Old Stereotypes "Live Free or Die": Addressing the Evaluation Problem of non-rhoticity in New Hampshire

Nicole Chartier

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Reading Committee:

Betsy Evans, Chair

Alicia Beckford Wassink, Chair

Richard A. Wright

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Abstract

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Nicole Chartier

Co-Chairs of the Supervisory Committee:
Associate Professor Betsy Evans
Department of Linguistics

Associate Professor Alicia Beckford Wassink
Department of Linguistics

Recent research examining New Hampshire English has demonstrated that the traditional Eastern New England features are dissipating among New Hampshirites (Nagy, 2001; Labov, Ash, & Boberg, 2005; Nagy & Irwin, 2010; Stanford, Leddy-Cecere, & Baclawski, 2012; Stanford, Severance, & Baclawski, 2014; Stanford, 2019). The most salient feature of the Eastern New England dialect is nonrhoticity, and the aim of this dissertation is to empirically and systematically address the "evaluation problem" (Weinreich, Labov, & Herzog, 1968) of nonrhoticity in New Hampshire. The process of an evaluative response is broken into three steps: noticing, classifying, and imbuing (Preston, 2010a). Three studies were conducted to examine each step in the evaluative process individually, paying particular attention to variation in the evaluative process.

The first study in this dissertation addresses noticing using a seven-step continuum of rhoticity. The purpose of this study was to determine the proximity of $F2$ and $F3$ necessary for a listener to notice the speech signal as rhotic. New Hampshirites were compared to Washingtonians to determine if the perception of rhoticity was dependent on the speech community an individual is from. The findings from the noticing study suggest that the majority of participants tend to perceive

rhoticity when the distance between $F2$ and $F3$ is 980 Hertz, with $F3$ lowering to 2520 Hz, and $F2$ raising to 1540 Hz. Further, participants tend to perceive the signal as nonrhotic when the distance between $F2$ and $F3$ is 1501 Hz. This proximity was constant between New Hampshirites and Washingtonians, suggesting the task of noticing rhoticity is not influenced by regional factors of the listener.

The second study addresses classifying, utilizing a geographic open-ended classification task. The guises for classification consisted of a three-step continuum between rhoticity and nonrhoticity. The purpose of this study was to determine where New Hampshirites associate rhoticity and nonrhoticity. The results from this study demonstrate that those with lower socioeconomic status scores and those with higher regionality scores (Chambers & Heisler, 1999; Chambers, 2000) are more likely to view nonrhoticity as a widespread New England feature, whereas those with lower regionality scores and those with higher socioeconomic status scores are more likely to view nonrhoticity as a feature of Boston. This suggests that the step of classifying is influenced by social factors of the listener.

The third study addresses imbuing, using an online implementation of the draw-a-map task (Preston, 1986). The purpose of this study was to explore the ways in which New Hampshirites evaluate the pleasantness, correctness and similarity of English in Boston and other areas of New England. New Hampshire participants were asked to draw regions in New England that have a distinct or identifiable way of speaking, and then rate the regions that they drew in terms of pleasantness, correctness, and similarity. Results from this study demonstrate that the evaluations of Boston are not monolithic, but instead, the rating of pleasantness depends on a person's regionality score (Chambers & Heisler, 1999; Chambers, 2000): those with higher regionality scores rate Boston higher for pleasantness than those with lower regionality scores.

The results from these studies contribute to the literature surrounding New Hampshirites' perception of nonrhoticity and evaluations of Boston. Further, taken together, these results contribute

to the understanding of language regard, addressing the evaluation problem of linguistic change. Finally, the results from this dissertation provide evidence for the structured heterogeneity of evaluations of a linguistic variant.

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ACKNOWLEDGMENTS

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Finally, thank you to my colleagues at the the University Washington. Russell Hugo, thank you for being my mentor during my time at UW. You always encouraged me and reminded me that there is a whole world outside of graduate school. Our chats about linguistics and life uplifted me in times of feeling discouraged. Thank you Benjamin Jones for all of your excellent advice and suggestions, and for always letting me bounce ideas off of you. Collaborating with you on the Six Views of New England project has been invaluable in my understanding of sociolinguistics and

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This dissertation would not have been possible without you all.

All mistakes are my own.

DEDICATION

to my mom

Chapter 1

CHANGING STATE OF THE NORTHEASTERN NEW ENGLAND DIALECT: THE CASE OF SOUTHEASTERN NEW HAMPSHIRE

This dissertation examines the "evaluation problem" [1] of language variation and change (Weinreich et al., 1968) with respect to nonrhoticity in southeastern New Hampshire (NH). The evaluation problem is addressed using methods from both language regard and sociophonetic perception. Chapter 1 of this dissertation introduces the contemporary dialect changes occurring in southeastern New Hampshire, explaining how nonrhoticity is declining in the region and presenting the suggested reasons for change. Chapter 2 defines the evaluation problem of linguistic change as presented by Weinreich et al. (1968) and provides the theoretical approach from which the evaluation problem will be addressed and the methodological frameworks from which the individual studies are built on. Chapters 3, 4 and 5 outline separate studies conducted in order to address the evaluation problem. And Chapter 6 synthesizes the results from these individual studies in order to have a more nuanced understanding of the social evaluation of non-rhoticity in southeastern New Hampshire.

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[1] From this point, I will not include the evaluation problem in quotes. Any time the term evaluation problem is used in this dissertation, it refers specifically to the evaluation problem of language variation and change as addressed in (Weinreich et al., 1968)

1.1 Introduction

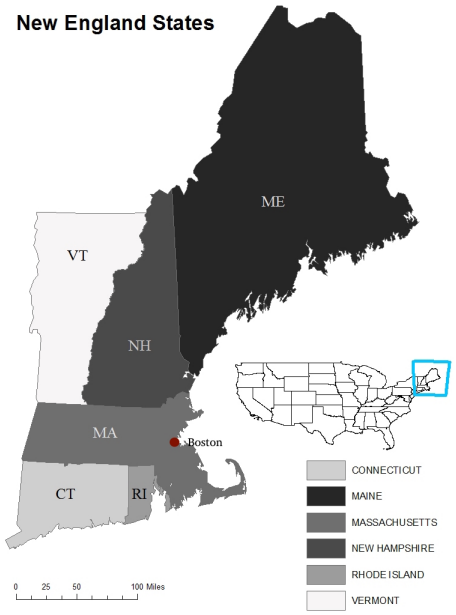

Figure 1.1: States of New England, with Boston, MA identified

New England is located on the northeastern corner of the United States and is comprised of the following six states: Maine (ME), New Hampshire (NH), Vermont (VT), Massachussetts (MA), Connecticut (CT), and Rhode Island (RI) (Figure 1.1). The popular notion of the 'New England dialect' typically refers to the northeastern portion of the region, namely the Northeastern New England dialect, which centers around Boston and encompasses eastern Massachusetts, Maine, and New Hampshire[2] (Carver, 1987; Labov et al., 2005). The New England dialect is a well-known dialect region in popular culture, due in part to public figures and mass media caricatures of the area.

The northeastern New England dialect has traditionally been characterized by the following six

[2]See later section about contention between exact boundaries as described by *LANE* and *DARE*

features (Kurath & Bloch, 1939, p. 11; Stanford et al., 2012; Laferriere, 1977; Nagy & Roberts, 2004; Dinkin, 2005; Villard, 2009; Madan, 2010a; Madan, 2010b; Labov et al., 2005):

1. non-rhoticity: (r-vocalization, loss of postvocalic, preconsonantal /ɹ/)
2. FATHER-fronting: (use of low, central /a/ in words such as *father*, *palm*, etc., distinct from low, back /ɑ/[3])
3. BATH-TRAP split: (use of /ɑ/ in words such as *bath*, *pass*, *aunt*, distinct from use of /æ/ in words such as *trap*, *gas*, *ant*)
4. START-fronting: (use of low, central /a/ in words such as *start*, *farm*, *barn*, distinct from low, back /ɑ/)
5. MARY-MERRY-MARRY distinction: (distinction between /e/, /ɛ/, and /æ/ (*Mary*, *merry*, *marry*, respectively) before intervocalic /ɹ/
6. HORSE-HOARSE distinction: (distinction between prerhotic /ɔ/ in words such as *horse*, *for*, and *forty* and prerhotic /o/ in words such as *hoarse*, *four*, *sport*)

From a non-linguist point of view, the most identifiable characteristic of this dialect, by both residents and non-residents, is nonrhoticity (identified by non-linguists as "*r*-dropping"), which has long been embraced by members of the speech community. The well-known shibboleth *Pahk the cah in Hahvahd Yahd* is evidence of this caricaturization. Even though non-rhoticity is a stigmatized feature, it still holds covert prestige, with members of the speech community embracing the stereotype in not only speech but also commercial goods such as license plates, store signs, and bumper stickers. It is this traditional variable, nonrhoticity, that will be the focus of this dissertation.

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[3]In some studies, /ɑ/ is used to represent the low, back vowel in New England (Nagy & Roberts, 2004). In other studies, /ɒ/ is used (Nagy, 2001). Additionally, some studies have just listed both options, /ɑ/ and /ɒ/ as possible realizations without indicating which one occurs. For the purposes of maintaining clarity, we chose to represent the low, back vowel as /ɑ/ in this study while making the reader aware that there is variation in the IPA symbol used to denote the low, back vowel between different studies.

1.2 Previous Production Work in Northeastern New England

Even though the popular view of the northeastern New England dialect is prominent in the minds of the folk[4], current research on the dialect in New Hampshire shows that its features are dissipating, especially among younger speakers (Stanford et al., 2012; Nagy, 2001; Stanford et al., 2014; Labov et al., 2005; Wells, 1982b; Madan, 2010a, 2010b; Nagy & Irwin, 2010). In what follows, we will examine previous research on the New England dialect, focusing particularly on studies that examine change in New Hampshire.

1.2.1 Historical Dialectal Work in New England

The *Linguistic Atlas of New England* (*LANE*) (Kurath, Hanley, Bloch, Lowman, & Hansen, 1939-1943) and its subsequent works (Kurath & Bloch, 1939; Kurath, 1949; Kurath & McDavid, 1961) were some of the first studies describing the New England dialect region. The states covered in *LANE* were Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island (New England states) as well as part of New York (Long Island) and southern New Brunswick. 416 participants were interviewed between 1931 and 1933, covering 213 communities within the region (Kurath et al., 1939-1943). The subsequent studies that followed *LANE* have helped to report the methods of *LANE* (Kurath & Bloch, 1939); provided detailed phonetic transcriptions of each item in the linguistic maps of *LANE*; established divisions of the dialects of New England (Kurath, 1949); and described the phonetic and phonemic patterns of New England (Kurath & McDavid, 1961)[5]. *LANE* provides a starting point for understanding the dialectal regions of New England, demarcating northeastern New England as its own identifiable subregion.

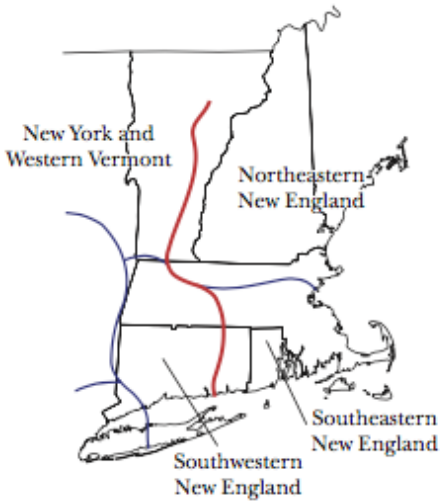
The dialect regions of New England can be subdivided into East-West and North-South, and

[4]In this dissertation, I will use folk to refer to non-linguists, a common standard practice in language regard research.

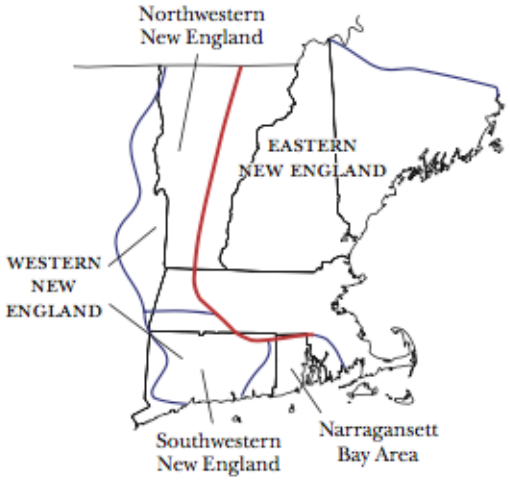
[5]These subsequent works, esp. (Kurath, 1949; Kurath & McDavid, 1961), described more than New England, but that was not relevant for this work.

while the East-West line is an historically agreed-upon division (Kurath, 1949; Kurath & McDavid, 1961; Carver, 1987), there has been contention as to where exactly the north-south boundary lies. The primary East-West division of New England reflects the original settlement patterns of the region (Kurath & Bloch, 1939; Kurath, 1949), with the Green Mountains in Vermont and the Connecticut River through Massachusetts and Connecticut serving as the boundary marker between the Eastern and Western areas of New England. This subdivision was first cited in *LANE* (Kurath et al., 1939-1943; Kurath & Bloch, 1939), and later confirmed by *DARE* (Cassidy & Hall, 1985; Carver, 1987). The location of the North-South division first identified by *LANE*, however, was rejected by *DARE*. The most important distinction between the north-south subdivisional boundaries used by *LANE* (Kurath, 1949; Kurath & McDavid, 1961) and *DARE* (Cassidy & Hall, 1985; Carver, 1987) is that *LANE* places Boston, Massachusetts and Providence, Rhode Island in the region labelled 'Southeastern New England' and places the northern part of Massachusetts, New Hampshire, and Maine as the 'Northeastern New England' region.

DARE, on the other hand, splits Boston and Providence into two different dialect regions, with Boston being the hub of the 'Eastern New England' dialect region, and Providence being the center of the 'Narragansett Bay Area' dialect region. The other important distinction between the subdivisional boundaries used by *LANE* and *DARE* are concerned with the North-South boundary of Western New England. According to *LANE*, 'Southwestern New England' includes most of Connecticut (except for a small eastern portion) and the north and southern parts of western Massachusetts, whereas *DARE* only includes a small portion of southwestern Massachusetts in what is labelled 'Southwestern New England'.



(a) Boundaries of the subregions of the New England dialect according to *LANE*, (cf. Stanford et al., 2012, p. 129).



(b) Boundaries of the subregions of the New England dialect according to *DARE*, (cf. Stanford et al., 2012, p. 129).

Figure 1.2: Boundaries of the subregions of the New England dialect according to *LANE* (left) and *DARE* (right), (cf. Stanford et al., 2012, p. 129).

1.2.2 Contemporary Studies in Eastern New England

Describing the state of the New England dialect, the *Atlas of North American English* (*ANAE*) (Labov et al., 2005) provides support for the regions created by Carver (1987) (Figure 1.2) using production and perception data. In their description, the northeastern New England dialect region centers on Boston and extends to New Hampshire and Maine (Labov et al., 2005, p. 225). This claim is supported by evidence of the following features: FATHER-fronting; START-fronting; non-rhoticity; and the COT-CAUGHT merger. With respect to non-rhoticity, the *ANAE* finds that, in New Hampshire, "vocalized /r/ falls to very low levels" (r-vocalization $\leq$ 10%) (Labov et al., 2005, pp. 226-7).

The most recent large-scale study describing the state of the New England dialect was con-

ducted by Kim, Reddy, Stanford, Wyschogrod, and Grieve (2018)[6]. The authors collected 526 self-reported judgements from the Northeast and 626 audio recordings from across the six New England states using Amazon Mechanical Turk (mTurk). The findings from this study support the notion that the northeastern New England dialect region is still maintained, based on the existence of non-rhoticity, FATHER-fronting, START-fronting, and the COT-CAUGHT merger. Unlike the *ANAE*, the data from this study suggest that non-rhoticity ***is*** present in southeastern New Hampshire, distinguishing it from other areas in the state.

These large-scale studies provide the geographic distribution of New England dialect features to help distinguish dialect division within New England. However, the nature of data collection and analysis for these large-scale studies makes it difficult to ascertain the current state of the northeastern New England dialect, especially with regard to New Hampshire. Kim et al. (2018) note that the results of their large-scale study should be "interpreted with care" (31), as the only social factor used to distinguish participants was geographic. In other words, sociodemographic characteristics such as age, gender, and social class were not taken into consideration when averaging across speakers. The *ANAE* indicates a change underway for some of the variables, such as non-rhoticity, but there is not sufficient data to support Wells (1982b)'s claim that New England speakers are converging with General American speech patterns. One reason is that speakers from large cities were targeted for the *ANAE*, and New Hampshire is mostly comprised of smaller towns. In 2015 only one city, Manchester, had a population just over 110,000 (U.S. Census Bureau, 2015). This city was represented in the *ANAE* data. The third largest city in the state is the capital city, Concord, which is also represented in the *ANAE* data. Thus, the data available for New Hampshire in the *ANAE* is scarce, with a total of only 6 speakers–four speakers from Manchester, the state's largest city, and two speakers from Concord, the state's capital city–representing the state. Acknowledging the scarcity of data in smaller towns and cities, *ANAE* states, "a more precise contemporary delineation of the borders between the subregions of New England awaits more detailed

[6]There has just been a book published on New England English (Stanford, 2019), which I obtained a manuscript copy of a week before the submission of this dissertation.

local studies" (Labov et al., 2005, p. 230).

Localized studies (e.g. Nagy, 2001; Nagy & Irwin, 2010; Madan, 2010a, 2010b; Stanford et al., 2012, 2014; Wood, 2010) have focused on traditional New England variables in smaller, less populated areas. The topics of these studies ranged from self-reported questionnaire surveys about FATHER-fronting and MARY-MARRY-MERRY distinction (Nagy, 2001); acoustic analysis of traditional features (Stanford et al., 2012, 2014; Nagy & Irwin, 2010); auditory analysis of the traditional features (Madan, 2010a, 2010b), and acoustic analysis of the short-*a* system used by southeastern New Hampshire speakers (Wood, 2010). The areas of New Hampshire covered in these studies are the Vermont-New Hampshire border (eastern New Hampshire), central New Hampshire, and southeastern New Hampshire. This research has demonstrated the change in progress occurring in New Hampshire, as suggested by Wells (1982): the traditional eastern New England dialect features are disappearing.

On the Vermont-New Hampshire border, the east-west dialect boundary of New England, Stanford et al. (2012) examined the six traditional New England variables, finding that younger speakers in eastern Vermont and western New Hampshire are no longer producing the majority of these variables (FATHER-fronting, BATH/TRAP split, non-rhoticity, MARY/MARRY/MERRY distinction) as frequently as older speakers, if at all. With respect to START-fronting and HORSE/HOARSE distinction, these variables are also receding in use, but at a slower rate.

Similar findings were observed in rural, central New Hampshire, where (Stanford et al., 2014) note "...the recent decline of traditional ENE [Eastern New England] features in northern New England has not been adequately investigated, especially considering that this change involves a whole 'suite' of features, including non-rhotic speech, intrusive-*r*, FATHER-fronting, START-fronting, 'broad-*a* in BATH, and others"(3). This acoustic analysis complements similar findings by Madan (2010a, 2010b), whose auditory analysis suggests changes underway in traditional New England features in central New Hampshire. The exception to the case of dissipating variables in rural, central New Hampshire is the same as western New Hampshire: START-fronting is changing

at a slower rate than other features, and the HORSE-HOARSE distinction is stable.

In southeastern New Hampshire, Nagy (2001) notes the decrease of FATHER-fronting and the prerhotic merger of /e/, /ɛ/, and /æ/. These variables were analyzed using an impressionistic self-judgment survey, where merger was measured by whether or not participants identified specific words as rhyming. For example, participants were asked if *father* and *bother* rhymed in a written survey. If a participant identified that the two words rhymed, it was an indication that the speaker no longer produced FATHER-fronting (i.e. the FATHER class was merged with the LOT class). The data from this study show that younger New Hampshire speakers have merged the FATHER class with the LOT class.

A decline of non-rhoticity in southeastern New Hampshire was also reported in Nagy and Irwin (2010). The authors auditorily compare production of rhoticity by white speakers in two southeastern New Hampshire towns, Dover and Manchester, to production of rhoticity by white speakers in two working class neighborhoods of Boston, South Boston and Dorchester[7]. The authors found that the production of (non)-rhoticity in both southeastern New Hampshire and Boston are variable—neither area being categorically rhotic or non-rhotic. However, they do find that a change towards rhoticity is occurring at a higher rate among southeastern New Hampshirites than is occurring among younger Bostonians.

Finally, a preliminary acoustic study (Chartier, Fernandes, Perry, Ravindranath, & Stanford, 2013) found FATHER-fronting, START-fronting, and nonrhoticity were receding in southeastern New Hampshire, central New Hampshire, and Maine. The authors used a small number of tokens in their analysis; the main focus of the study, rather, was to combine initial findings to examine the extent that the changes were affecting northeastern New England as a whole. The findings across these studies suggest that the changes found in eastern New England are large-scale on two

[7]This study also includes data from African American speakers from the Boston areas of Dorchester, Roxbury, and Mattapan; however, there are no comparisons to African American speakers in New Hampshire. The authors compared the production of non-rhoticity of African Americans in Boston to White speakers in Boston. They compared the White speakers of Boston to the white speakers of New Hampshire. Therefore, for the purposes of our discussion here, we will focus only on the comparison between Boston and New Hampshire.

dimensions: the change involves a variety of different features across many populations within eastern New England, supporting the notion of uniformity across speech communities (Labov, 2012).

