appropriate fit to the data. A better model would include a *breakpoint* in the regression line. A regression with a breakpoint, or piecewise regression, is a technique that essentially fits different regression lines to different parts of the data to account for discontinuities (Baayen 2008). A basic way to model this is to simply code age as a binary variable (left center panel of Figure 2), in which case the slope of each section is zero, indicating no change within cohorts. There are more complicated ways to model discontinuities by including various combinations continuous and categorical representations of time. This, in turn, yields more complicated patterns such as parallel angled sections (top left panel), an unbroken regression line but with a sudden change in slope (bottom left panel), two drastically different pieces (bottom center panel), or some combination of flat and angled sections that may or may not be connected (bottom right panel). Not all of these patterns may be attested in language change, but given a sudden shift, these account for the logical possibilities that could, in theory, be found.

To test for sudden change in the realizations of BAG, 234 models were fit to this data. First, a null and a straight-line model were fit as a baseline. Then, for every year within the range of years of birth in the sample (excluding about three years on the extreme high and low end of the range, which would not converge because of a lack of data for one piece or the other), each of the other model types showing in Figure 2 were fit to the data, with a breakpoint defined at that year.

To compare these models to each other, a useful measure is needed to determine the model fit

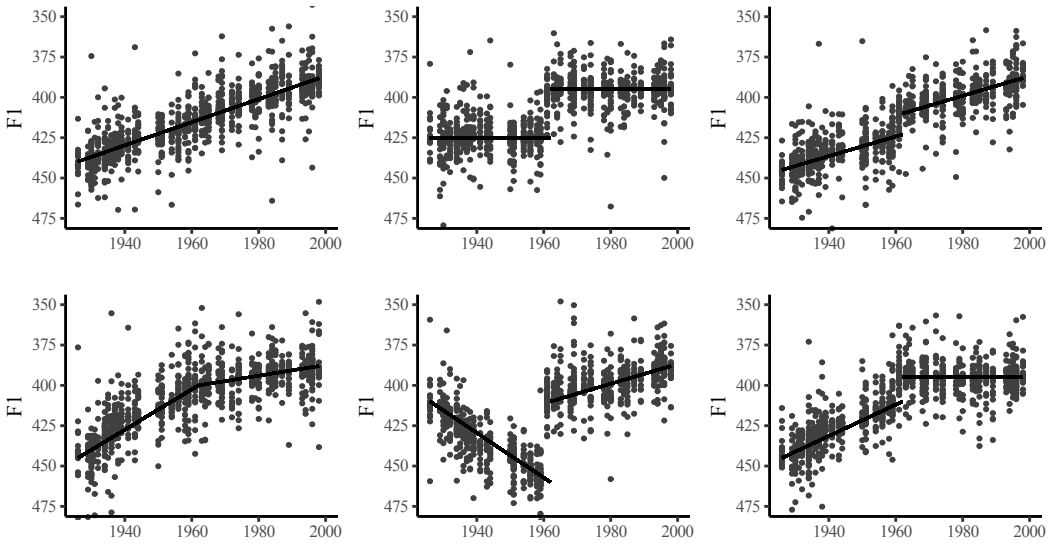

Figure 2: Six visualizations of artificial, idealized data showing various theoretical types of language change. Top left: continuous change with no catastrophic event. Top center: a discontinuity between two periods that otherwise have no change. Top right: the catastrophic event interrupts otherwise gradual change, with the rate of change being the same on both pieces. Bottom left: the catastrophic event causes only a change in trajectory with no discontinuity. Bottom center: the catastrophic event causes a discontinuity and a change in direction. Bottom right: the catastrophic event causes a discontinuity and trajectory, but one piece shows no change. Each of these models requires a different underlying formula, with the exception of the center and bottom right which can be done using the same formula. In these plots, the magnitude of discontinuities and rates of change are exaggerated for the purposes of illustration.

while also accounting for its complexity. For example, hypothetical model A may fit a straight line to the data. Meanwhile, model B fits a more complicated model that includes a breakpoint and two pieces of a regression line and performs marginally better than model A. Upon closer inspection though, it is found that the jump at the breakpoint in model B is very small and that the two pieces of the regression line have nearly the same slope, essentially forming one continuous line. This is a case where model B may be overfitted to the data and may not be generalizable to the population. In such a case, model A should be selected because it provides nearly as good a fit to the data without the added complexity of model B. Two measures, the Akaike information criterion (AIC) and Bayesian information criterion (BIC), are used in model selection for this very purpose, and the model with the lowest AIC or BIC is selected. The two criteria are related and penalize a complex model for doing the same work as a simpler one. The difference is that BIC applies a harsher penalty for additional variables, so the model with the lowest BIC is generally more conservative than the model with the lowest AIC. In this paper, the model with the lowest BIC was selected.