1.3 Reasons Posited for Change

The results of these studies suggest a trend in which the traditional New England features are no longer being used by younger speakers across New Hampshire. These speakers don't *Pahk the cah in Hahvahd Yahd*, but rather *Park the car in Harvard Yard*. Change in New Hampshire has been attributed to a variety of causes such as changing demographics (Wood, 2010); attitudes towards Boston (Nagy, 2001; Nagy & Irwin, 2010); attitudes towards rural New Hampshire (Stanford et al., 2012, 2014); supra-regional levelling (Roberts, 2006, 2007; Stanford, 2019); outward orientation, as presented in Labov (2012) (Stanford, 2019). Wood (2010) argues that one reason for change in New Hampshire, especially southeastern New Hampshire, is due to the rapid population growth that began in the 1970s. Citing sociological research, Wood (2010) demonstrates that in-migration was the "primary component of change [in New Hampshire] between 1970 and 1980" (151), accounting for two-thirds of the population growth from 1970 - 1990. The result being that by 1980, over 50% of New Hampshire's population was born elsewhere. Using out-of-state license surrenders to the NH Department of Motor Vehicles from 1977 - 1978, (cf. Luloff & Ilvento, 1981), Wood shows that from 1977 - 1978, 61% of people moving to NH were from Massachusetts alone, and 79% came from the Northeast in general (New York, Pennsylvania). Figure 1.3 shows the population growth in New Hampshire from 1970 - 2010. Population in the maps below is presented as population density, rather than total population.

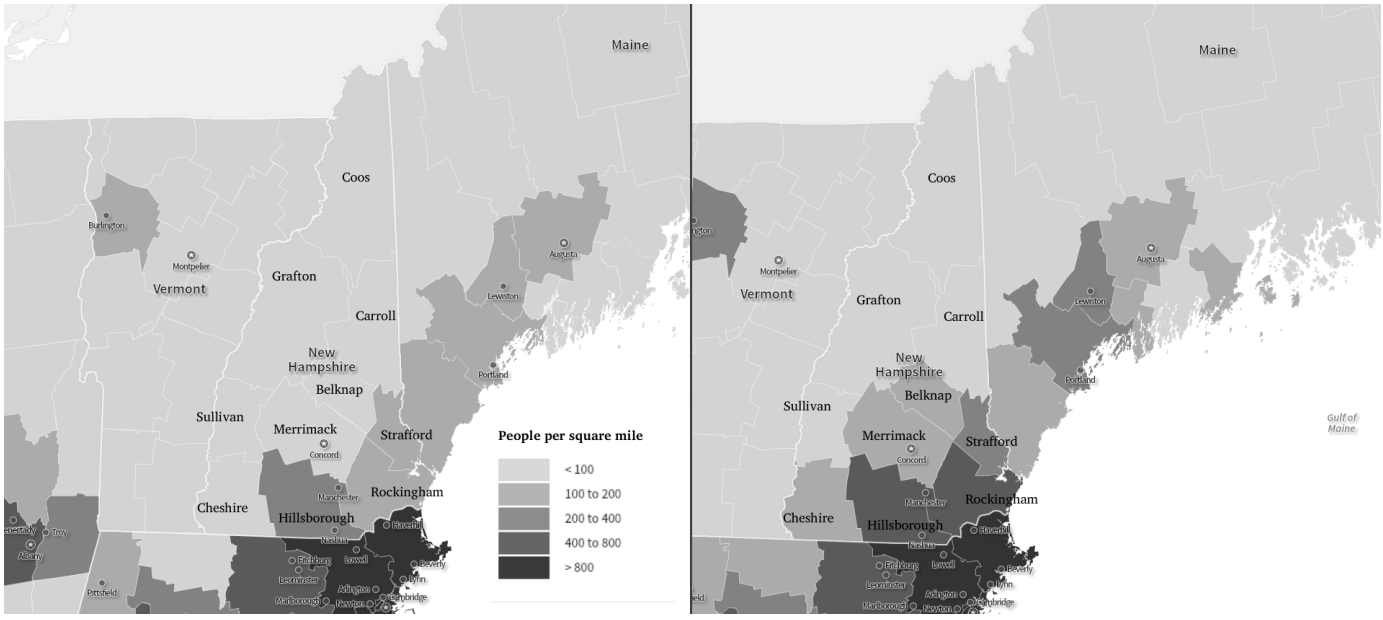


Figure 1.3: Change in population density in New England from 1970 - 2010.

Wood (2010) argues that New Hampshire, and especially the southeastern corner, was a desirable location due to its close proximity to Boston. Although many of the newcomers had urban jobs, they chose New Hampshire as their residence due to "pro-rural, anti-urban attitudes" (Wood, 2010, p. 156). Southeastern New Hampshire was ideal in that it allowed people to have access to urban occupations and urban luxuries while also enjoying non-urban activities.

Nagy (2001) explains the changes seen in New Hampshire as "lack of appeal to New Hampshire residents of the 'big city' life offered by Boston" (30). Nagy (2001) comes to this conclusion by examining license plates in New Hampshire and noticing the lack of personalized license plates demonstrating city values, "Many plates illustrate a fondness for activities that cannot be done in the city (e.g. KAYAK, SKIERZ, LUMBA) or express a positive local identification (e.g. LOCAL, HEEYAH). I have observed no NH plates that could be interpreted as reflecting 'big city' values" (40). Nagy also refers to the nicknames *Taxachusetts* and *Massholes* that are used by some New Hampshirites to refer to Massachusetts and its residents.

Stanford et al. (2012) use conversations with respondents to suggest that certain traditional eastern New England features are associated with urban New England and older speakers. The authors suggest that, for younger speakers, "traditional eastern variants are backward, old-fashioned, and inappropriate for modern northern New England" (Stanford et al., 2012, p. 161). Stanford et al. (2014) suggest that the changing demographics in New Hampshire have led to cultural changes, and as a result, younger speakers are using "supraregional norms" (44).

Nagy and Irwin (2010) combine the positions from Nagy (2001) and Wood (2010), and argue that the changes seen in New Hampshire are due to diffusion accompanied by divergence. They argue that the Bostonians who relocated to New Hampshire are seen as 'invaders' and note that New Hampshirites tend to denigrate non-rhoticity, while it is seen as a "point of pride" (Nagy & Irwin, 2010, p. 247) in Boston. Because of the attitudes towards non-rhoticity, which are in part due to the in-migration patterns cited in Wood (2010), Nagy and Irwin (2010) argue that New Hampshirites are becoming more rhotic as a means to linguistically distance themselves from Boston.

Stanford et al. (2014) says... "dialect leveling toward non-local norms has a role in constructing local social changes, not just reflecting them. Specifically, younger speakers are using dialect leveling to distance themselves linguistically from (1) Boston and other metro areas of southeastern New England and (2) 'old-timers' and 'backwoods' people in northern New England.

What all of these localized studies have in common is that an underlying cause of change towards rhoticity in southeastern New Hampshire is the negative attitudes towards what nonrhoticity represents (either Boston or rural New England). "Modern" New Hampshirites, according to these researchers, do not want to be associated with the stigmatized variant. Instead, they are opting for the overtly prestigious rhotic variant.

1.4 Perceptual Dialectology Studies in New Hampshire

While the studies in Section 1.3 discuss possible reasons for change, the primary aims of these studies were to collect production data. Participants' attitudes and perceptions of New England speech

appear to be post-hoc in nature, relying on anecdotal evidence from sociolinguistic interviews or car license plates as evidentiary support. While these types of data can be useful in creating a narrative, it is imperative that these negative attitudes are systematically examined, especially if they are being set forth as reasons for linguistic change in the region.

To date, there have been few studies that directly examine New Hampshirites' perceptions of and attitudes towards New England speech, all of which have utilized the draw-a-map task (Preston, 1986). This methodology asks participants to draw areas on a map, identifying places where they believe people speak differently, and then label those areas. Next, participants are asked to rate regions, either pre-defined regions such as states or the places that they drew, on a Likert-type scale in terms of correctness and pleasantness. Researchers utilize quantitative and qualitative methods to analyze the labels that are provided for the areas drawn, the spatial distribution of the areas drawn, and the ratings provided.

Jones (2015) examined New Englanders' perceptions of speech in the region; however, the main focus of this research was Maine residents with only 2 participants being from New Hampshire. Jones (2015) found that Boston was the most identified region and also tended to receive the lowest ratings in terms of pleasantness and correctness by New Englanders in general.

Fernandes, Routhier, and Ravindranath (2014) examined southeastern New Hampshirites' perceptions of New England speech. They collected perceptual maps from 110 southeastern NH participants. They found that New Hampshirites, especially younger speakers, identified as sounding more similar to speakers from Vermont than to speakers from the Boston area. The authors argued that these findings reflected the change away from traditional northeastern New England features in the region. When evaluating the ratings of correctness and pleasantness of the states, Fernandes et al. (2014) found that New Hampshirites tended to rate Massachusetts as the second lowest in New England on both dimensions —the only state with a lower score on both dimensions was Rhode Island.

Chartier and Jones (2018) used an online implementation of Preston (1986)'s draw-a-map task,

deployed over all six states of New England. The researchers collected 178 maps, 28 of which were from New Hampshirites. The analysis conducted by Chartier and Jones (2018) differs from previous draw-a-map studies in that the researchers examined variation in the ratings provided by participants. Rather than finding a mean rating score for correctness, pleasantness, and similarity, Chartier and Jones (2018) divided the scores of each dimension into tertiles based on the distribution of scores (see Table 1.1 for tertile distribution of correctness and pleasantness scores). The authors then subset the data based on these tertiles and calculated the frequency of overlap of each tertile.[8]

	Lowest Tertile	Middle Tertile	Highest Tertile
Pleasantness	0 - 2.00	2.01 - 3.37	3.38 - 5.00
Correctness	0 - 1.96	1.97 - 3.34	3.35 - 5.00
Similarity	0 - 1.25	1.26 - 2.93	2.94 - 5

Table 1.1: Tertile score distribution for Pleasantness, Correctness and Similarity used by

This method of data analysis highlighted variation in the ratings for Boston on all three dimensions (correctness, pleasantness, and similarity) when including participants from all six states. The authors do not further examine the heterogeneity found in ratings of Boston; however, Chapter 5 will explore how New Hampshirites rate the regions they drew and explore the variation found among participants. In terms of similarity, (Chartier & Jones, 2018) found that there appears to be *some* consensus among New Hampshirites that Boston is least similar to their speech. They also find some consensus among participants that Vermont speech is similar to their own. However, these frequency of consensus is not extremely high. For example, only 8 - 13 respondents (out of 28) rated Boston speech as least similar to their own. (see Map 1.4). These results warrant further investigation into the attitudes of New Hampshirites.

[8]Chapter 5 will subset the NH responses from their study to look at perceptual dialectology in New Hampshire, and will go into further detail regarding the methods used to analyze the data.

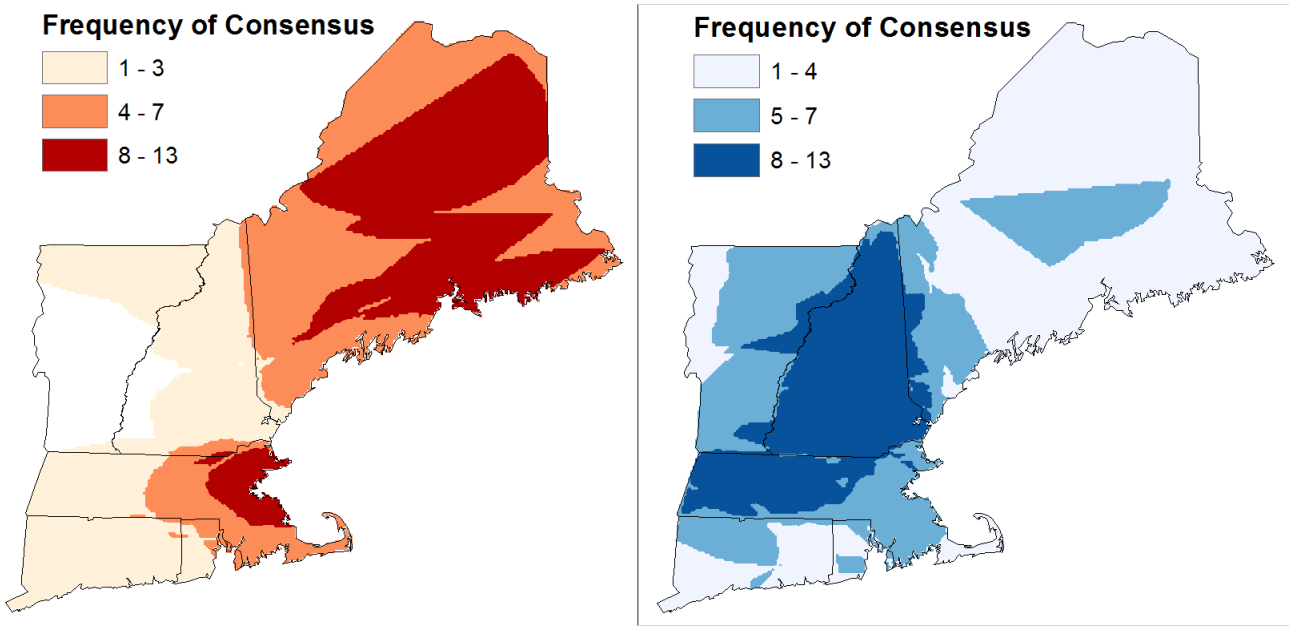


Figure 1.4: On the left, frequency of consensus among NH participants locating areas that were given a low score of similarity (0 - 1.25). On the right, frequency of consensus among participants that gave a high score of similarity (2.94 - 5.00)

What these perceptual dialectology studies suggest is that Boston, as a region, is a culturally salient region in New England. This fact should not be surprising, as Boston is often noted as the cultural hub of New England, especially the northeastern portion. There appears to be variation with regard to which subregions of New England New Hampshirites believe sound similar to their own speech in apparent time Fernandes et al. (2014), and there appears to be variation in terms of ratings of correctness, pleasantness, and similarity that needs to be further explored Chartier and Jones (2018).

1.5 Pilot Study: Examining attitudes

Previous production work on the New England dialect in New Hampshire has suggested that negative attitudes to Boston and rural New England are motivators for change in the region. Perceptual dialectology work in New Hampshire has demonstrated that younger New Hampshirites seem

to align themselves linguistically with Vermont and distance themselves linguistically from the Boston area. However, these studies have also shown that there is variation among participants with respect to the speech of Boston is rated in terms of similarity, correctness, and pleasantness (Chartier & Jones, 2018) and that these ratings show change in apparent time (Fernandes et al., 2014).

The pilot study described here was used to further examine attitudes towards both New England as a region and language use in the region. In order to examine New Hampshirites' perceptions of and attitudes towards these concepts, a content analysis based on the guided conversation portion of twenty-six sociolinguistic interviews in the spring of 2013 was conducted. A content analysis provides a systematic approach to understanding participants' responses and allows for replicable and valid inferences (Krippendorff, 2004) about participants' perceptions to be made, rather than relying on anecdotal evidence.

The goals of the conversation portion of the interviews were two-fold. The first aim was to capture natural speech. The second aim was to capture participants' attitudes about the region and language use in the region by using guiding questions to ensure that that all participants discussed particular topics. The transcripts from this portion of the interview were used as the contextual units (Krippendorff, 2004) for the content analysis, aimed at answering the following question about folks' perceptions:

RQ: What are younger New Hampshirites' perceptions of traditional New England variants?

1.5.1 Sampling

The sampling procedure used to collect the data for this study was quota sampling in southeastern New Hampshire. This region was chosen to gather production data for acoustic analysis in order to compare with self-reported questionnaires collected by Nagy (2001) in the same area, and acoustic analyses performed in western (Stanford et al., 2012) and central NH (Stanford et al., 2014). The interviews were conducted in participants' schools, places of work, or homes, depending on which

was most convenient for the interviewee. The 26 participants were native or near-native New Hampshirites, moving to NH by the age of 5. All participants included in the content analysis were born after 1970–the start of a period of in-migration from other states, with southeastern New Hampshire absorbing a large portion of the population increase (Wood, 2010) (see Section 1.3). Gender is fairly balanced in the sample (12 women, 14 men), and race and ethnicity were controlled for by only interviewing non-Hispanic, white residents of the area.

1.5.2 Data Collection

The sociolinguistic interviews were part of a larger project titled "New Hampshire Language and Life" (NHLL), directed by Professor Maya Ravindranath at the University of New Hampshire. The goals of the project were to study the culture and language of NH by examining the personal history and speech of NH residents. In order to achieve this goal, NHLL researchers conducted sociolinguistic interviews using an interview script that was an adaptation of the form used by Stanford et al., 2012. The advantages of using the same interview form (i.e. word list, sentences, reading passage) is that it allowed for the results from NHLL to be compared *directly* to results found in western and central NH (Stanford et al., 2012, 2014).

The interview consisted of background questions, used to collect sociodemographic information about the participants, e.g. year of birth, socioeconomic class, and where they grew up. Next, participants were asked to read a word list, in isolation, and then isolated sentences, both of which included words with and without the targeted traditional northeastern New England variables. Then, the interviewer used the semantic differential technique (Labov, 1984), where the researcher asked participants to identify the difference in meaning between two words. For example, the participants answered questions such as "What's the difference between *father* and *dad*?". The semantic differential technique allows for some control over the data collected while also obtaining more natural speech from participants. The use of this technique ensured specific tokens were elicited in a participants' speech by constructing specific questions in order to gain sponta-

neous pronunciation of words such as *father*, *farm*, *storm*, and *laugh*; while focusing on answering the semantic differential question, participants pay less attention to the pronunciation of the token itself (Labov, 1989). Next, participants read a reading passage, adapted from Nagy, 2001, "How to Survive a New England Winter." Finally, the interview concluded with a directed conversation aimed at uncovering participants' attitudes about their community, New Hampshire, Boston, and New England; and their awareness of and attitudes towards language variation and change in the region.

The portion of the sociolinguistic interview that is of interest for this paper is the responses to the directed conversation. A content analysis was conducted on the responses provided. The directed conversation questions used for this study were adapted from Stanford et al., 2012 to include questions about Boston and participants' desire to stay in NH. Using guiding questions for the conversation portion of the sociolinguistic interview ensures that all participants provide information on the same topics. Utilizing these responses by conducting a content analysis provides us with a systematic approach for understanding the folks' perceptions of not only language variation and change in the region, but also their perceptions of space in the region.

The following questions were used to guide the conversations around language variation and change in New England, and a version of these questions was asked to all participants:

- What are some things that you notice about the way people speak in your area?
- Are there any particular words or sounds that people notice about accents around here?
- Do you know of any regional vocabulary words?
- Do you think everyone in New England sounds the same? If not, where do people sound different?
- Do you think that there is a New Hampshire accent?

Questions about the "way people speak" were aimed to understand the extent to which partici-

pants were aware of traditional New England dialect features and which features participants were aware of. Questions about New England differences were asked in order to examine whether participants had perceptual linguistic boundaries within New England, and if so, where those boundaries existed. These questions are indirectly eliciting attitudes and evaluations. According to Stanford et al. (2012), it is from these questions that negative evaluations towards traditional variants were established.

1.5.3 Coding for Content Analysis

The goal of creating category schemes for content analysis is to summarize the responses into groups, thereby reducing the variety of individual responses. Coding categories should be mutually exclusive, exhaustive, and adequate to answer the research questions (Krippendorff, 2004). In order to maintain mutual exclusivity, each recording unit needs to fit into one and only one category on a given scoring dimension. To make the category scheme exhaustive, there needs to be a category for each recording unit. In order to do this, some of the category schemes listed below include a category of "none" or some type of "other". Adequate category schemes cover the concept while excluding related concepts that are not to be measured by that scheme, and have meaningful differences among the categories.

Using a bottom-up approach to coding, the first step of this approach was to inspect the responses to the individual questions in order to make a list of the main themes. After doing so, it became clear that the interview as a whole should serve as one unit, rather than each individual question being its own mutually exclusive unit (Krippendorff, 2004). This became evident due to the nature of the guided questions–where the aim was to allow participants to answer the questions with as much detail as they saw fit. This methodological approach encourages the speaker to initiate tangential transitions, which helps promote use of the vernacular (Labov, 1984). In many cases, the responses to the guided conversation questions included off-topic and on-topic shifts, which led to personal anecdotes. It was within these personal anecdotes that a participant would

provide an answer for a subsequent or previous question. For example, when asked about community change, one speaker (NHM77) started discussing an interaction he had with someone from the Boston area. In this personal story, he used imitation to describe the Bostonian speaker. In the portion about regional differences, however, he just said that the Boston region was different and referred back to his imitation rather than providing new commentary.

Three category schemes were created to operationalize the folk's perceptions of language in the region. The first category schema captured dialect features that were most salient to participants, identified from the following questions.

> *What are some things that you notice about the way people speak around here?*
> *Are there any particular words or sounds that people notice about accents around here?*
> *Do you know of any regional vocabulary words?*

Participants used different metalinguistic tools to describe the dialect features, such as imitation and explanations of phonetic, pragmatic and prosodic phenomena. The second category schema captured whether or not participants believe that Boston and/or Massachusetts[9] sounds the same as New Hampshire, using the following question to probe whether or not participants identified Boston as a place where people spoke differently from their own community.