It is important to note that this technique does not impose a predetermined breakpoint, nor does it force a breakpoint to be present. All theoretically possible breakpoints were tested and compared against the straight-line model and the null model. If the null model was selected as best, it is interpreted as no change in apparent time. If the straight-line model was selected as the best, it is interpreted as change in apparent time at a constant rate. However, if some sort of piecewise regression model is a better fit to the data than a straight-line or null model, one plausible interpretation of this is that a catastrophic event occurred and affected the speech of the community, with the location of the breakpoint (the year of birth in this case) indicating when that event may have happened.

3 Results

Of the many models fit to the data, the one that was selected was one that treated age as a binary factor, with those born in or before 1973 being part of the older generation and those born after 1973

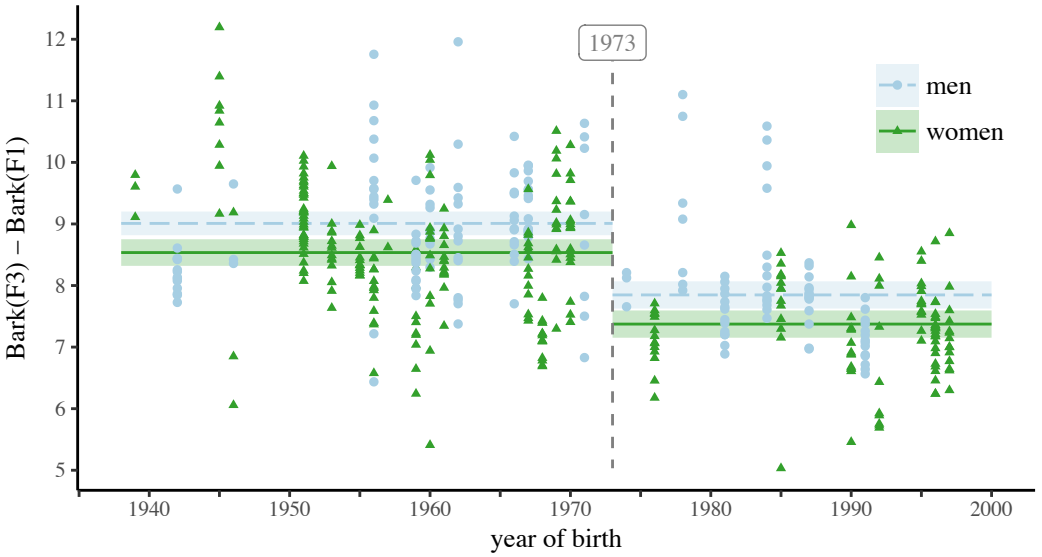

Figure 3: Bark difference metric for tokens of BAG by year of birth, colored by sex. The estimates of the best model are indicated with lines with the shaded region representing the standard error. The vertical dotted line at 1973 represents the division between generations.

being the younger generation. Figure 3 shows the Bark difference metric for the nucleus of BAG vowels, with the light blue dotted line and darker green solid line representing the model's predicted values for men and women, respectively. The predicted values for the older men was 9.01 Barks, for older women it was 8.54 Barks, for the younger men it was 7.85 Barks, and for younger women it was 7.37 Barks. The difference between the sexes was approximately 0.47 Barks, with men's values being consistently higher. (As mentioned above, this difference is likely due to the transformation rather than indicating a gender-based sociolinguistic difference.) The difference between generations was approximately 1.16 Barks, with the older generation having the higher value, meaning the BAG vowel was raised more. Because a binary model was selected over the other model types, there is no significant change within generations but there was a drastic and sudden change around 1973.

However, Figure 3 also shows that some people are behave unexpectedly within their generation, but we can find systematic patterns upon closer inspection of these speakers. For example, two men in the younger generation have BAG-raising to the same degree as many of the older people. Ryan[1] (b. 1978, μ = 9.2 Barks) is related to many of the most established families in town and has perhaps the largest networks of long-term Longview residents in the sample. Andrew (b. 1984, μ = 8.5 Barks) comes from a family that has been settled in Washington for many generations, antedating Longview itself, and has strong positive feelings about the Pacific Northwest. The speaker with the highest degree of BAG-raising was Margaret (b. 1945, μ = 10.7 Barks). Not only does she come from an established family in the area, but she was extremely knowledgeable about the history of Longview and loves the area. Finally, Cynthia (b. 1969, μ = 9.1 Barks) has a father and grandfather who worked in the mills, so she has strong roots in Cowlitz County. Thus, those who are firmly established in town and expressed positive feelings towards the area tended to have more BAG-raising within their generation.

The speakers who had unusually low tokens of BAG also share some attributes. Elizabeth (b. 1946, μ = 7.4 Barks) and Kim (b. 1968, μ = 7.1 Barks) both spent several years in a remote Alaskan logging camp. Among this sample, they are among the speakers who spent the most amount of time outside of Cowlitz County, so it is possible that their unusually low BAG tokens are the result of this time away from the community. Robin (b. 1960, μ = 8.4 Barks) was an elementary school teacher for 30 years, and Rob (b. 1942, μ = 8.3 Barks) is a professionally trained radio personality, so their

[1]All names used in this paper are pseudonyms.

unusually low tokens of BAG might be the result of education and employment that involves a heightened awareness of speech.

Thus, the speakers whose tokens were the most unexpected given the model output are exceptional in some way. Higher tokens of BAG are correlated with degree of connectivity and positive feelings about the Pacific Northwest while lower tokens are a result of time away from the community and more education. It is worth noting that because speaker was included as a random effect in the model, their idiosyncratic patterns are accounted for by their random intercept, and that the patterns seen across generations are found after taking into account these individual patterns.

4 Changes in the Timber Industry

4.1 What Happened in 1973?

In the previous section, it was shown that sudden changes in the realization of BAG happened in Cowlitz County starting with people born around 1973. While some explanations were given for the outliers, the bigger issue that must be addressed is: what happened in 1973 to cause catastrophic linguistic change? In this section, I turn to census data (U.S. Census Bureau 2017), and both Barrier and Froyalde's (1998) and Bailey's (2017) reports of the economy and demographics of the area to answer this question.

As it turns out, the economy was booming in Cowlitz County in 1973, just as it had been for several decades. The logging industry prospered after the Great Depression, driven primarily by the high demand for wood and paper products during World War II and the housing boom that followed. The mills provided employment for a significant portion of the community, and high-paying jobs were easy to obtain. Many people could afford automobiles and enjoyed activities such as cruising down Commerce Avenue in downtown Longview.

However, this began to change in the late 1970s. The national housing boom ended in the 1970s and the price of lumber fell. Couple this with increased competition in wood and paper manufacturers and the Longview companies were driven to cut costs. The mills therefore began to automate and outsource much of their work, causing massive layoffs. The number of residents employed in the manufacturing industry (which, in Cowlitz County, is primarily lumber, wood, and paper products) peaked at 12,210 in 1977, but by 1985 it had fallen to 9,160 and has continued to decrease. Washington as a whole was hit hard by the national recession in the early 1980s, but unemployment in Cowlitz County soared far above even the state average to 17.5% at that time. The eruption of Mount St. Helens (just 36 miles to the east of Longview) in 1980 may not have had a significant long-term effect, but it exacerbated the increasing problems in the area at least for a short while.

This sudden change in town was observed by the residents. Carol (b. 1959, $\mu = 7.4$ Barks), who had several family members lose their jobs in the early 1980s, says this about the changing community:

(1) "There were a lot of people that worked in the woods, and if they didn't work in the woods they were like support system, like office people… A lot of people lost their jobs and a lot of people moved. A lot of people just got out of here. And so you take that kind of income from these people out in the woods—and they made really good money considering, y'know—okay, so what does that do to the rest of your economy? They're no longer buying as much gas. They can't afford to go out and go to the movies and eat out and groceries… So yeah. It hit us especially hard."

Harold (b. 1949),[2] who worked at the mills his whole life, shares this insider's perspective about the effects of increased automation and the use of technology:

(2) "At that time [in the 1970s], it was a family company. Everybody wanted their sons to work there or their daughters to work there. And then it slowly started changing… and it started

[2]Though they are quoted in this section, Harold, Bruce, and Ed are not part of the sample analyzed in this paper because they did not do any of the reading tasks.

getting away from a family wage job. It started getting away from guys that knew their profession working up through the ranks so your boss knew the job. By the time I retired forty years later, all the bosses were college graduates with an engineering degree that they thought automatically could tell the guy with forty years' experience how to do the job."