> *Do you think everyone in New England sounds the same? If not, where do people sound different?*

The last category schema captured the valence of qualifiers that were used to describe the Boston accent, as we know that attitudes about language varieties reflect attitudes about the people who speak them (Weinreich et al., 1968). The categories used reflect positive, negative, or no qualifiers[10].

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[9]Some participants did not specify Boston directly, but did indicate Massachusetts as being distinct. It is not likely from the context of the interview question that they are referring to western Massachusetts, but rather that they are referring to the Boston region. Due to this, mentions of Massachusetts being different were included in this count.

[10]There is no category for positive qualifiers because they did not exist in the data

1.5.4 Results

The set of category schemes created for the content analysis set out to examine which dialect features were available for metalinguistic commentary by the folk (Preston, 1996). The counts for this category scheme exceed the number of participants because many participants referred more than one type of dialect feature. This is not surprising since participants were asked if they notice anything about the speech and also if they could identify regional vocabulary words. Figure 1.5 shows the distribution of the different features that were identified by participants. The largest number of participants (23) identified a lexical feature. Lexical features that were identified by participants were *wicked* (21 participants), *bubbler* (2 participants), and *jimmies* (the tiny rod-shaped sprinkles put on ice cream) (1 participant). The large number of participants identifying lexical features is not surprising, as participants were explicitly asked for any regional vocabulary words. The next most frequently identified feature was non-rhoticity (12 participants). The remaining features were all identified by less than five people.

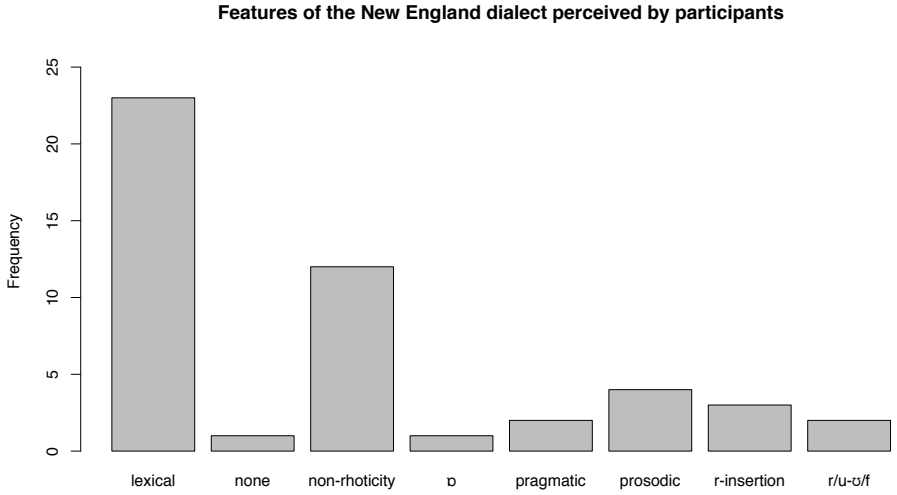

Figure 1.5: Frequency of the dialect features that were identified by participants

One participant could not identify any features of the dialect. One participant used imitation to demonstrate the pronunciation of *Boston* as /bɑstən/. Two participants described pragmatic conventions: using distance to tell time and conversational directness. Four participants referred to the dialect as "fast" (which was labelled as prosodic). Three participants identified r-insertion, by either providing examples of, or explaining that they add an 'r' to the end of some words.

It appears as though of the traditional northeastern New England dialect features identified by linguists (non-rhoticity, FATHER-fronting, BATH-TRAP split, START-fronting, MARY-MERRY-MARRY distinction, and HORSE-HOARSE distinction), nonrhoticity is the most salient feature available to the folk.

The next category scheme explored whether or not younger New Hampshirites identified the Boston dialect as being the same or different from their own. The counts for this come from asking participants about where they believed people spoke differently within New England.

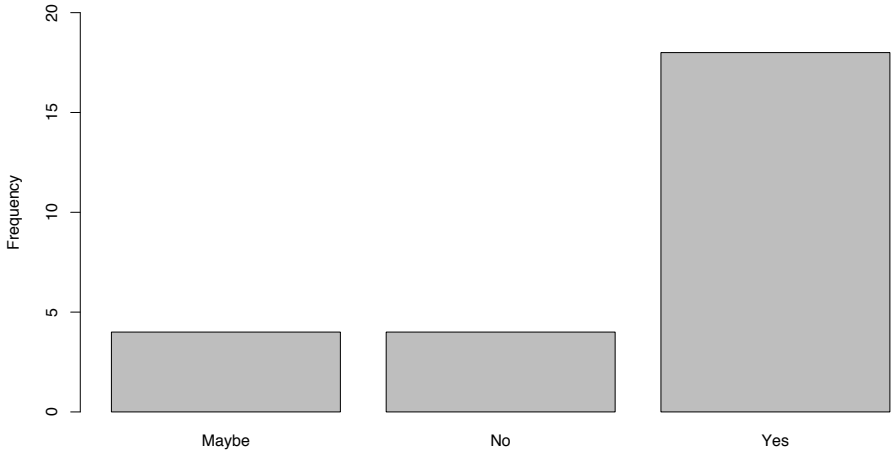

Figure 1.6: Counts of participants who perceive the speech of Boston to be distinct from the speech in New Hampshire

In general, younger New Hampshirites perceive the speech of Bostonians to be different from their own speech (18); 4 believed that the two areas were the same; 4 were indecisive. This

linguistic difference that is perceived by participants is reflected in production studies which show Bostonians productions of traditional northeastern New England features are stable in comparison to other parts of northeastern New England (Sipple, Stanford, Stewart, & class, 2015).

The final category schema consisted of counting the number of participants who used negative qualifiers such as “trashy”, neutral qualifiers such as “fast”, or no qualifiers to describe the speech of Bostonians. The counts represent the overall valence of participants’ attitudes towards the Boston dialect, determined by their use of qualifiers to describe the dialect. Participants were not asked explicitly for value judgments of the dialect; therefore, all qualifiers that were given were voluntary.

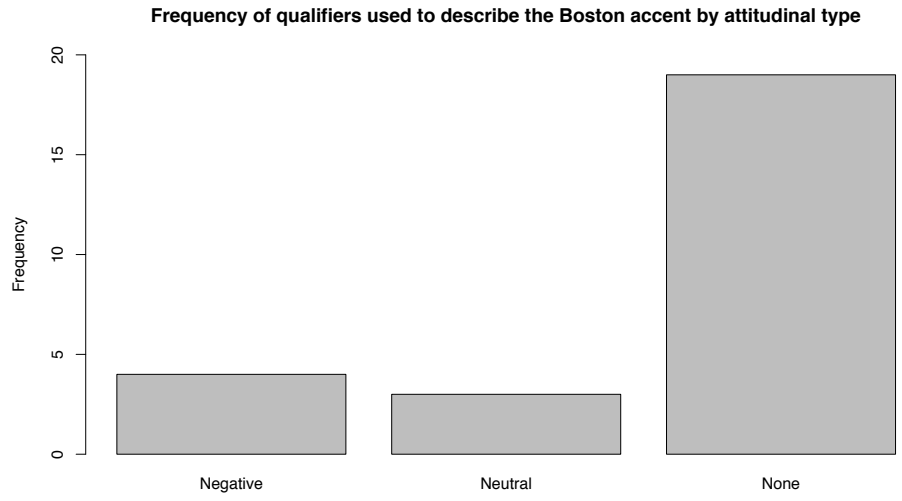

Figure 1.7: Counts of participants who used negative qualifiers, neutral qualifiers, and no qualifiers to describe the Boston accent.

The first interesting point to note from the data is that not a single participant used a positive qualifier to describe the Boston dialect. The majority of responses provided included no qualifiers (19). This is not surprising if one takes into account that participants volunteered qualifiers rather than being asked outright, and that social desirability bias (Garrett, 2010) most likely played a

role in participants not volunteering negative evaluations. Of the qualifiers provided, four were negative and three were neutral. Upon closer examination of the participants who provided a negative qualifier, the researchers noted that they were the oldest four particpants (all born before 1985). This suggests that the evaluation of sociolinguistic variables may be changing within the community, a finding that seems consistent with (Fernandes et al., 2014).

1.5.5 Conclusion

Overall, the most salient features of the New England dialect were the lexical item *wicked* and non-rhoticity among younger New Hampshires, even though these speakers varied on whether or not they believed that non-rhoticity was a feature of New Hampshire speech. While most research in the region suggests that non-rhoticity is more or less absent among younger speakers, some participants interviewed here suggest that they are sometimes nonrhotic in more informal styles. In other words, sociolinguistic interviews that do not capture, and use for measurement, the vernacular may be more likely to over-report the presence of rhoticity among younger speakers.

Similar to reports of nonrhoticity declining (Nagy, 2001; Nagy & Irwin, 2010) and also still being present in the region Kim et al. (2018), what is reported by younger New Hampshirites is that there is variation as to whether or not nonrhoticity is a feature of New Hampshire speech. Some participants outright rejected the notion that New Hampshirites are nonrhotic:

> *I don't pahk my cah in Hahvahd Yahd. I park my car in Harvard Yard.*

Some people attribute nonrhoticity in New Hampshire to an influence from Boston:

> *I feel around here, in southern New Hampshire, they [accents] are strongly influenced by Massachusetts...People like to forget their "r"s a lot. ... It's not the same as Boston, but it's like, a relative. You can tell that it's influenced by that.*

Some say that speakers in New Hampshire are nonrhotic:

I mean, I drop my "r"s sometimes if I'm talking really fast or something.

I talk to people outside of New England every day. And, uh, usually it only takes a few words and they think I'm from Boston.

Using a content analysis provided a means to systematically observe younger New Hampshirites' perceptions of and attitudes about language in New Hampshire and Massachusetts by making use of the conversational portion of the sociolinguistic interview. The overall observations from the content analysis support the claim that there seems to be variation in the perception of nonrhoticity in New Hampshire, especially in terms of who is nonrhotic. In general, younger New Hampshirites perceived the Boston dialect as different from their own (18 participants), but only 4 participants used negative qualifiers to describe the Boston dialect. The fact that there were not many negative attitudes attributed to the Boston accent could be due to the nature of this study. Participants were not directly asked to provide their attitudes towards nonrhoticity; therefore, the only attitudinal data provided by the participants was voluntary.

This type of variation in attitudes towards Boston and the Boston dialect is not surprising and should be expected (Preston, 2010a). Attitudes can vary based on a variety of factors such as eliciting conditions (Bassili & Brown, 2005) to socio-demographic characteristics of the participant (Jeon, Cukor-Avila, & Rector, 2013). In using anecdotal evidence alone to guide our inferences, it is easy to remember the salient negative comments and forget the neutral (or positive) comments. Extracting away the variation in attitudinal data may be oversimplifying the nuances of attitudes in New Hampshire. The systematicity of a thorough content analysis, similar to the one conducted here, highlights this variation, which is the first step in fully addressing the evaluation problem of linguistic change.

1.6 Research Questions for Dissertation

Combining the results of these perceptual studies with the production studies suggests that there may be a correlation between the changing state of traditional New England features in New Hamp-

shire, and New Hampshirites' perceptions of these features. However, further research needs to explore the role in which perceptions of and attitudes towards traditional New England features play a role in language variation and change in the region. In order to examine this avenue of research, this dissertation will examine the evaluation problem of linguistic change Weinreich et al. (1968), examining specifically nonrhoticity in southeastern New Hampshire. The goal is to answer the following research questions:

RQ 1 What are the acoustic correlates for the perception of nonrhoticity by New Hampshirites?

RQ 2 Where do New Hampshirites believe that nonrhoticity occurs?

RQ 3 What are New Hampshirites attitudes towards Boston?

1.7 The perception of nonrhoticity in New Hampshire: Roadmap for this dissertation

The aim of this dissertation is to further investigate the role of the evaluation problem in linguistic change in New Hampshire, focusing on the three steps to an evaluative response of a linguistic variant, presented by Preston (2010a): noticing, classifying, and imbuing. Each step of the process is examined with its own study, utilizing methodological techniques from language regard and sociophonetic perception. In each step, variation among participants is examined and whether that variation can by explained by certain sociodemographic characteristics is explored.

Chapter 2 provides the theoretical background for this dissertation. It defines the "evaluation problem of linguistic change" (Weinreich et al., 1968) in New Hampshire and reviews the use of language regard and sociophonetic methodology to address the evaluation problem.

Chapter 3 describes a forced-choice identification study that examines the acoustic correlates of rhoticity for New Hampshirites. This study addresses the noticing step of the evaluation process with the goal of establishing the proximity between $F2$ and $F3$ that is necessary for a listener to perceive /ɹ/.

Chapter 4 describes an open-ended classification task in which New Hampshirites listened to rhotic and nonrhotic speech samples and placed the voices on a map. This study addresses the

classification step of the evaluation process with the goal of examining where or with whom New Hampshirites associate non-rhoticity.

Chapter 5 focuses on a traditional perceptual dialectology study in New Hampshire to examine the evaluations of distinct dialect regions of New England, with a particular focus on the evaluations of the Boston metro area. This study addresses the imbuing step of the evaluation process, with a goal of examining how New Hampshirites evaluate Boston as a region.

Chapter 6 reviews the results of each of the individual studies and then ties these studies together in order to understand where New Hampshirites believe non-rhoticity exists and the attitudes they have towards those regions. Next, it relates these studies back to the evaluative tendency and the evaluation problem of linguistic change. Finally, it suggests avenues for future research.

Chapter 2

THEORETICAL FRAMEWORK: THE EVALUATION PROBLEM OF LINGUISTIC VARIATION AND CHANGE

2.1 Introduction

In Chapter 1, the state of the traditional New England features in New Hampshire has been presented, demonstrating a decline in some features by New Hampshirites (see Stanford, 2019; Kim et al., 2018; Stanford et al., 2012, 2014; Nagy, 2001; Nagy & Irwin, 2010; Nagy & Roberts, 2004). The explanations suggesting the driving force for change have varied from demographic shifts (Wood, 2010); supra-regional levelling (Roberts, 2006, 2007; Stanford, 2019); outward orientation, as presented in Labov (2012) (Stanford, 2019), negative attitudes towards rural New England (Stanford et al., 2012, 2014); and negative attitudes towards Boston (Nagy, 2001; Nagy & Irwin, 2010). Previous perceptual dialectology work (Hartley, 2005; Fernandes et al., 2014; Chartier & Jones, 2018) in New England has demonstrated that there may be negative attitudes towards Boston, but these evaluations appear to be variable. The purpose of this chapter is to lay out the over-arching theoretical framework for this dissertation–i.e. the evaluation problem–and how it will be addressed in this dissertation. Each chapter will present methodological considerations, data, and results. We will conclude the dissertation by combining the individual studies and return to the evaluation problem.

Young and Bayley (1996) cite two basic principles, the principle of quantitative modeling and the principle of multiple causes, which were originally used to describe interlanguage variation, but are helpful to put the rationale behind this dissertation into perspective. The first principle deals with the notion that the variation found in linguistic data can be modeled quantitatively:

> "This means that we can examine closely the forms that a linguistic variable takes, and note what features of the context co-occur with these forms. By context, we mean the surrounding linguistic environment and the social phenomena which co-occur with a given variable form. With a large enough set of data, we are able to make statements about the likelihood of co-occurrence of a variable form and any one of the contextual features in which we are interested. These statements express in quantitative terms the strength of association between the contextual feature and the linguistic variable" (Young & Bayley, 1996, 253).

The quantitative modeling of non-rhoticity has been examined with production studies, especially (Nagy & Irwin, 2010; Levy, 2010; Kim et al., 2018; Stanford, 2019). The aim of this dissertation is to utilize quantitative modelling to address the evaluation problem of linguistic change.

The second principle explains that "it is unlikely that any single contextual factor alone can explain the variability in the data....the question for the researcher is thus not which single factor is associated with variation but what the relative weight of the different factors associated with variation is" (254). The principle of multiple causes is an important one for this dissertation, because as we see from Wood (2010), in-migration has played a role in dialect change of the *short-a* system. In-migration, on its own, can lead to dialect change over time (see Payne, 1980; Trudgill, 1986, among others). However, the interesting note here is that the majority of in-migrants into NH have been from MA, among other areas. Figure 2.1 displays migration patterns into New Hampshire from 1970 to 2012:

What we see from the migration change pattern is that from 1970 - 1990, the increase in population in New Hampshire was due more to net migration (people moving into New Hampshire) than it was natural increase (people being born in the state). New Hampshire's demographics were changing so that the largest increase in the population was due to "outsiders" (i.e. non-New Hampshirites) moving in. According to Johnson (2007), the largest source of in-migrants to NH come from the Boston metro area. This is important because these migrants fall in the same isogloss

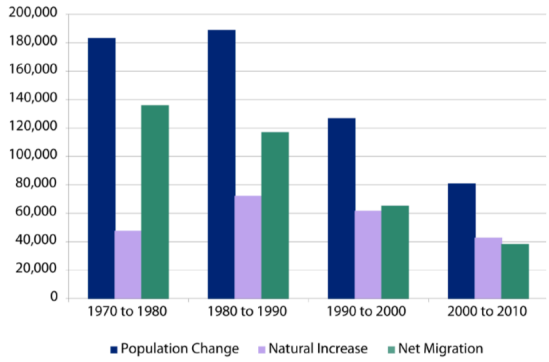

Figure 2.1: NH Migration change from 1970 to 2010, cf Johnson (2012)

as those from New Hampshire, especially the southeastern portion. This suggests that nonrhotic speakers moved to a location where other nonrhotic speakers already resided. The fact that this could play a role in a change towards rhoticity by the "original" (native) residents suggests that some factor outside of the linguistic system, a social (or external) factor, is playing a role in the linguistic change.

This dissertation is based on the observation that many sociolinguistic studies in the region have been fruitful in investigating change of production with regard to traditional New England features, but saddled with paradoxes in understanding the attitudes towards traditional New England features. For Weinreich et al. (1968), "the key to a rational conception of language change...is the possibility of describing orderly differentiation in a language serving a community" (3). Support for the claim that attitudes towards language and linguistic variants are a catalyst for change are often evidentiarily inadequate (Johnstone, 2016; Erickson, 1990). The arguments put forth by (Nagy, 2001; Wood, 2010, among others) suggest that, for New Hampshirites, there is an anti-urban, anti-Boston attitude that prevails. Nagy (2001) supports this argument by examining personalized license plates of New Hampshirites. Analyzing personalized license plates is a creative way to examine local attitudes in an indirect way; however, the lack of representation of "big city" in personalized license plates could be due to a number of reasons, ranging from the geography of

the region to positive attitudes towards the outdoors. In other words, a lack of desire to represent the "big city" in a state where the largest city has a population of around 100,000 people is not surprising. This does not necessarily suggest that New Hampshirites *dislike* the city, but rather they do not *identify* with it. Further, there is no systematic reporting of either the methodology used to analyze license plates nor what is meant by "[f]requent scornful reference to *Taxachusetts* and *Massholes*" (Nagy, 2001, 39). "Frequent" is a vague term that can have different interpretations. The discussion of attitudes using personalized plates appears to be more of a framing narrative of the article, which helps explain the self-reported judgments of production in the actual study[1]. Stanford et al. (2012, 2014) add to the anti-Boston attitudes to include anti-rural, old New Englander. The authors support this argument by conversations that were had with participants in their studies. There is no reference to a systematic content analysis or the like to demonstrate *how* the authors concluded that New Hampshirites had these negative attitudes. It leaves the question as to *who* has negative attitudes towards the traditional New England features (in our case, nonrhoticity) and whether these negative associations are shared cultural notions or just the attitudes of a few.

It would be an extremely difficult undertaking for a study whose focus was on production to simultaneously conduct empirical studies on evaluations/perceptions. Instead, using participants' meta-linguistic commentary provides starting point from which to design empirically-based evaluative studies. Even though these studies did not all systematically examine the relationship between attitudes and linguistic change, the notion that attitudes towards languages and their varieties are tied to attitudes towards groups is not a new one (Hoenigswald, 1966; Wassink, 1999; Campbell-Kibler, 2012, 2013; Preston, 2013b, among others). Language attitudes can play a role in linguistic change (see Labov, 1963; Becker, 2014b; Bailey, Wilke, Tillery, & Sand, 1993, among others). Weinreich et al. (1968) discuss this relationship between attitudes and language change as the evaluation problem of linguistic change, which addresses how members of the speech com-

[1]Interestingly, two of the license plates that Nagy (2001) uses in her argument against big city life and values demonstrate non-rhoticity: " LUMBA" (lumber) and "HEEYAH" (here), which is counter to New Hampshirites avoiding non-rhoticity because they attribute it to Boston and have negative attitudes towards Boston.

munity react to changes in progress and how these attitudes and perceptions can shape linguistic variation and change. In order to fully address the evaluation problem in NH, empirical studies that examine New Hampshirites' perceptions of and attitudes toward nonrhoticity are necessary. This can be achieved through language regard and sociophonetic perception methods. In what follows, the evaluation problem of linguistic change, the perception of (non)rhoticity, sociophonetic perception, and language regard will all be addressed in order to lay the foundation from which the rest of this dissertation will be built.

A final key issue that still has not been addressed in these previous studies is *what* is considered nonrhotic to the speech community, *where* people believe nonrhoticity exists, and *who* uses it. Previous research has suggested that New Hampshirites associate nonrhoticity with rural New England and Boston, but there have been no studies to date that have tested this hypothesis.