Bruce (b. 1958), who comes from a family of loggers, also noted the difficulty that people have in getting jobs recently:

(3) "Back then, everybody… could find work. Y'know somebody had a job say, 'Hey there's an opening. Come in.' And it's who you know. And go right to work. Like my dad, y'know, you just say, 'I got a son.' Well they just hired him and went to work. Now, I hear, they don't have the degree. They don't have the knowledge to run the paper machines. So, I hear on the radio they're always advertising, 'Okay there's a special guy to run the machinery we don't have anybody [who's] qualified to run these new fancy machines.' So now you have to hire these college kids… Yeah so things change a lot to technology. So it's not like you can't just go in there and work so it's… everything is advanced now."

Putting it more succinctly, Ed (b. 1949) simply says:

(4) "I grew up in good times. The sixties was a good era, the seventies was good, eighties. And then it started going down the tube."

The topic of the changing economy was not mentioned by all of the interviewees because it was only during the course of data collection that I became aware of it. However, the fact that several of these people talked about it unprompted supports the idea that it was a significant change in the community. As a point of comparison, there were only a couple passing references to the recession of the late 2000s in all of the 54 interviews.

These changes had a lasting effect on the community. At its peak in 1976, manufacturing jobs accounted for 45% of the total income in the county. Twenty years later in 1996, this dropped to 27% and in 2015 it was approximately one-sixth of the total income. Not only are fewer people working at the mills but their salaries are lower, relative to the rest of the country. In fact, the inflation-adjusted earnings per capita peaked in 1977 at $19,352 before falling drastically to less than $15,926 in 1985. It took Cowlitz County twenty years to return to the level it was at in the 1970s.

It is unlikely a coincidence that the results from this study point at 1973 as year that the speech in the community changed—just a few years before this major shift in the timber industry. Those born after 1974 were just entering elementary school when this local recession was starting, a time in which the influence of peers may be stronger than input at home (Johnson 2010). Many of their parents lost their high-paying jobs and were unemployed. While the older generation could reliably get a job at one of the mills without the need of a four-year degree, the children in this new generation were suddenly part of a town where this was not the case.

4.2 Raised BAG as an Identity Marker

To explain the sudden loss of BAG-raising, I offer two possible explanations. The first is that these changes in the timber industry may have led to a massive shift in the demographics of the area. Catastrophic events often take the form of population dislocations (Labov 1994), so if there was suddenly more contact with surrounding regions, particularly Portland, it is possible that children would be exposed to other varieties of English. Evidence from neighboring varieties of English supports this: BAG-raising is primarily found only in the older generations of Oregonians (Becker et al. 2016, McLarty, Kendall, and Farrington 2016), so this may simply be a case of language diffusion.

However, there are several reasons for why this might not be the cause. First, the population was stagnant in the 1980s, and when it started growing again, there is no evidence of immigrants from any one region coming in. Second, while the average commute time in Cowlitz County did increase slightly after the 1970s, it is unlikely that children were in contact with other varieties of English just through their parents' place of employment. Besides, 89% of those who were employed

worked within the county, and 86% of employees in the county also lived there, meaning there are relatively few that commute to nearby Vancouver or Portland. Finally, the completion of Interstate 5 in the 1960s through Cowlitz County did make it easier to travel in and out of the county, but the timing of this highway does not offer a good explanation for the sudden change found in 1973. Therefore, there is no apparent demographic shift that happened in the area around that time.

An alternative explanation may have to do with the attitudes that the two generations have about the area. Many of the older generation expressed positive feelings towards Cowlitz County, often reminiscing about "the good ol' days." They are a nostalgic people: monthly gatherings are common for the older high school classes, there is an annual show for hot rods in Longview, and descendants of the original settlers of Longview meet regularly as part of the '23 Club. Kevin (b. 1967), who actually met his wife cruising down Commerce Avenue, explains why this may be:

(5) "I mean, downtown Longview back in the day was fun. There was really a lot to do."

There were movie theaters (including a drive-in), a roller rink, a racetrack, department stores, and plenty of locally-owned businesses. However, this changed in the 1980s when the recession hit. Even the downtown sector changed: the Three Rivers Mall opened in Kelso, drawing many of the department stores out of downtown Longview and driving the smaller shops out of business. To top it all, a city ordinance that regulated cruising downtown passed in 1991 (Longview Municipal Code 1991), hampering what was once a popular activity that drew in people from as far as Portland (Longview City Council 1991).[3]

So, while the older generation liked the town, the younger generation had lots of negative feelings. Jessica (b. 1998) said,

(6) "We're boring. Kelso's boring. Like, honestly, I think Kelso sucks. Just, Kelso is so boring like I want to change Kelso so badly. When I go to like the park… I just want to change the park into something, uh, better. Yes, yes we are a old town but we're boring."

The other major observation that most of the younger generation made during the course of their interview was the increased drug activity happening in town. Andrew (b. 1984), despite his positive feelings towards the Pacific Northwest, readily acknowledged this in his interview:

(7) "Right after I talk about how, y'know, how positive I feel about the town I'm going to start rattling off some negatives. Y'know, maybe—and maybe it was just something I didn't notice when I was younger—but drugs are a big problem in Cowlitz County. Y'know methamphetamine and heroin… It's the dangerous stuff. That's the thing is it's scary stuff you hear about… I think everyone's pretty aware of it…"

With these and similar comments, it was apparent that most of the younger people interviewed did not share the same positive feelings that their parents and grandparents had about Cowlitz County.

Thus, it appears that the town is divided into two groups and the use of BAG-raising correlates with membership in these groups. The older generation grew up in a beloved, picturesque small town while the younger generation grew up in a town of unemployment, drug abuse, and an aging population. Akin to residents of Martha's Vineyard (Labov 1963), the use or avoidance of BAG-raising may be an identity marker by speakers to signal these associations they have to their community. This explains why those who have the highest degree of BAG-raising within their generation were those that had positive feelings about the Pacific Northwest and had strong connections to other local people. This corroborates Swan's (2018) findings that those with the greatest amount of BAG-raising in Seattle were those who talked about nostalgic "old" Seattle and who bemoaned encroachment and gentrification, while speakers without BAG-raising expressed desire to move elsewhere.

Bailey et al. (1996) explain that catastrophic events cause traditional linguistic features to die out and innovative variants to spread. However, it is unclear whether raised BAG is a traditional or

[3] I am grateful to Debbie Pineda for tracking down these documents and confirming their accuracy with the city clerk.

an innovative feature in Cowlitz County. In nearby Portland and other areas in Oregon, it is primarily the older generation that had BAG-raising in their speech, suggesting that it is a more traditional variant (Becker et al. 2016, McLarty, Kendall, and Farrington 2016). However, it is likely that raised bag is innovative because while Reed (1961) says pre-velar raising is infrequent in the *Linguistic Atlas of the Pacific Northwest*, recent work in Seattle has found it to be common even in younger speakers (Wassink 2015). Therefore, in Cowlitz County, this pattern of a more traditional variant, unraised BAG, to spread at the expense of an innovative form is the exact opposite of what was predicted Bailey et al. (1996). Perhaps the strong social meaning assigned to these variants overpowers the typical pattern of catastrophic change. Or perhaps it is the more widespread features that spread at the expense of local features in a catastrophic event, regardless of whether they are traditional or innovative.

5 Conclusion

This paper has shown that BAG-raising is more common in the speech of the older Cowlitz County generation than it is in the younger generation. The data suggests that the generational divide was around 1973, a few years before the start of a recession in the area that was triggered in part by a change in the timber industry. While the exact cause for the lack BAG-raising in younger people has not been proven definitively, ample evidence in census data does point to a real change in the area around this time. By this interpretation, the early adopters of the unraised variant were those that were starting elementary school around the time of the shift. In addition, those with positive feelings towards the area tended to use raised BAG more than others within their cohort as they do in other areas of the Pacific Northwest (Swan 2018). Further research in nearby rural regions such as Wakiakum County to the west, which relied more upon timber industry than Cowlitz County and was hit harder by its change, may help understand the social meaning of this variant among these speakers.

Since BAG-raising was not found to be common among younger speakers, it appears then that the speech of Cowlitz County is more similar to that of Oregon than to rest of Washington. In fact, this paper presents evidence against the suggestion that pre-velar raising is spreading southward (Wassink 2016) and instead shows that the tendency for younger speakers to have more raised variants of BAG (Becker et al. 2016) has crossed the Washington border. Additional work is needed, both on other linguistic variants in Cowlitz County as well as a larger sample across southwestern Washington, to see the extent of this similarity with Oregon.

This paper has also shown how using a regression with breakpoint can test for the presence of catastrophic events. More sophisticated techniques have been used effectively for testing the presence of incremental change (Fruehwald 2017), but this paper presents a technique specifically for change that is abrupt. Further refining of these methods may be necessary to account for non-idealized examples of linguistic change as a result of catastrophic events, especially as more examples of this type are found.

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