2.2 The Evaluation Problem of Linguistic Variation and Change

The seminal work of Weinreich et al. (1968) introduced a paradigm shift in sociolinguistics that pushed the field to using more empirically-based methods for investigation. This new approach is known as the variationist paradigm. Weinreich et al. (1968) highlighted the notion of heterogeneity that is found in speech communities and argued that linguists should not abstract away from heterogeneous structures present in a speech community, but rather, employ empirical methods in order to understand it. In order to come to a theory of language variation and change, (socio)linguists should study language empircally and not divorce the linguistic system from the speakers that use it. Because language is a social convention, in order to understand language, we need to understand how people use it. With that, it is crucuial to also understand the ways in which people use language differently. In fact, this heterogeneity serves a purpose: it can mark group affiliation, group/individual identity, and index certain traits or characteristics (see Eckert, 2000; Preston, 1996; Becker, 2014b, among others). Weinreich et al. (1968) argue that "linguistic and social factors are closely interrelated in the development of language change. Explanations which

are confined to one or the other aspect, no matter how well constructed, will fail to account for the rich body of regularities that can be observed in empirical studies of language behavior" (59-60). The heterogeneity found in speech communities illuminates the complex social relationships between individuals within a community. Examining the heterogeneity provides a way to understand the inter-relationship between language use and society.

Weinreich et al. (1968, pp 183-186) put forth five "problems" that must be addressed *empirically*, that together, define the heart of variationist sociolinguistics:

1. **actuation problem:** How and why is a change activated? "Why do changes in a structural feature take place in a particular language at a given time, but not in other languages with the same feature, or in the same language at other times?"
2. **transition problem:** How does a language pass from one state into another? What processes shape the intervening stages in a change situation?
3. **constraint problem:** What is a possible change?
4. **embedding problem:** How are innovations embedded in the linguistic matrix? How are innovations embedded in the social matrix?
5. **evaluation problem:** How are changes evaluated by the speech community? Do they carry prestige or stigma or do they operate below the level of social awareness? How is the course of change affected by social perceptions?

In addressing these problems, sociolinguists can explain the *orderly heterogeneity* found in linguistic use within speech communities. For Weinreich et al. (1968), these problems must be addressed empirically in order to construct a viable theory. While a complete theory of language variation and change must address these five problems *together*, for the purposes of this dissertation, the focus is on the evaluation problem. However, one can easily see the interrelatedness among the five problems put forth by Weinreich et al. (1968). For example, the ways in which a linguistic feature is evaluated can reflect the ways in which the linguistic change is embedded

in the social matrix. If a linguistic feature is associated with a specific group, and that group is evaluated positively, the linguistic feature would likely also be evaluated positively. Alternatively, if a linguistic feature is associated with a group that is evaluated negatively, that linguistic feature would likely also be evaluated negatively.

The evaluation problem of linguistic change states:

> *The theory of language change must establish* ***empirically***[2] *the subjective correlates of the several layers and variables in a heterogeneous structure. Such subjective correlates of evaluations cannot be deduced from the place of the variables within the linguistic structure. Furthermore, the level of social awareness is a major property of linguistic change which must be determined directly. Subjective correlates of change are more categorical in nature than the changing patterns of behavior: their investigation deepens our understanding of the ways in which discrete categorization is imposed upon the continuous process of change* (Weinreich et al., 1968, 186).

The "subjective correlates" refer to members of a speech community's perceptions of and attitudes towards language variation. "Several layers and variables in a heterogeneous structure" refer to the linguistic system. Attitudes towards a particular language or linguistic structure are independent of the actual linguistic variety or variable itself, but rather the attitude refers to the group who is associated with that variable/variety. For example, nonrhoticity is considered a stigmatized feature in the United States (Labov, 1966; Becker, 2014a; Wolfram & Schilling, 2016). However, nonrhoticity is the prestigious form in England. This suggests that there is nothing inherently "good" or "bad" about nonrhoticity, but rather, negative or positive evaluations about groups of people. These attitudes typically depend on speakers being aware of the linguistic feature (and arguably can associate the feature with a particular group)[3].

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[2]Emphasis mine

[3]Although, some studies have shown that the notion of awareness needs to be further investigated, (see Schuld, Salmons, Purnell, & Raimy, 2016).

Finally, Weinreich et al. (1968) argue that perceptions and attitudes are categorical. This is unlike the process of certain types of linguistic variables where the process would be more gradient in nature. For example, the vowel /a/ (the FATHER class) and the vowel /ɑ/ (the LOT class) are traditionally distinct in northeastern New England, a feature that is dissipating among younger speakers (i.e. the vowels are merging) (see Stanford et al., 2012; Nagy, 2001). The FATHER-LOT merger[4] consists of the second formant ($F2$) of the FATHER class lowering, which results in a backing of /a/. A merger, however, does not occur instantaneously, but rather over time, where the production of the vowel gradually moves backward. Evaluations of a linguistic variable, on the other hand, are categorical, meaning that there are usually a fixed number of values (e.g. positive, negative, neutral) that can be assigned to a unit of observation. This is what Weinreich et al. (1968) are referring to when they note the difference between the subjective correlates being more categorical than the changing pattern. The authors argue, however, that these categorical subjective correlates are imposed on the process of change, meaning that these attitudes and perceptions can catalyse or interrupt the ways in which a variant is used. For example, Becker (2014b) examined the reversal of raised BOUGHT (/ɔ/) in New York City by examining both the production and perception of the variable. The evaluation problem, then, is concerned with both how members of a speech community react to changes in progress and also how perceptions and evaluations of a linguistic variable can shape sociolinguistic variation and change. In other words, are variants perceived as prestigious or stigmatized, or are members of the speech community unaware of the variable? Furthermore, how do these evaluations play a role in the variation and change that is found within a speech community?

[4]This merger is often called the FATHER-BOTHER merger in the literature on New England, however, I have used the traditional designation of the LOT class, as found in (Wells, 1982b)

2.3 Understanding Evaluations: Defining attitude

The subjective correlates, or evaluations, of a particular language or linguistic variable, are ultimately an individual's (or many individuals') attitudinal response to a language variety or linguistic variable(s). Thus, it is imperative that a definition of attitude is established before proceeding. Attitudes are not solely evaluations, but rather, attitudes convey how we orient ourselves to some object (Augustinos, Walker, & Donaghue, 2006). Although the definition of attitude is not agreed upon within social psychology, there are some general features of attitudes that need to be identified *before* getting to a comprehensive definition. (For a complete discussion on attitudes, see Albarracin, Johnson, & Zanna, 2014; Augustinos et al., 2006).

- Attitudes exist in the mind of the individual. The evaluation that an individual provides is **not** their attitude, but points to their attitude. Thus, an attitude is available if it exists within a person's cognition.

- Attitudes are activated and require some cognitive effort. Attitudes operate as nodes in memory, connected in an associative network. Nodes activate when we categorize some experience in terms of them, and multiple nodes become connected through experiences of co-activation (e.g. non-rhotic and Boston, dog and cute, dog and scary, etc). The more frequently a connection is experienced, the stronger that connection becomes. The activation of an attitude refers to a process with at least some minimal cognitive activity (Zanna & Rempel, 2008). However, this effort can be minimal in the sense that attitudes can be activated and function automatically.

- Attitudes are (relatively) enduring. Although attitudes can change, an attitude is different from a transitory evaluation. Instead, an attitude can be thought of as "'a learned disposition to think, feel and behave toward a person (or object) in a particular way" (Allport, 1954). An attitude, then, consists of a body of knowledge and experience with a particular object, per-

son, or issue. While aspects of attitude measurement, such as context effects, can influence the evaluation provided by an individual, attitudes themselves (what exists in the mind of the individual) are considered to have some degree of permanence.

- Attitudes can be/are influenced by ideology. When considering attitudes to language, especially from the folk, these attitudes are often being built upon language ideology (Milroy & Milroy, 1999). Language ideology will be defined here as "ingrained, unquestioned beliefs about the way the world is, the way it should be, and the way it has to be with respect to language" (Wolfram & Schilling, 2016, 10).

- Attitudes require a dimension of judgment. This judgment may be universal or specific, socially shared, or idiosyncratic.

- Attitudes are social: they originate in social life, they communicate meaning, they are shared and they have social consequence (Augustinos et al., 2006).

With these general attributes of attitude in mind, attitude is defined as:

> *a psychological tendency that is expressed by evaluating a particular entity with some degree of favor or disfavor* (Eagly & Chaiken, 1993, p 1)

This definition of attitude was chosen because it is an inclusive definition of attitudes that allows for various frameworks for understanding the nature of the psychological tendency (Eagly & Chaiken, 2007). With this definition, attitude, then, is a *tendency* that gives rise to judgments: it is not the actual response, but rather, the response allows researchers to glean what the attitude might be. Further, according to Eagly and Chaiken (2007), attitude is comprised of three components:

1. attitude object (attitude referent): an entity that is evaluated
2. evaluation: evaluative response, which can be conscious or subconscious

3. tendency: predisposition to evaluate an object in a specific way

The attitude object is the object or entity that the individual is evaluating. This can be specific, such as the production of an /ɹ/, or it can be something more abstract, such as the notion of 'urban' or 'rural'. By denoting the attitude-holder's orientation to the referent, an attitude conveys that person's evaluation of the referent, such as *like-dislike*, *intelligent-unintelligent*. In this dissertation the attitude objects are nonrhoticity and Boston.

The evaluation (or evaluative response) is the response that is given by an individual to the attitude object. It is this that is used to measure a person's attitude towards an attitude object. The evaluation can be expressed by a variety of responses, and "are best regarded as expressions, or manifestations, of the inner tendency" (Eagly & Chaiken, 2007). It is important to note that evaluative responses are expressions of attitude; they are not the same as an attitude. For Eagly and Chaiken (2007), this distinction is critical because the evaluative *tendency* is represented in the mind as part of a cognitive structure, whereas the evaluative *response* reflects a range of influences such as the context, as well as the inner tendency. In the same way that the realization of a linguistic variant is the expression of a variable, but not the variable itself. In this dissertation, the attitudinal responses are discussed in Chapter 5 when participants are asked to rate dialect regions in New England.

Tendency, according to Eagly and Chaiken (2007), refers to a "mental residue" (585). A person's experiences help shape the evaluative response they will have to an attitude object. This mental residue can be conscious or subconscious. The authors choose to not further define inner tendency in order to maintain an all-encompassing definition. In other words, the description of inner tendency allows for a variety of frameworks or conceptualizations.

The framework used in this dissertation to understand evaluative tendency is the potentiated recruitment framework (Bassili & Brown, 2005). Within this framework, "attitudes are emergent properties of the activity of microconceptual networks that are potentiated by contextually situated objects, goals, and task demands" (Bassili & Brown, 2005, 552). Attitudes, then, are not merely

the result of retrieval of a stored evaluation, but rather emerge from a constructive process. In this process, microconcepts, or features of attitude objects, are imbued with evaluative information.

Microconceptual networks are comprised of microconcepts, molecular elements of knowledge, which exist in the *attitudinal cognitorium* (Bassili & Brown, 2005; Rosenberg, 1968). The attitudinal cognitorium "consists of microconcepts that are associated with each other in varying degrees and that have, at any given moment, a certain level of activation" (552). The microconceptual networks are activated when an individual encounters an attitude object and can lead to various attitudinal responses. The evaluative tendency, as a whole, refers to the potentiated recruitment framework. Some factors that play a role in the activation of microconcepts within the attitudinal cognitorium are prior experiences, context, eliciting conditions, and the the attitudinal object. Microconcepts have the potential of being activated in different ways, leading to different evaluative responses.

The use of the attitudinal cognitorium in explaining attitudes to language variation and change is not a new one (see Preston, 2010a, 2010b; Niedzielski & Preston, 2003, among others). It is important to understand that the potentiated recruitment framework is the framework representing the definition of attitudes used in this dissertation. An attitude object (along with other factors) activates the attitudinal cognitorium (tendency), which then outputs an evaluative response.

2.4 The Attitude Object: Establishing the acoustic correlates for nonrhoticity

Before moving to the evaluations of an attitude object, it is imperative that to understand the attitude object. There are two attitude objects that are addressed in this dissertation: nonrhoticity and Boston. Chapter 3 is devoted to understanding what is perceptually considered rhotic and nonrhotic via a sociophonetic perceptual experiment that consists of an identification task, which helps to identify the acoustic correlates of non-rhoticity among New Hampshirites.

In order to identify what is considered rhotic and nonrhotic, a rhoticity continuum was created using resynthesized speech from a trained phonetician. American English /ɹ/ is characterized by

an acoustic pattern of *F3* lowering close to the value of *F2* (Boyce & Espy-Wilson, 1997; Espy-Wilson, Boyce, Jackson, Narayanan, & Alwan, 2000; Guenther et al., 1997; Hagiwara, 1995). From an articulatory perspective, there are generally two ways of producing the American English /ɹ/: raising the tongue blade or bunching the tongue in the palatal region (Stevens, 1998). Previous studies have examined the different articulatory methods of producing the American English /ɹ/ (Delattre & Freeman, 1968; Westbury, Hashi, & Lindstrom, 1999; Espy-Wilson et al., 2000), and these studies have demonstrated that the acoustic profiles of American English /ɹ/ are the same, no matter the manner of articulation–an example of a many-to-one articulatory-acoustic relationship. Thus, for the purposes of this dissertation, the focus of the articulatory method with which the speaker created the /ɹ/ is less important than the process of resynthesizing the speech to create the appropriate acoustic profiles. Natural speech, rather than synthesized tokens, was chosen because previous research has shown that listeners perceive synthetic speech differently from natural speech (Delogu, Conte, & Sementina, 1998; Andersson, Yamagishi, & Clark, 2012; Pisoni, Nusbaum, & Greene, 1985). Further, full words and parts of a word, rather than a sound in isolation were used. This methodological decision makes the task more natural for listeners[5]. Because the aims of this study are *socio*phonetic, it was imperative that the psychoacoustic threshold found from this study could be applied to the study in Chapter 4. This process is further explicated in Chapter 3 and was a necessary first step before the study in Chapter 4 could be conducted.

2.5 The Attitude Object: Boston metro area

The second attitude object of this dissertation is Boston (and its surrounding area). The reason that this is an attitude object is because according to previous research, it is negative attitudes towards Boston (and Bostonians) that is playing a role in language variation and change. The

[5]Feedback from participants from a pilot study using synthesized vowels (with and without a following rhotic) alone suggested that a vowel (with or without a following rhotic) in isolation was not sufficient for participants to determine whether or not they heard rhoticity. Many participants said that the stimuli sounded "robotic" and many others said the clip was too short for them to hear.

spatial division of society into distinct social cleavages, i.e. urban-rural cleavage, can become relevant to language variation, as it can act as a barrier to impede diffusion of linguistic variants.

The notion of spatiality will be used to address the evaluation of spatial divisions. Spatiality (Britain, 2004) describes the intersection of geometric, social, and perceptual space. Geometric space refers to objective, measurable space. It is a location that can be identified. For example, the proximity of southeastern NH to Boston refers to the measurable distance. Social space refers to space as it is shaped by the social world. This includes built environments that have changed the landscape, such as highways that make commuting from southeastern NH to Boston a feasible endeavour, which increases the face-to-face interactions between members of the two communities. Perceived space refers to the perception of both immediate and distant environments. For example, understanding New Hampshirites' perceptions of and attitudes towards towards rural areas and Boston. Space and spatiality are not fixed. Therefore, the notions of space and spatiality within a community or region can change over time. These three types of space are not mutually exclusive, but rather interdependent:

> *Geometric space is appropriated and thus made social through human settlement, but social space can never be entirely free of the physical friction of distance. And our perceptions and value systems associated with our surroundings, although deeply affected by both social and Euclidean space, can in themselves affect the way space is later appropriated and colonized* (Britain, 2004, 604).

Spatiality, then, not only shapes, but also can be shaped by people's idea of space. The intersection of these three types of space, or spatiality, should help to explain the co-construction of social meaning and linguistic change, as Becker (2014b) did in NYC with the reversal of raised BOUGHT. Thus, in order to understand attitudes about space in New Hampshire, it is imperative to understand spatiality. Language regard research has demonstrated that there is a connection between language perception and spatiality (Plichta & Preston, 2005; Preston, 2010a). Spatiality helps shape the

communities under investigation, and changes in spatiality can have linguistic consequences, such as dialect contact (Trudgill, 1986) and dialect leveling (Britain, 2004). Linguistic changes play a role in evaluations of language. Therefore, changes in spatiality can play a role in our evaluations of language, and addressing the "evaluation problem" should include an understanding of spatiality in the region.

Before continuing, it is important to address how the traditional northeastern New England variables can be associated with both rurality (Stanford et al., 2012) and urbanity (or Boston) (Nagy, 2001). In order to address this, a closer examination of the speech communities where the research took place is necessary. The difference in negative attitudes between Stanford et al. (2012) and Nagy (2001) needs to be considered with respect to the locations of the respective studies. Stanford and his associates examined changes in western and central New Hampshire, whereas Nagy examined changes in southeastern New Hampshire. The counties of NH that compromise the southeastern portion: Hillsborough, Rockingham, Merrimack, and Strafford are all a part of the Combined Statistical Area (CSA) of Boston (See Map 2.2). CSAs are composed of metropolitan and micropoitan[6] areas that are linked either socially or economically. The strength of these economic ties are measured by commuting patterns. Also, CSAs have an employment interchange of at least fifteen percent with the central county of the larger metropolitan area. In the context of southeastern NH and Boston, this means that at least 15 percent of the residents in the metropolitan and micropolitan areas of the NH counties commute to Boston for work. The geographically close proximity to Boston makes southeastern NH socially and perceptually close to Boston. Therefore, the impact of Boston should be felt more strongly in southeastern NH than it is in central or western NH, due to its proximity.

[6]urban area with a population less than 50,000 but more than 10,000 people

Figure 2.2: Distribution of CSA of Boston, showing the inclusion of southeastern New Hampshire, (cf US Department of Commerce, Economics and Statistics Administration, US Census Bureau, 2017)

The towns under investigation in Stanford et al. (2012, 2014) would be categorized as rural. In the study in western NH, the town populations vary from as little as approximately 500 residents in North Woodstock to approximately 13,000 in Lebanon and Claremont. In central NH, the authors cite the towns in the study as rural (Stanford et al., 2014).

When one considers the spatiality of the different speech communities in previous research, i.e. western and central New Hampshire on the one hand and southeastern New Hampshire on the other, it becomes easier to understand how traditional New England variants could be associated with rurality in the context of western and central NH, while being associated with urbanity in southeastern New Hampshire. In western and central NH, it is possible that the evaluation of the traditional variants became stigmatized and associated with rurality. This, perhaps, could be due

to the relative frequency of traditional variants produced by speakers from more rural areas being higher than those from less rural, more urbanized areas. In the case of southeastern New Hampshire, it is possible that the evaluation of these same variants became stigmatized and associated with Boston. Although the driving force for change seems to be attributed to the opposite social cleavages in different parts of New Hampshire (rurality and urbanity), these seemingly opposing viewpoints can be merged by understanding space and spatiality in the region.

2.6 Investigating Evaluative Responses: Methods of inquiry

This dissertation is guided by principles in two subfields of sociolinguistics: sociophonetics and language regard. Sociophonetics "views social meaning as a crucial aspect of the cognition of language" (Thomas, 2011). As an interdisciplinary field, sociophonetics is primarily concerned with using methodology from phonetics and sociolinguistics to understand the cognition of language in constructing social meaning.

Language regard is mainly concerned with "beliefs about, reactions to, and comments on language" (Niedzielski & Preston, 2003, vii). Language regard research draws on linguistics, geography, psychology, social psychology, and cognition in order to gain a better understanding about the folks' implicit and explicit attitudes to language and what the folk perceive and believe about language use. Further, language regard research aims to holistically understand the psychological, social, spatial, and linguistic factors that can contribute to a person's beliefs about and attitudes towards linguistic input. Thus, although some of the methods of inquiry for understanding socio-cognitive aspects of language variation and change are different between these two fields, sociophonetics research and language regard research overlap in the sense that the aims of both subfields are to better understand the cognitive aspects of language variation and change. In fact, many of the types of studies listed as sociophonetic studies in introductory textbooks (Di Paolo & Yaeger-Dror, 2011; Thomas, 2011; Hay & Drager, 2007) are often referenced as language regard studies (Niedzielski & Preston, 2003).

One way to explore the perception of social categories is through classification studies (Clopper, Hay, & Plichta, 2011), in which participants listen to a set of stimuli and are asked to categorize the speaker (or a group of speakers) by some social category, such as region, gender, or social class. The stimuli can be a single word, a sentence, or a longer passage. For example, Clopper and Pisoni (2004) asked listeners to categorize a set of stimuli by regional dialect using sentence-length utterances and analyzed the results in terms of accuracy and similarity.

Another experimental task that can be used to understand the perception of social categories is rating. Similarity ratings (Clopper et al., 2011) are used to obtain judgments on how similar two stimuli are along some experimenter-defined dimension, such as regional dialect. A researcher may have listeners listen to two different speakers and ask if they come from the same region. Another rating method is the attitude judgment rating task (Clopper et al., 2011). The listener is asked to judge a stimulus item along some dimension that is (usually) defined by the researcher. These types of tasks have taken any different forms, and employ different methods of investigation. For example, listeners might rate a speaker on how educated or polite they sound.

A common technique used to create stimuli for the attitude judgment rating task is the matched-guise technique. The matched-guise technique was first developed by Lambert, Hodgson, Gardner, and Fillenbaum (1960) as a means to uncover implicit attitudes towards French and English in Canada. The way a matched-guise test works is that a participant listens to speech that represents different "guises" (i.e. different languages, different varieties, different variables). The participant-listener then rates the speech on an evaluative dimension (usually using a likert-type) scale, in terms of things such as the speakers' personality/character, (social) power, or intelligence. The participant-listener does not know that the same speaker is used in the different guises. Thus, the evaluation is not about the *speaker* per se, but rather, the variety of language that is used by the speaker. The method used byLambert et al. (1960), and adapted by later researchers, allows for the researcher to control the effects of an individual speaker by having the same speaker in both guises. In the Lambert et al. (1960) study, this was done examining Canadians' evaluations of French and

English. Utilizing a matched-guise test allows the researcher to control inter-speaker variability (such as pitch) by having the same speaker speak different guises. With current technological advances, researchers can now resynthesize a single speaker's speech into different guises, therefore controlling for more in the speech signal. The matched-guise technique has been adapted and reused in sociolinguistic perception studies (Lambert et al., 1960; Labov, 2012; Labov et al., 2011; Plichta & Preston, 2005; Niedzielski, 1999; Becker, 2014b; Bailey, 2018; Campbell-Kibler, 2007; Dragojevic, Berglund, & Blauvelt, 2018; Fridland, Bartlett, & Kreuz, 2004). The rating scales have been adapted depending on the types of attitudes the researcher is expecting to uncover. It is important to note that the matched-guise technique is not used **solely** with attitudinal rating tasks, but rather are a means in which to create stimuli for a variety of sociophonetic perceptual tasks.

Finally, perceptual dialectology tasks are a means for understanding the ways in which people group or create dialect boundaries or dialect differences. The most common perceptual dialectology task is the draw-a-map task, made popular by Preston (1986). In these studies, a participant is given a blank map of a region under examination (for example, the United States), and asked to draw areas where they believe that people speak differently and then to label that area with what they would call that way of speaking. Participants are often asked to then rate the regions on a variety of researcher-determined dimensions, most often using pleasantness and correctness. Researchers then can combine the individual responses to create an aggregated map depicting the frequency and overlap of perceptually salient dialect regions, conduct a content analysis on the labels provided by participants to understand the valence of the regions, and create a score for the ratings that were provided. This helps researchers see where folk believe dialect differences exist (or are perceptually salient), potentially what people think about those dialect regions (through the labels provided), and how they rate those regions in terms of the dimensions provided.

This dissertation utilizes two of these methods to investigate evaluations of nonrhoticity. First, in order to answer RQ2: *Where do New Hampshirites believe that nonrhoticity occurs?*, a classification study in which participants were asked to listen to a set of stimuli and then click on a map

where they believed that speaker was from was conducted. The study uses the matched-guise technique. Second, in order to answer RQ3: *What are New Hampshirites attitudes towards Boston?*, perceptual dialectology study is used.

2.7 Analyzing Evaluative Tendency: Language regard and the attitudinal cognitorium

While sociophonetic research is considered more experimental in nature, there are calls for more ethnographic work (Hay & Drager, 2007) to be conducted to help understand the social-cognitive connection for sociophonetic perceptual studies. The attitudinal cognitorium is a framework for understanding the tendencies created in the brain that link the linguistic with the social, ultimately providing a theoretically viable or widespread method of explaining the relationship between perception and social categories. When looking at localized variables, it is crucial to return to a generalizable theory, especially if the aim is to create an empirically based theory of language variation and change. And while a bottom-up approach to theory is ideal, it is necessary to generalize the individual, localized meanings in order to build a cohesive theory. It is for this reason that the use of the attitudinal cognitorium as a framework for discussing the connection between attitude object and evaluative response that an individual or a collection of individuals (such as a speech community) might share is imperative. The attitudinal cognitorium also provides a framework for understanding why there may be variation in the evaluative responses that are provided by participants. Third wave sociolinguistics focuses primarily on stylistic changes as a factor of individual expression, as language and social meaning are inextricably intertwined (Eckert, 2012), the attitudinal cognitorium provides a method to explain *how* the two are connected, or the socio-cognitive construct of the relationship between language and social meaning. Utilizing broadly defined groups does not negate the individuality of a speaker-hearer. Rather, it allows for a starting-off point to understanding and potentially finding patterns that contribute to a theory of linguistic variation and change.

Utilizing the cognitorium in linguistic perception was first introduced and subsequently refined

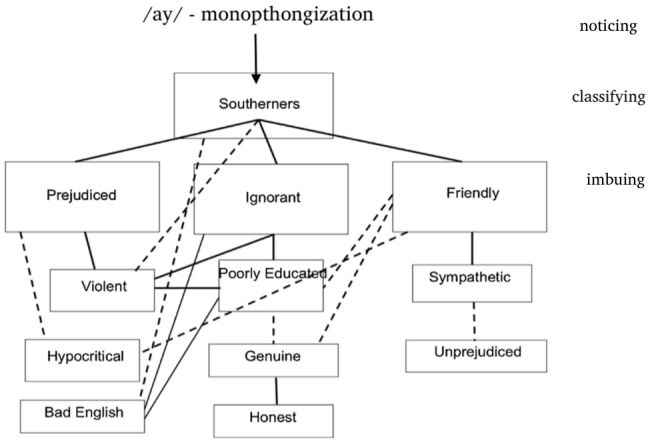

Figure 2.3: Steps to a language regard response, adapted from Preston 2010a

by Preston (2009, 2010a, 2017), who provides the clearest account of how the attitudinal cognitorium (and potentiated recruitment framework) can be used to describe language regard. Figure 2.3 demonstrates how microconcepts can be activated when a listener hears /ay/-monopthongization.

According to Preston (2010a), there are three major steps to the evaluative response to a linguistic variant that occur in the attitudinal cognitorium: noticing, classifying, and imbuing. The first step, noticing, occurs when a listener notices the attitudinal object. In Figure 2.3, the listener notices /ay/-monophtongization. The second step, classifying, occurs when a listener connects that attitudinal object to a particular variety. In the image above, the listener connects /ay/-monophthongization with Southern speech. The last step, imbuing, occurs when the listener connects evaluative microconcepts with the attitudinal object, based on the classification. The image above highlights how one might provide a different evaluative response, depending on the imbuing process. For one listener, the microconcepts of ignorant and bad English might be activated, whereas for another friendly and honest may be activated.

It is important to note that noticing, as a term, can mean two different things. One type of

noticing that could be inferred is noticing a sociolinguistic variant as such. For example, a listener notices that a speaker was nonrhotic in a position where one would typically find an /ɹ/. The second type of noticing can simply refer to the auditory process of hearing a speech signal a particular way. For example, changing the formant trajectory of /aː/ to incorporate a lowered $F3$ and a raised $F2$ will result in a listener noticing rhoticity in the speech signal. Study One, the acoustic correlate study, described in Chapter 3, utilizes the second definition of noticing. The aim of the acoustic correlate study is to examine what the acoustic correlates are for a person to notice /ɹ/ in the speech signal when the social cues about the speaker are absent. In essence, the acoustic correlate study is attempting to isolate noticing from classifying and imbuing.

Preston (2013a) argues that not only is language regard research an integral part of understanding linguistic change, but it is an integral part of understanding the evaluation problem. This assertion is supported by the notion that language regard can help us understand not only how social factors can influence our perception (Niedzielski, 1999; Campbell-Kibler, 2009), but also how the notion of space and spatiality play a role in our perceptions of linguistic variation (Evans, 2013; Plichta & Preston, 2005; Britain, 2013). Although beliefs and attitudes about language can vary depending on the context, and be conscious or subconscious processes, language regard researchers can control for variability in perception by carefully considering the research question and aims in the study, and allowing this to guide the methodological design, much like sociolinguists control for variability in production using the same basic principles. Language regard research should, then, be carefully controlled and scrutinized, and depend on the research question at hand. This is no different from sociolinguists studying perception using methodology that will account for variation due to factors such as attention to speech, topic, or style shifting.

2.8 Variation in Evaluative Responses: Methodological considerations for addressing variation

An initial pass at answering the evaluation problem in NH with respect to nonrhoticity, based on previous production studies, suggests that the negative attitudes towards nonrhoticity are a driving

force of change towards rhoticity. These reports seem to assume that the negative attitudes towards nonrhoticity are monolithic or uniform in nature. For Labov (1972) "uniform evaluation of linguistic features" (117) help to unite a speech community, even if that speech community displays stratification in the production of that linguistic variable. In essence, evaluation of a particular variable is seen as stable and uniform within a speech community. Taking this into account, it is necessary to establish that there are two different types of prestige: covert and overt. While nonrhoticity has been established as not having *overt* prestige in the United States in general (see Labov, 1966; Becker, 2014a; Wolfram & Schilling, 2016, among others), it still carries *covert* prestige for some members of the community, as can be seen in store signs, bumper stickers, and license plates (Stanford et al., 2012). In trying to understand the evaluative tendency of New Hampshirites, considerations need to be made to account for these two types of beliefs within the "shared beliefs" that make up a speech community. Furthermore, the fact that some members of a speech community may not find covert prestige in local forms, while others do needs to be accounted for. The fact that two different (competing) social valuations of a form can co-occur suggests the need for an empirical approach to the heterogeneity found in linguistic perception and language regard.

The notion that variation is present in the production of a linguistic variable is a basic assumption of the variationist paradigm (Weinreich et al., 1968). The assumption is ingrained to be so self-evident to sociolinguists that every sociolinguistic study examines some type of social variation, be it age, gender, ethnicity, region, social class, identity, or some other variable, to help describe the variation that occurs. However, when it comes to attitudes towards a linguistic variant, or the evaluative responses that are collected, it often appears as though the basic assumption is that attitudes to a linguistic variant are homogenous[7]. Summarizing the work by Lambert et al. (1960) with regard to examining attitudes towards French and English, Weinreich et al. (1968) conclude that "[t]he subjective correlates of language alternation appear to be more uniform than behavior itself" (Weinreich et al., 1968, 44). Even though there is variation in the production of

[7]There are exceptions to this that are cited below.

a linguistic variable that is explained by a particular social factor, the evaluative response of that variable tends to be uniform or homogenous. In fact, a speech community has been defined by a "uniform evaluation of linguistic features" (Labov, 1972, 117). This definition of a speech community has propagated the underlying notion of uniformity of attitudes, problematic not only because it reduces the notion of what an attitude is simply to an evaluative response, but also in doing so, simplifies the complexity of attitudes[8].

On the contrary, research in language regard and social psychology have demonstrated that variation in evaluative responses is to be expected (see Preston, 2010b; Manstead, 2018, among others). The perceptual dialectology studies and pilot study presented in Chapter 1 demonstrate variation in the evaluative responses. The previous perceptual dialectology studies in New Hampshire demonstrate that there appears to be some heterogeneity with respect to attitudes towards who New Hampshirites believe they sound more similar to (Fernandes et al., 2014) and how Boston is rated by New Englanders[9] (Chartier & Jones, 2018). Finally, Section 1.5 of this dissertation established that there appears to be variation in attitudes towards the speech of Boston.

Given the definition of attitude in this dissertation, and the way in which the process from which an attitudinal object enters the mind and triggers the microconceptual network, it is not surprising to find variation in evaluations of a linguistic variation. Let's take a few hypothetical examples:

Person A: hears the word Boston, which reminds them of going to Red Sox games. These are happy memories for this person and this triggers positive evaluations of Boston.

Person B: hears the word Boston, reminds them of traffic and driving in the city. These are stressful and unpleasant memories for the person, and this triggers negative evaluations of Boston.

Person C: hears nonrhoticity, which reminds them of their family who lives in and around Boston. It is a point of pride in their family that they are from New England, and this triggers

[8]The problematic nature of this definition of speech community has been contested by many researchers, and is a dissertation on its own. The issue with the definition of a speech community is beyond the scope of this dissertation. Rather, highlighting this definition is to bring to light the notion of uniformity of attitudes.

[9]It needs to be made clear here that Chartier and Jones (2018) did not report patterns for the variation in ratings that they found. They simply noted the variation that was present in the data.

positive evaluations of nonrhoticity.

Person D: hears nonrhoticity, which reminds them of their family who lives in rural New Hampshire. They are mortified that their family sounds like this, and this triggers negative evaluations of nonrhoticity.

In essence, although attitudes are intra- and inter-individually variable, there is some stability with attitudes. This relates back to the *evaluative tendency*: individuals have a tendency to evaluate an object a particular way that relates to their life experiences, the eliciting conditions, and so forth. What should be examined, then, is whether certain social factors or life experiences can contribute to generalizations that can be made to describe variation found in the evaluative response of a linguistic variant. Language Regard research[10] is well-equipped to examine the variation in the perception of and attitude towards linguistic variants, and some researchers have begun to include sociodemographic factors of the participant to explain perceptions and attitudes, such as Demirci and Kleiner (1999), who examines the role gender; Montgomery (2012) who examines the role of location, or proximity; Evans, Dunbar, and Chartier (in press), who examine the role of travel experience; and Cukor-Avila (2018), who examines the role of age and gender.

Because part of the aim here is to fully address the evaluation problem, the following steps have been taken to be able to further examine the variation that was found in evaluations in previous PD research in the region. First, in all studies for this dissertation, all participants were asked to complete a thorough sociodemographic questionnaire, the answers to which were then used to make macro-level categories. Participant-listeners were asked to provide information about their age (by birth year), what gender they identify as (male, female, non-binary, opt out), whether or not English was their first language. Using the period where there was a substantial number of migrants moving into New Hampshire (1970 - 1990) as a guide, participants were categorized into one of three age groups in every study. Age group 1 represents those participants born before 1970. Age group 2 represents participants born between 1970 and 1990. Age group 3 represents

[10]Language regard research is being used as an umbrella term here to encapsulate perceptual dialectology (PD) studies and sociophonetic perception studies, and language attitude studies.

participants born after 1990.

Table 2.1: Age Group categorization

Age Group 1	Age Group 2	Age Group 3
Before 1970	1970 - 1990	After 1990

Next, participants were asked to identify their educational attainment, occupation and income. The categories for occupation were provided by the U.S. Census Bureau. The answers to these questions were then combined to make a composite Socioeconomic Score (U.S. Bureau of the Census, 1963; Boyd & Nam, 2015, 2016) for each participant, used as a proxy for social class. The Socioeconomic Score was then broken into three categories. SES Group 1 represents working class. SES Group 2 represents middle class. SES Group 3 represents upper class.

Table 2.2: SES Group categorization

SES Group 1	SES Group 2	SES Group 3
Score 2-5	Score 6 - 9	Score 10-11

The last social factor used in this study consisted of determining the multi-generational links a participant had to New Hampshire. This was determined by collecting detailed information about a participants' multi-generational relationship to NH. Participants were asked to provide information about where they were born, where they grew up, where their parents grew up, and where they live now. The answers to these four questions were then scored and combined to give a Regionality Index Score (adapted from Chambers & Heisler, 1999; Chambers, 2000). The Regionality Index is an objective measure used to determine a person's multi-generational links to a particular region. Participants were given points for each of the four questions:

1. *Where were you born?*: 1 point for NH // 0 points for outside of NH
2. *Where did you grow up? (up to age 18)*: 4 points for NH // 0 points for outside of NH
3. *Where did your parents grow up?*: 1 point for each parent who grew up in NH (up to 2 points total) // 0 points for outside of NH
4. *Where do you live now?* 2 points for NH // 0 points for outside of NH

Question 2 was awarded the highest number of points–double the points of the second highest point-giving question. This is because this period of development is critical in language/dialect acquisition (Payne, 1980). The range of scores for a participant was 0-9. A score of zero means that none of the responses to the four questions placed a participant in NH. These participants were excluded from analysis. A score of 9 indicates that a person was born in NH, grew up in NH, their parents grew up in NH, and they live in NH now. The scores for the Regionality Index were then grouped to create three region groups. The group with the lowest regionality scores (Region Group 1), are called interlopers (Chambers, 2000). The group with the highest regionality scores (Region Group 3) are called indigenes (Chambers, 2000). The group in the middle have been termed in-betweeners in this dissertation.

Table 2.3: Region Group categorization

Region Group 1	Region Group 2	Region Group 3
Score 2 - 3	Score 4 - 6	Score 7 - 9
interlopers	*in-betweeners*	*indigenes*

All three studies in this dissertation were conducted online using a convenience sampling via Amazon Mechanical Turk (Amazon, 2019). mTurk is a method of crowd-sourced data collection that has been shown to be as valid as other methods of data collection (Buhrmester, Kwang, & Gosling, 2011; Byun, Halpin, & Szeredi, 2015; Kim et al., 2018). mTurk is a platform that allows

researchers to create surveys on their website or link a survey to the website where participants can be paid to complete the survey. Researchers, called requesters, are able to set up qualifications of the types of social and demographic factors necessary for their participants, called workers. For example, one demographic characteristic that can be identified is state. Because of this, one qualification used in all three studies of this dissertation was the state of New Hampshire. For the acoustic correlate study (Study One), Washington state was also included as a demographic characteristic. When using qualifications in mTurk, the studies are only visible to workers who fulfill the requisite qualifications. mTurk workers who have identified some connection with New Hampshire, then, are able to view (and take) the survey. For example, if an mTurk worker grew up in New Hampshire, but does not live there now, they could have NH marked on their mTurk profile. Alternatively, an mTurk worker could have grown up in North Carolina and moved to NH recently, and had NH marked in their profile. In both of these hypothetical instances, these participants would be able to view and take the studies presented here. The differences in connections to New Hampshire by participants, i.e. growing up in New Hampshire or moving there later in life, are handled through the Regionality Index (Chambers & Heisler, 1999; Chambers, 2000). Further, the inclusion of non-native New Hampshirites in these studies is an important demographic characteristic of the state, as not only does migration from other U.S. states play an important role in the population changes of New Hampshire, but there is also a high turnover in the population of migrants in New Hampshire. Between 2014 and 2019 almost the same number of migrants moved to NH that moved out of the state (244,000 inmigrants, 214,000 outmigrants) (Johnson, 2019).

2.9 Conclusion

According to the variationist paradigm in general, and Weinreich et al. (1968) specifically, our understanding of speech community members' perceptions of and attitudes towards specific linguistic variants needs to be established empirically and systematically, "[t]hus, the study of the 'evaluation problem' in linguistic change is an essential aspect of research leading to an explana-

tion of change" (Weinreich et al., 1968, 44). While using anecdotal evidence from sociolinguistic interviews can help to illuminate potential underlying attitudes, systematic empirical studies are necessary in order to not only examine these attitudes, but also correlate the perceptions of dialect features with these attitudes.

The argument put forth has been that the means in which to address the evaluation problem of language variation and change is through a combination of sociophonetic and language regard studies, utilizing the potentiated recruitment framework, and especially the attitudinal cognitorium as a means for explaining the socio-cognitive aspects of linguistic perception. Furthermore, the goal is to be able to find a way to generalize the localized evaluations and meanings. In order to do this, it is imperative to synthesize subjective data with objective data, combining qualitative and quantitative data. For the purposes of this dissertation, the first step in understanding evaluations of nonrhoticity is to establish what is considered rhotic and nonrhotic to New Hampshirites. In other words, what are the acoustic correlates of rhoticity and nonrhoticity. The next step is to understand how the folk evaluate nonrhoticity in the community. This will be done in two steps: first, by identifying spatially where people believe nonrhoticity exists; second by examining the places where New Hampshirites believe distinct dialects exist within New England, and looking at how the folk evaluate those areas, especially focusing on the Boston metro area.

Chapter 3

ACOUSTIC CORRELATE STUDY

3.1 Background

The first step in addressing the process of evaluation is noticing. For the purposes of this study, it is necessary to establish the acoustic correlates of nonrhoticity. Rather than prescribing the attributes of rhoticity, the goal was to ensure that what was determined as rhotic (and non-rhotic) was, in fact, perceived as such by untrained listeners in New Hampshire. In other words, in order to determine whether or not New Hampshirites associate non-rhoticity with Boston or rural New Hampshire, it was necessary to first establish *what* untrained listeners identify as rhotic and non-rhotic. The study outlined in this chapter examines the proximity of $F2$ and $F3$ that is necessary for New Hampshirites to notice rhoticity in the speech signal.

Previous phonetic research into the perception of (non)rhoticity has focused the perception of rhoticity among phonetically-trained listeners to determine its psychoacoustic threshold (Heselwood, 2009; Heselwood, Plug, & Tickle, 2010). However, the participants in these studies were phonetically-trained and were listening for the *strength* of rhoticity. In contrast, the goal of this study is to examine whether non-trained listeners classify a syllable as rhotic or nonrhotic. The goal here is to find the psychoacoustic threshold for listeners to identify rhoticity in the speech signal. Establishing these acoustic properties will help to guide the voice placement study (Chapter 4), in which participants will be asked to *locate* a person in New England based on the presence or absence of rhoticity in the speech signal.

3.2 Methods

This study was an online forced-choice identification task, implemented by LimeSurvey (Limesurvey, 2019) and distributed via Amazon Mechanical Turk (mTurk) (Amazon, 2019). mTurk allows the researcher to constrain the participant pool based on certain qualifying characteristics. One such characteristic is location (by state) of the participant; the participants in this study come from New Hampshire and Washington. As a traditionally rhotic speech community, the Washington state participants were chosen as a control group. Participants were asked to listen to quasi-randomly ordered audio clips that consisted of a word or part of a word and to choose which word they heard, as shown in Figure 3.1. Four filler continua were added to ensure that participants were not aware that rhoticity was the focus of the study. These consisted of continua between [i] - [ɪ]; [ol] - [ʊl]; and [a] - [ɑ]. Two distractor questions, unrelated to phonetic perception were added to break up the monotony of the questions.

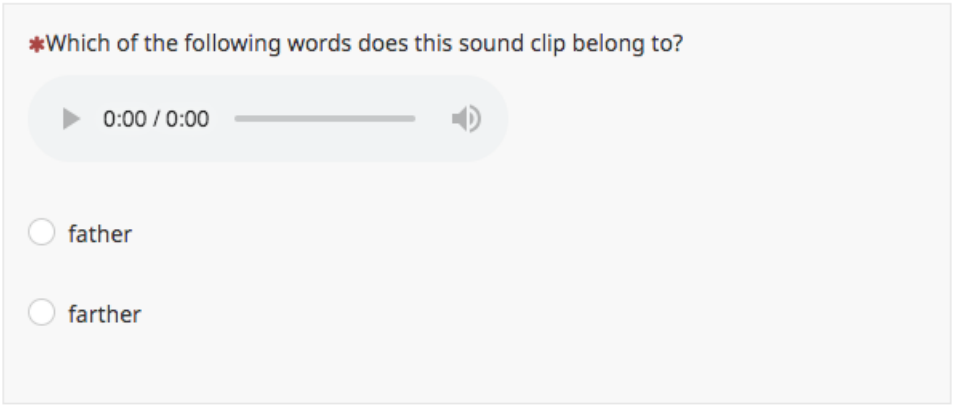

Figure 3.1: Example question from the acoustic correlate study.

3.2.1 Creating the Continua

Before discussing the acoustic properties of the rhotic-nonrhotic stimuli, this section will serve as a general overview of the creation of and consideration for the continua used in this study. The stimuli and filler were resynthesized natural speech samples of minimal pairs of single monosyllabic words or the stressed syllable and following consonantal material of disyllabic words. All speech samples were produced by a single trained phonetician in a sound-proof booth. Using whole words/parts of words and not just a vowel or vowel + rhotic was determined necessary after a pilot study using untrained listeners concluded that a vowel in isolation was not sufficient for the identification of rhoticity. Further, a synthesized vowel in isolation, while allowing for more control, is less natural than a full word (or even part of a word). Because humans perceive and respond to synthesized speech differently than they do natural speech (Pisoni et al., 1985; Delogu et al., 1998) and the ultimate goal of this study is to understand the psychoacoustic threshold of rhoticity in order to address the evaluation problem of language variation and change, it was imperative that naturalness of the stimuli took precedence over control, while still controlling for as much of the speech signal as possible.

The speaker read 16 words from a word list, repeated three times. The following word-pairs were then acoustically manipulated to become end points for the continua: (See Appendix A for the complete word list).

- *father - farther* [a] - [aɪ]
- *balm - bomb* [a] - [ɑ]
- *bowl - bull* [o] - [ʊ]
- *calmer - common* [a] - [ɑ]
- *feet - fit* [i] - [ɪ]

One consideration in choosing minimal pairs for this study was the trade-off between word-frequency effects and dispreferred phonetic environments. One issue with establishing minimal pairs was that the PALM class (Wells, 1982a), [a] (of which *father* is a part), is comprised of a limited set of words. This also comes under consideration when comparing words from this

class to the LOT class; there had to be a concession between dispreferred phonetic environments and low-frequency words. Because of this, some of the minimal pairs chosen have dispreferred environments such as preceding bilabial stops and following bilabial nasals. Further, due to the constraints from the word classes, two continua consist of disyllabic words, where participants hear the first syllable and consonantal material from the second syllable. The word-final /ɚ/ was removed as to not prime subjects' perceptions by another potentially rhotic sound.

The two words chosen for the forced-choice identification of rhoticity were *father* and *farther*. Using this minimal pair as endpoints for the continuum enables us to test which step in the continuum an untrained listener begins to hear /ɹ/, i.e. its presence or absence in the signal. Participants' identification of either *father* or *farther* identifies the proximity of $F2$ and $F3$ necessary to notice rhoticity in the signal, rather than asking participants to decide whether or not a speaker's production of a word was rhotic or nonrhotic. These continua are useful, then, because they allow for an empirical and systematic method of answering the question of the psychoacoustic threshold of rhoticity without directly asking participants if they hear rhoticity in the signal. We expect that the results will form an implicational scale: once an untrained listener hears rhoticity in a given step in the continuum, they will hear rhoticity in all steps in which $F2$ and $F3$ are closer in proximity.

Each continuum consisted of seven steps, created in Praat (Boersma & Weenink, 2014), using a semi-automatic script that includes a user interface to allow the researcher to alter the formant structure of natural speech (Winn, 2016). To use the script, the researcher selects a word, or pair of words, to model the manipulation off of, creating a continuum between two end points. Before using the script, choosing which of the three instances of each production would be used for manipulation was necessary. The choice depended on clarity, voice quality, and duration of the target sounds for manipulation. The best representative tokens were then input to the script for manipulation. The process began by extracting the portion of the sound file (word) to be manipulated. A gating technique, in which the cutoff points between the target vowel (or vowel plus rhotic for *father* - *farther*) and the preceding and following consonant, was used. To ensure

consistency across the continua, the formant transition from the vowel to the following consonant was excluded, and the formant transition from the preceding consonant into the vowel included three cycles from the transition. For two of the word pairs, *bowl - bull* and *calmer - common*, there was a transition from the preceding consonant that was incorporated into the manipulated portion. This transition was necessary to maintain naturalness in the stimuli from the preceding consonant to the manipulated segment.

The next step of the process was to manually manipulate the two extracted sounds that serve as endpoints for the continuum. These sounds were modified based on the means of the $F1$, $F2$, and $F3$ contours of the speaker for the token in question. This was completed by measuring the first three formants of the three productions for each token and then calculating the mean value for each point in time. For example, with the endpoint *father*, the formant values through the duration of /a/ were measured for each utterance of the token. The mean values were then calculated across the three measurements and used as the values for manipulation. Figure 3.2 shows the two end points of the *father-farther* continuum. The image on the left is the representation of the /a/ in *father*, and the image on the right is the representation of the /aɹ/ in *farther*. These two end points became steps 1 and 7, respectively, in the continuum. Finally, the script calculated five intermediary steps with equidistant values for $F1$, $F2$, and $F3$ while maintaining a constant duration.

After this process was complete, the script allowed the researcher to choose a preceding sound, a precursor, and following sound(s), a postcursor, for the manipulated file. A gating technique, along with examination of the spectrogram and the waveform, was used to ensure the correct formant transitions from the precursor and the postcursor were included to create natural-sounding stimuli. A process of trial and error was used to establish which precursor was the best fit for the continua in terms of naturalness. The same consonantal material, i.e. from the precursor and postcursor, was used in each step across the continua to ensure that listeners could not use cue differences in the precursor or postcursor to make their decisions. This process was repeated for all continua.

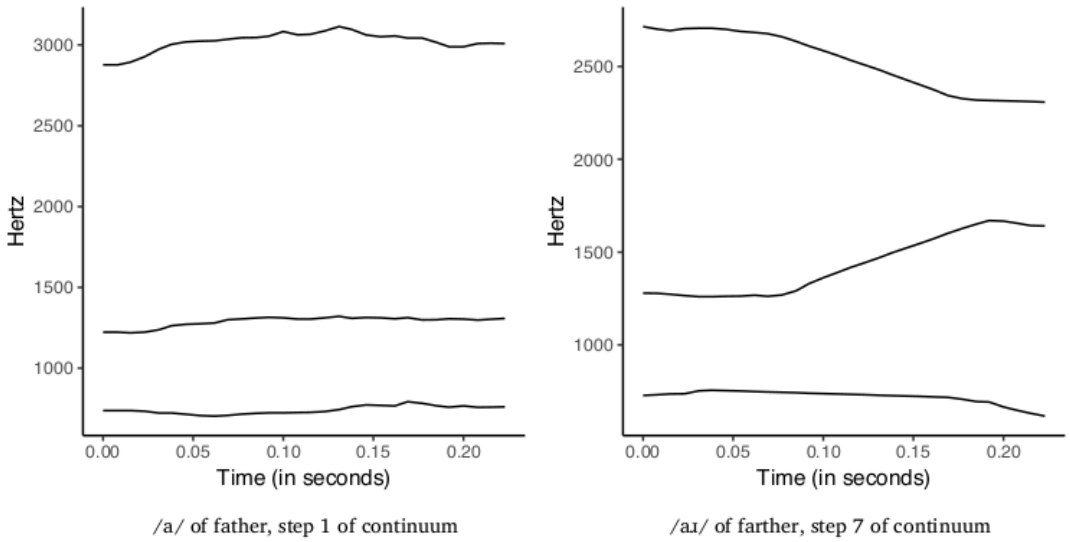

Figure 3.2: Formant contour of the first and seventh step of the rhotic-nonrhotic continuum.

3.2.2 Acoustic Properties of Nonrhotic-rhotic Continuum

Rhoticity was defined as the proximity of *F*2 to *F*3 relative to *F*1: the acoustic correlates of American English /ɹ/ consist of *F*2 raising and *F*3 lowering to come into proximity, while *F*1 lowers away from *F*2. The duration of both endpoints remained constant, forcing participant listeners to attend to spectral cues in order to make their decisions. The transition from the vowel into the /ɹ/ begins at approximately 30% into the signal, and the point of maximal restriction is reached at about 85% into the signal.

The first step, or endpoint, in the continuum was modeled on the production of the word *father*. The distance between *F*2 and *F3* in the first step is 1683 Hertz. The state of *F2* and *F3* matched the state of the preceding vowel. The seventh step, or endpoint, in the continuum was modeled on the production of the word *farther*. The point of maximal constriction between *F*2 and *F*3 in the seventh step is 647 Hertz, occurring 192 ms after the start of the preceding vowel. The token word

	*F*1	*F*2	*F*3	*F*2 - *F*3 distance
Step 1	759	1306	2989	1683
Step 2	748	1361	2862	1501
Step 3	737	1419	2742	1323
Step 4	726	1478	2628	1150
Step 5	715	1540	2520	980
Step 6	704	1604	2416	812
Step 7	693	1670	2317	647

Table 3.1: Formant values and *F*2 - *F*3 distance for rhotic-nonrhotic continuum used in acoustic correlates study

had the acoustic characteristics of rhoticity: lowered *F3* and raised *F2*.

The script then automatically created 5 intermediary steps with near equidistant values. Table 3.1 shows the Hertz values for *F*1, *F*2, *F*3, and the distance between *F*2 and *F*3 for each of the three steps at 192 ms after the start of the preceding vowel.

The figure below (Figure 3.3) shows the formant contours for *F*1, *F*2, and *F*3 for each of the steps in the rhotic-nonrhotic continuum. The color differences indicate each step in the continuum. Light blue indicates step 1 in the continuum (nonrhotic production) and dark purple indicates step 7 in the continuum (rhotic production).

3.2.3 Stimuli Presentation

The study was presented to participants online using LimeSurvey (Limesurvey, 2019), a free and open-source web application that allows users to develop and disseminate online surveys, collect responses, and export the results. After installing LimeSurvey to the user's server, the researcher is able to manage the application from a graphical user interface, integrating images, video, and audio. After developing the survey, the researcher can then activate it and make it available for respondents.

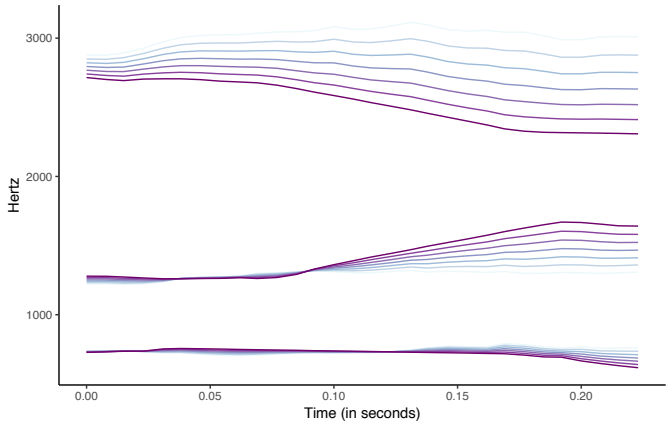

Figure 3.3: Representation of the first three formants in each step of the rhotic-nonrhotic continuum. $F1$, $F2$, and $F3$ of each step in the continuum is represented by a different color.

Participants were told that the goal of the study was to understand how people from different parts of the United States hear and recognize speech sounds. They were advised that the study involved listening to short audio clips and choosing which of the words the audio clip belongs to.

Before beginning the perceptual task, participants answered demographic questions about themselves. These questions elicited basic demographic information such as age, gender, and ethnicity. The participant was also asked about their educational attainment, income, and occupation in order to create a composite Socioeconomic Status Index score. Finally, participants were asked a series of questions regarding where they were born, where they grew up, where their parents were from, and where they live now. These questions were then combined to create Regionality Index Score (Chambers, 2000; Chambers & Heisler, 1999) for each participant.

The perceptual task began with three example questions that were used to help participants familiarize themselves with the task. These questions included speech samples from the continua *balm - bomb*, *feet - fit*, and *calmer - common*. In each of the familiarization questions, non-endpoint steps were chosen. Excluding the familiarization questions, the perceptual task consisted of fifty-six speech samples. In order to avoid a participant hearing speech samples from the same contin-

uum consecutively, three different quasi-random orders were created. A participant was assigned to one of the orders in LimeSurvey. To create these quasi-random orders, each of the stimuli were given a number in a text document and imported to R to randomize the order. Next, it was ensured that no two "words" of the same continuum were presented consecutively. If they were, the second of the two was moved down two places in the order. This process was repeated until no two words from the same continua were consecutive in the order. The answer options were fully randomized in order to mitigate bias.

Participants listened to each of the seven steps in the rhotic-nonrhotic continuum 3 times. Having participants listen to each step in the continuum three times provides a way in which to ensure that a participant's identification was not random. Using an odd number allows for a tie-breaker in the event that a participant identifies the same sound clip as *father* in one trial and *farther* in another. Participants heard the *bowl* - *bull* continuum 1 time, the *balm* - *bomb* continuum 1 time, the *calmer* - *common* continuum 2 times, and the *feet* - *fit* continuum 1 time.

Finally, there were two distractor questions added to the survey. The first distractor question appeared 1/3 of the way through the perceptual study for all participants regardless of which order they were assigned to. After the eighteenth question in the study, participants were asked to rate four types of places in terms of how much they would prefer to live in that area (city, town, urban area, rural area)[1]. The second distractor question appeared 2/3 of the way through the perceptual study. Again, this question appeared in the same place, regardless of which order a participant was assigned to, and it asked participants to put a pin on a map that indicates where they believe the speaker is from, as shown in Figure 3.4. This distractor question served two purposes: first, it tested this type of question among non-linguist listeners, as this is the method that would be employed in the study in Chapter 4, and second, it demonstrated where participants locate the voice on a map of the United States. (See Appendix C).

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[1] We will not be discussing the results of those in this dissertation

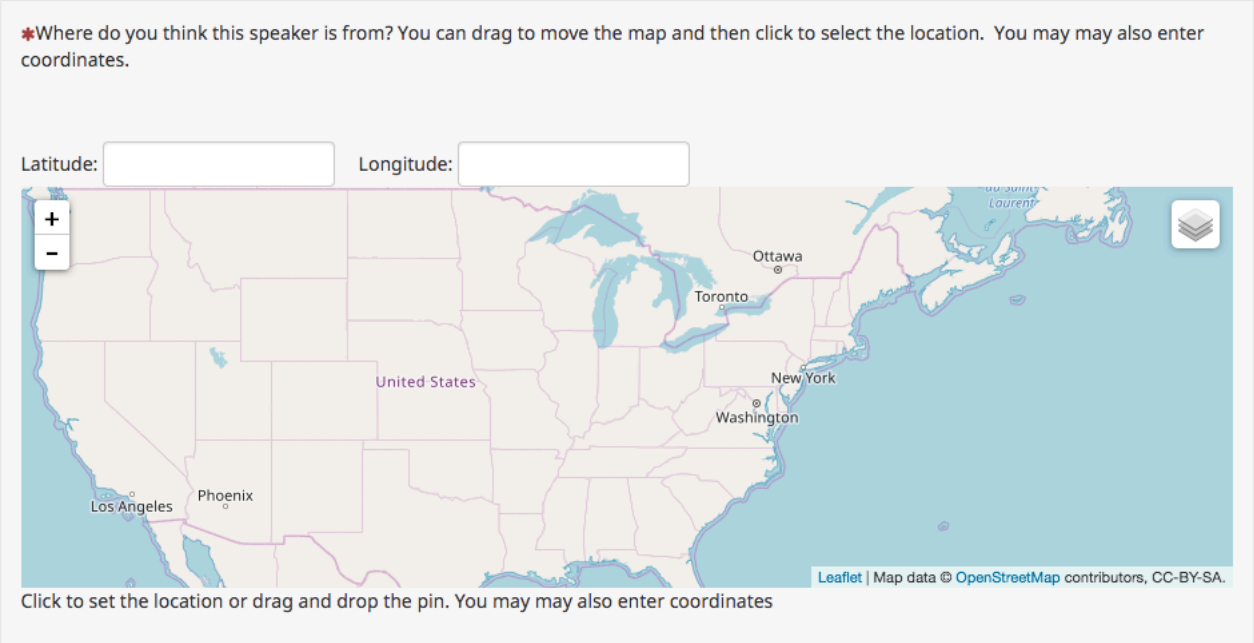


Figure 3.4: Distractor Map Placement Question

3.2.4 Sample

3.2.5 All participants

Convenience sampling using mTurk to recruit participants from New Hampshire and from Washington state was used. There were a total of 178 participants: 83 from New Hampshire and 95 from Washington state. The inclusion of participants from Washington state allows for the comparison between participants from a traditionally nonrhotic speech community (NH) to participants from a rhotic speech community (WA). The age distribution for participants was as follows:

Decade	New Hampshire Participants	Washington Participants	Total
1944-1950	0	3	3
1951-1960	8	6	14
1961-1970	8	14	22
1971-1980	10	22	32
1981-1990	37	31	68
1991-1999	20	19	39
Total	83	95	178

Table 3.2: Age distribution of participants (by decade) by state.

The gender distribution of participants, by state, are as follows:

Table 3.3: Distribution of gender of participants, by state.

New Hampshire Participants			Washington Participants			Total
Male	Female	Non-binary	Male	Female	Non-binary	
30	51	2	34	60	1	178

Overall, there were more participants from Washington state that participated in the study (95 in WA to 83 in NH), and the distribution was skewed younger and towards women in both states (Table 3.3).

3.2.6 New Hampshire Participants

Because the topic of investigation for this dissertation focuses on New Hampshirites' perceptions and evaluative responses, there was particular attention paid to age, regionality, and SES among

New Hampshire participants to examine whether or not these factors played a role within New Hampshirites' perceptions of rhoticity. The individual scores for each of these factors were grouped together into three categories for each of the variables. Following the migration data (see introduction of Chapter 2), three categories for the age counts: before 1970, 1970 - 1990, and after 1990 were produced. The distribution of New Hampshire participants, based on these age groups is as follows:

Table 3.4: Distribution of NH participants by age cohorts.

Age Group 1 before 1970	Age Group 2 1970 - 1990	Age Group 3 after 1990
16	41	26

Next Regionality Index Scores (Chambers, 2000; Chambers & Heisler, 1999) were calculated for each participant, and then three categories for the regionality scores were produced (3.5). The lower a regionality index score, the fewer multigenerational links a participant has to New Hampshire. Thus, those in Region Group 1, interlopers, have the fewest multigenerational links in New Hampshire, whereas those in Region Group 3, indigenes, have the highest number of multigenerational links in New Hampshire.

Table 3.5: Distribution of NH participants by Regionality Index Group.

Region Group 1 (Score 2 - 3)	Region Group 2 (Score 4 - 6)	Region Group 3 (Score 7 - 9)
30	24	29

Finally socioeconomic status scores were calculated for each participant. Again, three cate-

gories for the SES scores were produced. Those in SES Group 1 represent working class, those in SES Group 2 reflect middle class, and those in SES Group 3 reflect upper class.

Table 3.6: Distribution of NH participants by SES Group

SES Group 1 (Score 2 - 5)	SES Group 2 (Score 6 - 9)	SES Group 3 (Score 10 - 11)
29	38	16

3.3 Results

Initial inspection of the data showed an implicational scale: after a participant perceived rhoticity in a specific step in the continuum, all subsequent steps were perceived as rhotic. For example, if a person perceived rhoticity in the signal at step 4 of the continuum, they also perceived rhoticity (i.e. chose *farther*) in steps 5-7 as well. There were a handful of exceptions to this. Some participants (4 from WA, 1 from NH) chose *father* for every step in the continuum. This could potentially be due to the participants not taking the task seriously. There were also a handful of participants whose results did not follow an implicational scale, in that they perceived rhoticity (i.e. chose *farther*) in step 1, but did **not** perceive rhoticity in step two. However, with these exceptions, the next time they perceived rhoticity, their results followed an implicational scale.

Because of the nature of the data, and the implicational scale found, each participant was assigned a score of 0 - 7, representing which step in the continuum they began to hear rhoticity (0 represents the listeners who never reported rhoticity) for each of the three trials. Table 3.7 displays the counts of participants who identified perceiving rhoticity at each step in the continuum. The first column shows the step in the continuum. The second column shows the distance between $F2$ and $F3$ at that step. The third column shows the number of participants that identified rhoticity on that step. The fourth column shows the percentage of participants who identified rhoticity on that step. The final column shows the overall percent of participants who identified rhoticity by that step. For example, 35% of participants identified rhoticity on Step 5, but 81% of participants

identified rhoticity by Step 5.

	*F*2 - *F*3 distance	Count	Percent	Total
Step 0	NA	5	3%	3%
Step 1	1683 Hz	2	1%	4%
Step 2	1501 Hz	2	1%	5%
Step 3	1323 Hz	19	11%	16%
Step 4	1150 Hz	53	30%	46%
Step 5	980 Hz	62	35%	81%
Step 6	812 Hz	24	13%	94%
Step 7	647 Hz	11	6%	100%

Table 3.7: Counts of participants who identified rhoticity at each step in the continuum.

Table 3.7 demonstrates that by step 5 (*F*2 - *F*3 distance = 980 Hz), 81% (143 out of 178) of the participants perceived rhoticity, whereas at step 4, only 46% of the participants perceived rhoticity. When the distance between *F*2 and *F*3 is 1501 Hz or greater, 95% of the participants perceive the signal to be nonrhotic.

Regression analysis determined state was not a significant predictor of which step in the continuum a person perceived rhoticity ($F(1, 176) = 0.083$, $p = 0.773$). To rule out within-group variation for the null results found between states, a regression analysis was run on the NH participants, using Age Group, Region Group, and SES Group as predictor variables. The results from the regression for this was also not statistically significant ($F(3, 79) = 0.3581$, $p = 0.7834$). This suggests that perception of rhoticity, when keeping the speaker constant, is independent of social factors of the listener.

3.4 Discussion

The first research question of this dissertation aimed to establish the acoustic correlates of rhoticity and nonrhoticity. In order to examine the evaluation of an attitude object, it was imperative to ensure that the attitude object in question was seen as such. On its own, this study demonstrates the acoustic correlates for the perception of rhoticity by untrained listeners. The results suggest that participant-listeners generally perceive the speaker as being rhotic when the proximity between $F2$ and $F3$ reaches 980 Hz. Further, approximately 95% of participants perceived the signal as nonrhotic when the distance between $F2$ and $F3$ reaches 1501 Hz. It is important to bear in mind, however, that we are not suggesting these to be absolute values, but rather this is the proximity that cues rhoticity for this speaker when the preceding vowel is /a/. It is hoped that these results can further the understanding of post-vocalic, American English /ɹ/. The acoustic correlates for American English /ɹ/ found in this study are somewhat similar those described in Hagiwara (1995). Hagiwara (1995) found that for word-final /ɹ/ for female speakers, $F3$ tends to have a mean just above 2000 Hz.

Situating this study within the potentiated recruitment framework, this study suggests that the first step of the evaluative process, noticing, does not appear to be affected by social factors of the listener. This could partially be due to the fact that the goal in creating this task was to try and establish a neutral environment by attempting to remove as much social information about the speaker as was possible. In other words, this study examined the acoustic correlates of (non)rhoticity when untrained listeners are only provided a voice and no other explicit social cues such as age, region, or socioeconomic status of the speaker. The study design was aimed towards mitigating the effects of social information about the speaker by using the same speaker for every audio clip, limiting the audio clip to a single syllable, and not providing social information about that speaker, especially with regard to region. This is an important caveat to the results of this study. Especially because previous research suggests that information about the speaker can bias perception (Niedzielski, 1999; Strand, 1999), and the type of noticing that is discussed here excluded social cues about the

speaker. While it is entirely possible that listener participants were using something in the signal that was not accounted for in order to add in social cues about the speaker, it does not appear that, if that was the case, it affected participants in a patterned manner.

As part of the larger research objectives of this dissertation, this study establishes the validity of the study in Chapter 4. By establishing the acoustic cues of the speech signal when it is perceived as rhotic and nonrhotic, we were able to ensure that the tokens used in the study from Chapter 4 would be considered rhotic and nonrhotic by the participant-listeners.

Chapter 4

CLASSIFICATION OF (NON)RHOTICITY

4.1 Background

The second step of the evaluative process is classifying. The aim of this study is to understand where or with whom New Hampshirites associate nonrhoticity. As discussed in Chapters 1 and 2, previous research suggests that nonrhoticity is associated with Boston and rural New England. The anecdotal evidence from the pilot study, however, showed that some New Hampshirites associate nonrhoticity with their own speech (New Hampshire speech), while others suggested it was a feature of Massachusetts (or Boston) speech.

Classifying is the step that connects the attitudinal object to a particular group within the attitudinal cognitorium (Preston, 2010a). In the context here, participant listeners are making connections with the nonrhotic speech and regions or groups where they associate that speech. In other words, we are asking what microconcepts are activated for a participant when they hear nonrhoticity. Utilizing a classification task to uncover where or with whom listeners associate a particular variant is an integral part of understanding the evaluation problem, as Preston (1993) states:

> [u]nless we ask (and surprisingly few studies of language attitude have), we do not know where the respondents believe a voice is from. A report might accurately state that respondents had certain attitudes towards a South Midland voice sample, but the respondents might have gone home believing that they had heard an Inland North one (p. 193).

In order to argue that the decline in nonrhoticity in New Hampshire is a reflection of attitudes about Boston, it is imperative to first establish that nonrhoticity is classified as Boston speech.

Similar types of studies have asked participants to identify the dialect region of a speaker based on dialect features. However, these studies typically do not use a map as the instrument, and instead use category labels. For example, Clopper and Pisoni (2004) examined how well listener participants could identify the dialect region of a speaker and found that untrained listeners were able to use acoustic cues to categorize three broad regions (New England, South, North/West), but were not able to categorize fine-grained regions. Schuld et al. (2016) provided participants from Wisconsin speech samples that were lacking stereotype variants (Labov, 1972) to see if listeners were able to correctly classify a speech sample into the correct dialect region and found that in the absence of stereotype features, Wisconsinites were able to correctly identify Wisconsin speech.

The study presented here differs from both of these and more closely resembles Plichta and Preston (2005), in which the aim was to determine if the degree of monophthongization of [aɪ] correlated with the degree of "Southernness". The study consisted of a matched-guise experiment in which the participants listened to seven different degrees of [aɪ]-monophthongization and were asked to indicate on a map the place represented by the guise they heard. They were given seven cities as the places they could choose. Plichta and Preston (2005) found that participant listeners associated degree of monophthongization with degree of southernness: the amount of monophthongization in the guise matched the location of southernness on the map. The most monophthongized token was consistently placed in the southern-most city by participants, the least monophthongized token was placed in the northern-most city by participants, and the rest of the tokens followed in the order of north to south, least monophthongized to most monophthongized.

The experiment in this chapter differs from Plichta and Preston (2005) in a few ways. First, it was conducted online. Second, this experiment is an open-ended classification task. Participants were not asked to classify nonrhoticity based on pre-defined places. Third, this study consisted of three steps in a continuum: rhotic, nonrhotic, and ambiguous. Instead of examining degree of rhoticity with closeness to Boston, the aim is to examine whether or not there are clusters associated with Boston when nonrhoticity is present in the signal. One consequence of this approach is that

the results from this study will be “messier”.

4.2 Methods

This study was an online open-ended classification task, implemented by LimeSurvey (Limesurvey, 2019) and distributed via mTurk (Amazon, 2019). Utilizing mTurk qualifications, participants who were from New Hampshire[1] were able to complete the study. Unlike other classification tasks (Clopper & Pisoni, 2004; Schuld et al., 2016; Plichta & Preston, 2005, among others), where the participants were given prescribed options from which to choose the perceived region of the speaker, participants were provided with a map of New England and asked to indicate (by clicking on the map) where they believed the speaker was from based on a sentence uttered.

Participants listened to audio clips spoken by male and female speakers, and selected on a map where in New England they believed the speaker was from. A three-step continuum for rhoticity was created for the words *heart* and *farm* for two male and three female speakers. There was a total of 19 different voices: 2 male and 3 female guises for the target sentences, along with 14 additional voices for filler sentences. Participants listened to a total of 64 speech samples and answered two distractor questions.

4.2.1 Stimuli and Filler Considerations

The results of the acoustic correlate study (Chapter 3) were used as a guide for manipulating the speech samples for the rhoticity continua in this study. Unlike the study in Chapter 3, it was important to manipulate speech of New Englanders. One reason is that it was imperative the participants perceive the speech as from New England. Even though at the inception of this study (2017), there had not been any research that examines suprasegmental features that are attributed to the New

[1]This meant that we had participants who may not have been raised in NH, but currently lived in NH, or who had lived in NH for a short period of time. We used the same demographic questions that were used in the first study to understand more about the participants’ relationship to the region. Asking detailed demographic questions allowed us to omit participants who scored zero on the Regionality Index Score.

England dialect, this does not mean that they do not exist. In fact, Schuld et al. (2016), demonstrate that even in the absence of stereotype linguistic features (Labov, 1972), non-New Englanders can identify the eastern New England dialect[2]. This suggests that untrained listeners do attune to non-salient features, and perhaps suprasegmental features such as prosody. Further, because the task asked participants to identify the area represented from the stimuli, it was imperative to use multiple speakers. Instead of reusing the stimuli created for the acoustic correlate study, then, we are using the acoustic cues for the perception of rhoticity to guide the manipulation of the rhotic and nonrhotic stimuli for different speakers. For these reasons, the sentences for these stimuli come from sociolinguistic interviews that were conducted in the spring of 2013. Each interview was recorded using an H4next Handy Recorder with a 44.1 kHz sampling frequency and 16 bit rate. The speakers were all from southeastern NH, and interviews took place at participants' homes, places of work, or schools. All interviews consisted of the following activities in this order:

1. Demographic questionnaire
2. Word list, in isolation
3. Sentences, in isolation
4. Semantic differential technique (Labov, 1984)
5. Reading passage[3]
6. Directed conversation regarding the speakers' attitudes about their community, New Hampshire, Boston, and New England.
7. Directed conversation regarding the speakers' awareness of and attitudes towards language variation and change in the region[4]

The activities were performed with the conversation concluding the interview in order to reduce priming by the conversation topics that were discussed in the directed conversation. Conver-

[2]Was identified as *Boston* in the study

[3]Adapted from Nagy (2001) "How to Survive a New England Winter"

[4]Both directed conversation topics provided the data for the content analysis pilot study in Chapter 1.

sation topics can prime respondents' production of specific features, and the localized studies in the region have attributed attitudes towards rural New Hampshire or Boston (Stanford et al., 2012, 2014; Nagy, 2001) as a catalyst for linguistic change in the region. The aim was to not prime respondents' linguistic production by invoking attitudes about these topics until the *end* of the sociolinguistic interview. Instead, the order of activities began with the most attention to speech paid at the beginning (Labov, 1966) of the interview with the word list and sentences. Because of this methodological decision, the order of tasks in this study was different from the traditional order of a sociolinguistic interview.

The sentences for the study presented here were chosen from the isolated sentences read by the participants. This was to ensure that the same sentences were spoken by each of the guises, and to avoid prosody issues from extracting a sentence from a larger spoken utterance, such as the reading passage.

The filler sentences chosen for this study were:

My father doesn't bother to take off his shoes at home.
My Aunt Mary is planning to marry a generous, merry old man.
I caught a cold because I slept on a cot by the window.
That story about the witch has some scary topics which might frighten kids.
This horse seems to have a hoarse throat.

The sentences chosen as stimuli only included a single token that could be manipulated for rhoticity. These two sentences were (target word bolded):

*I calmly took the candy **heart** from his palm.*
*Out on the **farm**, my aunt takes care of a calf.*

Even though the second sentence contains /ɹ/ in the word *care*, it is followed by a vowel sound, and is usually produced as a rhotic, even by non-rhotic speakers (Nagy & Irwin, 2010). Further,

both sentences contain the potential for another traditional New England feature: fronted FATHER in the words *calmly* and *palm*. The speakers chosen produced this vowel further back, i.e. merged with the LOT class (/ɑ/). The formant structure of these words was not manipulated, and instead left with the original pronunciation of the speaker. Both options, manipulating or not manipulating the formant values for these tokens, would result in confounding results. On the one hand, not manipulating the formant values of these tokens may result in participants deciding that the speakers of these guises are **not** from Boston/rural New England, regardless of nonrhoticity, because none of the guises contain FATHER-fronting. On the other hand, if we had manipulated the guises to contain FATHER-fronting, participant listeners may have used that feature as an indicator of where the speaker was from. Because this dissertation deals with the evaluation of nonrhoticity, confounding results from the second option (e.g. manipulating the formant values for *calmly* and *palm*), would be more detrimental to an analysis of the evaluation of nonrhoticity. In essence, the analysis could potentially end up not being able to determine whether or not participants were attuning to the pronunciation of *calmly* and *palm* or of nonrhoticity. One way to get around this would be to create more stimuli so that each step on the continuum of rhoticity contained one sentence where these vowels were fronted and one where these vowels were not. However, this would end up doubling the number of stimuli, creating a perceptual task that could result in participant fatigue. For this reason, the original pronunciation of *calmly* and *palm* were used in these sentences. Further, rhoticity is assumed to be a more salient feature of the community (Stanford et al., 2012), and as such, *should* be what participant-listeners attune to when making their decisions.

4.2.2 Creating the Stimulus Continua

The process for creating the continua for this study was similar to the process outlined in Chapter 3. The first step of the process was to extract the target word (*heart* or *farm*) from the sentence. Next, the vowel and following rhotic were extracted for manipulation, using the same gating technique as previously discussed (3.2.1). All tokens for manipulation were rhotic; no speakers used for

manipulation were nonrhotic in their production of these tokens.

F1, *F*2, and *F*3 for the rhotic and nonrhotic endpoints were modeled on the average *F1*, *F*2, and *F*3, respectively, of each speaker. The averages were calculated for the different guises by using the token words in these sentences and words from the word list in the same phonetic environments, taking into consideration the results from Chapter 3, where the majority of New Hampshirites identified the speech signal as rhotic when the proximity of *F*2 and *F*3 reaches 980 Hz. This ensured that the rhoticity and nonrhoticity were natural for the guise and also considered rhotic (or nonrhotic) by listeners. In order to maintain similar durations for formant transitions from the vowel to /ɹ/, we used the proportions used in the acoustic correlate study for all speakers. The transition from the vowel to /ɹ/ begins between 25 and 30% into the signal, and the point of maximal restriction is reached between 85 and 90% into the signal. Table 4.1 displays the proximity of *F*2 and *F*3 for each of the manipulated rhotic guises. The point of maximal constriction occurs between 85 - 90% into the signal. Table 4.2 displays the proximity of *F*2 and *F*3 at the same point in the signal for each of the manipulated nonrhotic guises. Speakers 1 - 3 were female speakers (indicated with an 'f' in parentheses), and Speakers 4 - 5 were male speakers (indicated with an 'm' in parentheses).

The proximity of *F*2 and *F*3 for all speakers was much lower than 980 Hertz for both *farm* and *heart* in the rhotic guises. Further, the distance between *F*2 and *F*3 is much lower than 1501 Hertz in the nonrhotic guises. Recall the findings in Chapter 3 that showed 46% of participants perceived rhoticity when the proximity between *F*2 and *F*3 was 1150 Hz or smaller, and 16% of participants perceived rhoticity when the proximity was 1323 Hz. At first glance, it appears that the nonrhotic stimuli run the risk of being perceived as rhotic, as the distance between *F*2 and *F*3 never surpasses 1323 Hertz in the nonrhotic guises for any participant. However, this can be explained by examining the acoustic differences in the production of the preceding vowel, /a/, between the speakers in this study and the speaker in the previous study. The value of *F*3 for /a/ in the previous study was about 3000 Hz, whereas the *F*3 for /a/ for the speakers in this study

Speaker	Word	*F*2 - *F*3 distance
Speaker 1 (f)	farm	462 Hz
	heart	400 Hz
Speaker 2 (f)	farm	486 Hz
	heart	558 Hz
Speaker 3 (f)	farm	431 Hz
	heart	417 Hz
Speaker 4 (m)	farm	380 Hz
	heart	340 Hz
Speaker 5 (m)	farm	379 Hz
	heart	341 Hz

Table 4.1: *F*2 - *F*3 distance for rhotic guises

Speaker	Word	*F*2 - *F*3 distance
Speaker 1 (f)	farm	1109 Hz
	heart	1079 Hz
Speaker 2 (f)	farm	1267 Hz
	heart	1317 Hz
Speaker 3 (f)	farm	1309 Hz
	heart	1302 Hz
Speaker 4 (m)	farm	1153 Hz
	heart	1255 Hz
Speaker 5 (m)	farm	1255 Hz
	heart	1152 Hz

Table 4.2: *F*2 - *F*3 distance for nonrhotic guises

ranged from about 2300 - 2600 Hz. The value of *F*2 for /a/ in the previous study was about 1200 Hz, whereas the value of *F*2 for /a/ for the speakers in this study ranged from about 1100 - 1200 Hz, with the exception of Speaker 1, whose *F*2 for /a/ was about 1500 Hz. This means that the distance between *F*2 and *F*3 for the formant transition into the /ɹ/ began at around 1800 Hertz for the phonetician in the previous study and reached a proximity of 980 Hz at the point of maximal constriction. The distance between *F*2 and *F*3 for the formant transition into the /ɹ/ began between 1200 - 1400 Hz for the speakers in this study and reached a proximity between 340 and 486 Hz at the point of maximal constriction. Figure 4.1 shows the formant contours for *F*1, *F*2, and *F*3 for steps 1 - 3 in the continuum for the manipulated segment of the word *farm* for Speaker 5[5]. Light blue indicates nonrhoticity (step 1 in the continuum) and dark purple indicates rhoticity (step 3 in the continuum).

After the endpoints were manually manipulated, the middle step of the continuum was automat-

[5]See Appendix D for the formant contours of the rhotic-nonrhotic continuumfor each of the five guises.

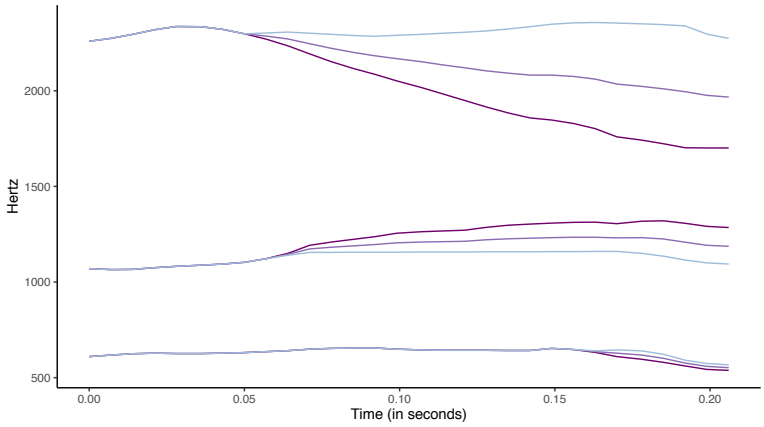


Figure 4.1: Representation of the first three formants in each step of the rhotic-nonrhotic continuum for the word *farm* for Speaker 5. $F1$, $F2$, and $F3$ of each step in the continuum is represented by a different color.

ically calculated as the midpoint between the two end points. Once this process was completed, the target word was then spliced into the original sentence, and some adjustments to amplitude were made in order to maintain naturalness between the unaltered and altered portions of the sentence. Feedback regarding naturalness and presence/absence of rhoticity was elicited from linguists and non-linguists and was used to guide a series of refinements to the resynthesized continua.

4.2.3 Stimuli Presentation

This study was also designed using LimeSurvey (Limesurvey, 2019) and disseminated via mTurk (Amazon, 2019). Participants were told that the goal of the study was to see how well they could locate different speakers within New England. Participants were advised to wear headphones to listen to the sound files, and a debrief question asking what they used to listen with was included. Although the main concern was whether untrained listeners from New Hampshire associated non-rhoticity with Boston or rural New England, participants were told the speakers were from all over New England for two reasons, both of which have to do with the limitations of customizing the presentation of the map. The map presentation was made possible by the Leaflet library (Agafonkin &

Cloudmae, 2019), a free and open-sourced JavaScript library used for web mapping applications. Without modifications to the code in LimeSurvey, customizing the map to only present New Hampshire and Massachusetts was not possible. Instead, participants were given a map that showed the surrounding states (Maine, Vermont, Rhode Island, Connecticut, and part of New York). Because of this, participants were able to click on any of the other areas, regardless of the instructions[6]. Second, the map features, such as physical geography, major highways, and city names, were also not customizable. Therefore, as shown in Figure 4.2, city and town names and Interstates 93 and 95 (emphasized on image below for clarity) could not be removed. Thus, by telling participants to only select New Hampshire or Massachusetts, the concern was that the map presentation would bias them, especially along Interstate 93 that connects Concord, NH to Boston, MA. Because of these concerns, and also the potential that New Hampshirites could associate nonrhoticity with locations in New England other than Boston and rural New England, participants were given all of New England to choose from.

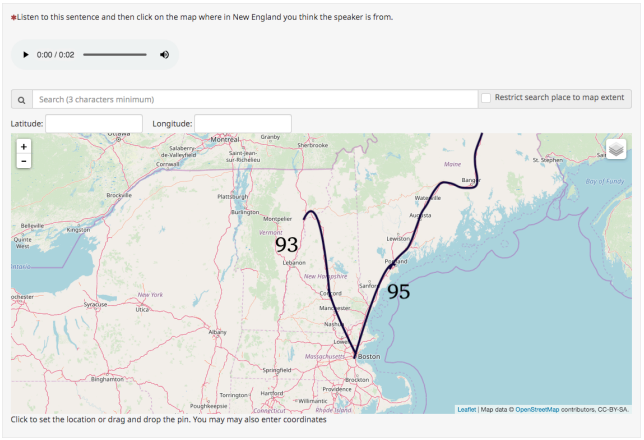


Figure 4.2: Map presented to participants for every question in the study. Black lines representing Interstates 93 and 95 highlighted here for clarity.

[6]Inspection of the results demonstrated that a number of participants selected areas in New York even though they were informed that the speakers were all from New England.

Participants answered the same demographic questions as in Chapter 3. This study commenced with two familiarization questions, allowing participants to get acquainted with the audio stimuli and selection process on a map (Figure 4.2). Participants listened to one of three fixed orders of quasi-randomized audio clips that consisted of complete sentences, spoken by male and female speakers, and then were asked to indicate on a map where they believed the speaker was from based on the sentence uttered. (See Section 3.2.3 for further discussion on quasi-randomization and the fixed order.)

Participants listened to each of the three steps in the rhotic - nonrhotic continuum in both of the sentences for each of the 5 different speakers once. This created a total of 30 stimuli for each participant. There were an additional 34 filler sentences incorporated into the study. A higher number filler sentences than stimuli were added to try and ensure that participant-listeners did not recognize the purpose of the study. The participants were informed that they would be listening to *different* New Englanders' speech, and as such, it was crucial that all precautions were taken to mitigate participants recognizing the same speaker multiple times. The filler sentences included some of the same speakers as the stimuli, but also an additional 16 speakers.

Similar to the study in Chapter 3, two distractor questions were added 1/3 and 2/3 of the way through the experiment. The first distractor question was the same as in the previous study, asking participants to rate four types of places in terms of how much they would prefer to live in that area (city, town, urban area, rural area). The second distractor question asked participants to rate the six states of New England by dragging them in order of best to worst. These questions were used in order to break up the monotony of the classification task.

4.2.4 Sample

Convenience sampling using mTurk (Amazon, 2019) was used to recruit and pay participants for this study. There were a total of 73 participants. There was a skewed distribution with regard to gender for this sample. 40 participants identified as women; 29 participants identified as men; 2

participants chose not to answer; and 1 participant identified as non-binary. The following tables (Tables 4.3, 4.4, and 4.5) show the distribution of participants by age, regionality and SES.

Participants were broken into three separate age groups. Age Group 1 represents those born before 1970. Participants born between 1970 and 1990 are placed in Age Group 2, and Age Group 3 consists of participants born after 1990.

Table 4.3: Distribution of NH participants by age cohorts.

Age Group 1	Age Group 2	Age Group 3
15	38	20

The Regionality Index was calculated in the same manner as Chapter 3, and participants were then categorized into one of three groups, depending on their index score. Region Group 1, interlopers (Chambers, 2000), represents those with the fewest multi-generational links to New Hampshire (a score less than 4). Region Group 2, in-betweeners, represents those with an index score between 4 and 6. Region Group 3, indigenes (Chambers, 2000), represents those who have the most multi-generational links to New Hampshire (an index score between 7 and 9).

Table 4.4: Distribution of NH participants by regionality group.

Region Group 1	Region Group 2	Region Group 3
26	25	22

Participants were categorized into one of three groups for socioeconomic status based on the composite score of occupation, income, and education. SES Group 1 would be considered working class; SES Group 2 would be considered middle class; and SES Group 3, upper class.

Table 4.5: Distribution of NH participants by SES group.

SES Group 1	SES Group 2	SES Group 3
19	32	22

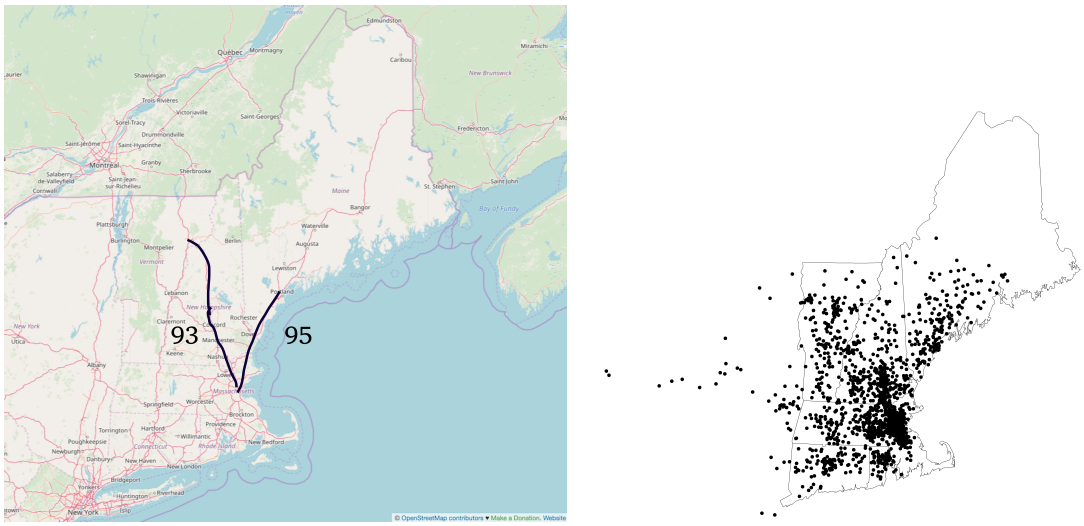
As in the previous study, there are skews for both gender and age. Those born between 1970 and 1990 were oversampled, as well as women. Part of the reason for this has to do with the demographics of the people who appear to use Amazon Mechanical Turk. The population using this interface appears to be younger, and female. The middle class is also over-represented in this data. Region Group is the most evenly distributed of the sociodemographic factors.

4.3 Results

The data consisted of answers to the sociodemographic questions along with geographic coordinates (latitude and longitude) that correspond to the placement of each guise for each participant. The sociodemographic information about each participant was converted into scores for age group, SES, and Regionality Index (Chambers & Heisler, 1999; Chambers, 2000). These scores, in conjunction with the spatial information were quantitatively analyzed using two ArcGIS tools (ESRI, 2019): Global Moran's *I* (Moran, 1950) and Anselin's local Moran's *I* (Anselin, 1995). Global Moran's *I* measures spatial autocorrelation between the attribute values (in the cases here, age, SES, regionality) and the location of a given feature (the latitude and longitude of a given point) (Chun, 2013; Scott, 2010; Haining, 2007). Given a set of spatial features and an associated attribute, spatial autocorrelation evaluates whether the spatial pattern expressed is clustered, dispersed, or random (Scott, 2010). The tool in ArcGIS calculates the Moran's I Index value and both a z-score and p-value to evaluate the significance of the index value. If a statistically significant spatial autocorrelation was found, we then used Anselin's local Moran's *I* to calculate the statistically significant clustering or dispersion of the highest and lowest feature values of a given dataset

as well as spatial outliers, and show where that clustering occurs on a map (Anselin, 1995).

In what follows, first the distribution between rhotic and nonrhotic stimuli is presented. Next, a comparison between the different groups within a given social variable is explored, and finally the social variable is tested for significance using both Global Moran's I and Anselin's local Moran's I (where applicable). Map 4.3b shows the distribution of the locations selected by all participants for all three steps in the rhotic-nonrhotic continua of the two stimulus sentences for the five speakers (30 sentences per participant). The filler sentences have been removed for clarity of the visualization.



(a) Map Instrument

(b) Distribution of the locations selected on the map

Figure 4.3: Comparison of the map instrument (left) to the placement of guises for for all participants (right).

Before addressing the research question, it is crucial to point out that the map instrument used may have influenced the placement of the guises on the map by participants. Comparing Map 4.3a (adapted again for visual ease) and Map 4.3b, it seems as though Interstate 93 may have biased the location of responses for some of the participants. There appears to be a cluster along Interstate

93, located between Concord, NH and Boston, MA. There also appears to be a (less) prominent cluster along Interstate 95, from Portland, ME to Boston, MA. Further, there appear to be clear clusters around around Portland, ME, Providence, RI, and Hartford, CT. This supports the findings of Bounds and Hettel (2014) that social and physical features that are provided on the map will bias the responses provided by participants. Although there is potentially bias due to the map instrument, there is still variation in the placement of these guises, which is further highlighted by examining sociodemographic characteristics of the participants.

The first step to understanding where New Hampshirites "locate" nonrhoticity was to subset the guises by rhotic (step 1 of the continuum), nonrhotic (step 3 of the continuum), and ambiguous (step 2). We turn our focus to compare the rhotic (step 1) and nonrhotic (step 3) throughout this section[7]. Map 4.4 compares the placement of the guises based on whether the sentence contained a rhotic pronunciation (left) to a nonrhotic pronunciation (right).

The placement of both rhotic and nonrhotic guises appear to be spread throughout New England, with the exception of northern Maine. The lack of placement in northern Maine is most likely due to the map instrument, as a participant would have had to reposition the map to click on northern Maine. Clusters in the Boston metro area are present on both maps; however there appears to be a more prominent cluster in Boston when the guise is nonrhotic. In the rhotic condition, the cluster around Interstate 93 from Concord, NH to Boston, MA appears more prominent than in the nonrhotic condition. In both rhotic and nonrhotic guises, there is dispersion throughout Vermont and central New Hampshire. There appears to be more placement in Connecticut when the guise is rhotic; however, a cluster in the center of Connecticut is present in the nonrhotic guise. There is also a cluster in Rhode Island, centering on Providence in both the rhotic and nonrhotic guises.

The research question to be answered here is where (or with what group) do New Hampshirites associate with nonrhoticity. The map depicting the placement of nonrhoticity suggests that while there is a prominent cluster around the Boston metro area, nonrhoticity is also associated through-

[7]Appendix E shows the distribution of the ambiguous stimuli (step 2).

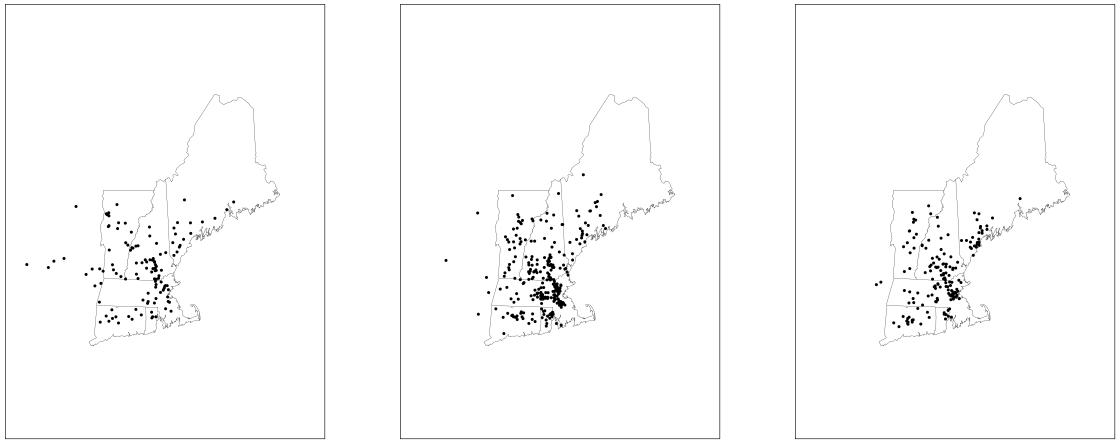
Figure 4.4: Comparison of placement of guise when guise is rhotic (left) and nonrhotic (right)

out New England. In order to examine the variation on the placement of nonrhoticity within New England, we now turn to sociodemographic characteristics of the participants.

4.3.1 Age

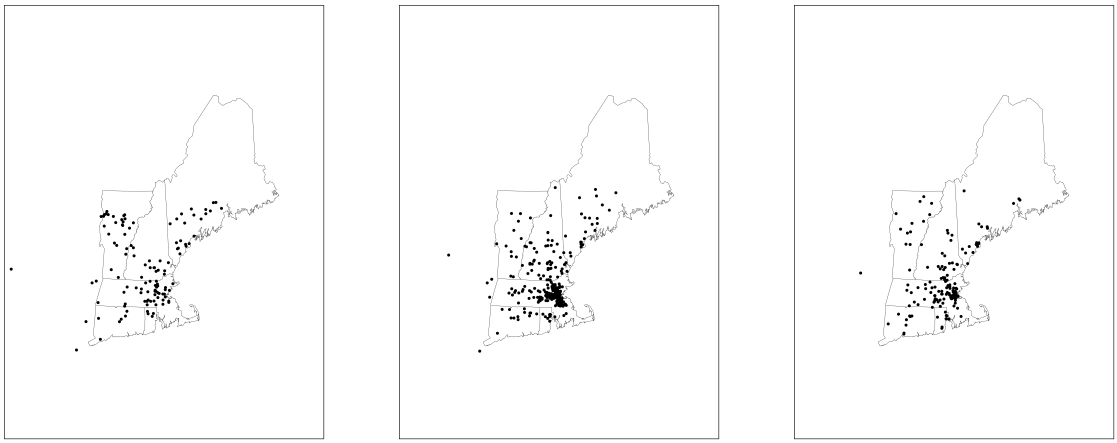
The first sociodemographic characteristic examined was age. Participants were categorized into one of three age groups (see Table 4.3). The following maps show a comparison of the placement of the rhotic guises (top row) and the nonrhotic guises (bottom) for each of the age groups.

Figure 4.5: Placement of rhotic stimuli grouped by age



(a) Age Group 1 **(b)** Age Group 2 **(c)** Age Group 3

Figure 4.6: Placement of nonrhotic stimuli grouped by age



(a) Age Group 1 **(b)** Age Group 2 **(c)** Age Group 3

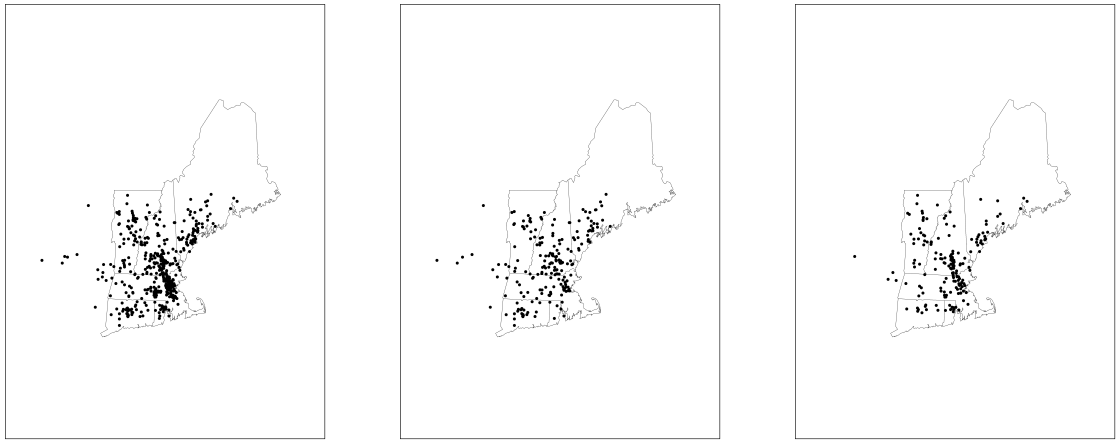
The maps in Figures 4.5 and 4.6, show different distributions with respect to the location of rhoticity and nonrhoticity in New England, as perceived by New Hampshirites. Comparing the top row of maps to the bottom row of maps demonstrates the shift in distribution when the guise is rhotic and nonrhotic. For age groups 2 and 3, i.e. those born *after* 1970, there is a general tendency to place nonrhoticity in the Boston metro area. The clusters in Boston become much more prominent when the signal is nonrhotic than when it is rhotic. With age group 2, nonrhoticity is still dispersed throughout the six New England states. With age group 3, there is also some dispersion throughout other parts of New England with respect to nonrhoticity; however it appears as though there is less placement of nonrhoticity outside of the Boston metro area. This may be due in part to the unequal number of participants between these two groups (n = 20 in age group 3 versus n = 38 in age group 2). The placement for nonrhoticity by age group 1, i.e. born *before* 1970, appears more dispersed than the other two age groups. The cluster in the Boston metro area appears to be less prominent than the other two age groups for nonrhotic stimuli. Nonrhotic stimuli are distributed across southeastern New Hampshire, Eastern MA (the Boston metro area), parts of northern Vermont, and parts of central and southern Maine.

A spatial autocorrelation, using Global Moran's *I*, in ArcGIS was conducted to measure this pattern. This calculation was statistically insignificant (p = 0.8). In other words, the degree of spatial concentration or dispersion based on age alone is not statistically significant. However, results should be taken with caution, as the second age group was double the size of both of the other age groups.

4.3.2 Regionality

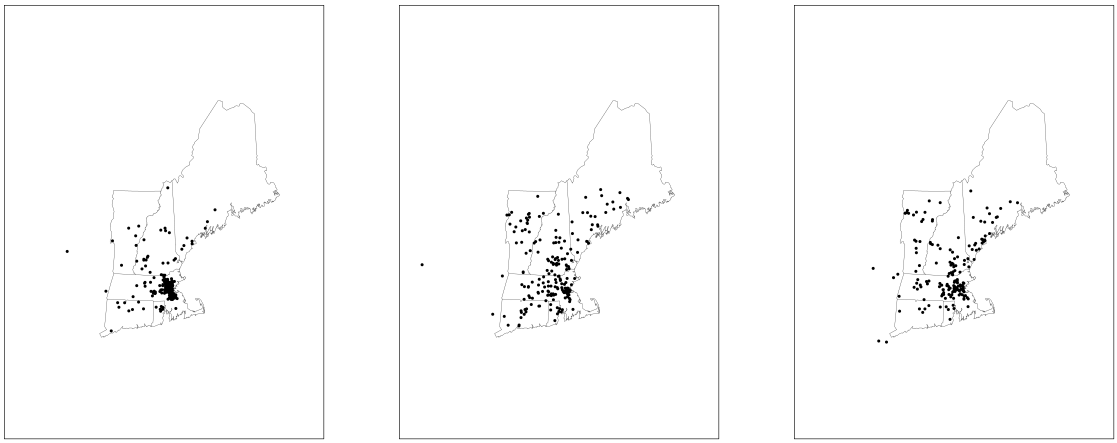
The second sociodemographic characteristic examined was the Regionality Index Score (Chambers & Heisler, 1999; Chambers, 2000). The Regionality Index score was calculated in the same manner as in Chapter 3, and participants were categorized into one of three region groups (see Table 4.4). Maps 4.7a - 4.8c compare the placement of rhotic and nonrhotic stimuli within each region group.

Figure 4.7: Placement of rhotic stimuli grouped by regionality



(a) Region Group 1 **(b)** Region Group 2 **(c)** Region Group 3

Figure 4.8: Placement of nonrhotic stimuli grouped by regionality



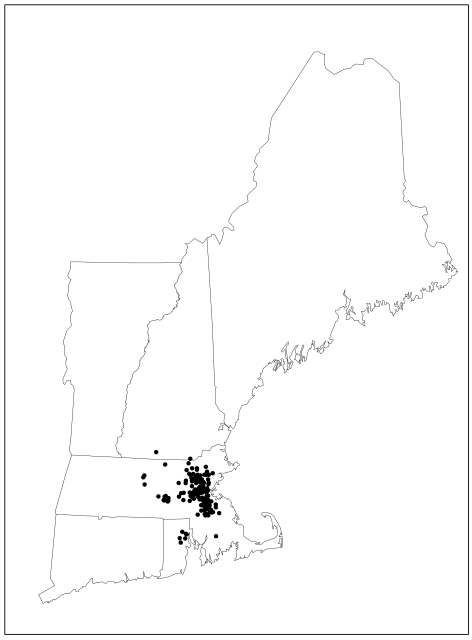
(a) Region Group 1 **(b)** Region Group 2 **(c)** Region Group 3

These maps demonstrate a clear indication that the presence or absence of rhoticity in the signal is playing a role in where the participant listener believes the speaker is from. This is especially evident in the Map 4.8a: those with the lowest regionality scores tend to classify nonrhotic speech as from Boston. We see the strongest clustering of nonrhoticity in the Boston metro area by this group.

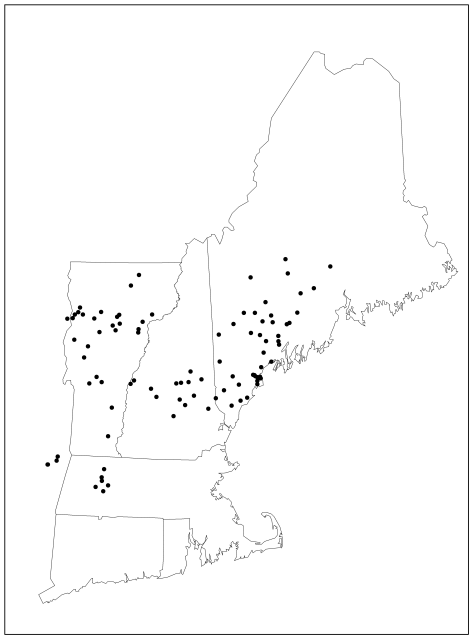
Global Moran's *I* autocorrelation indicated that the spatial distribution of high values and low values is more spatially clustered than would be expected if underlying processes were random. The results of the Global Moran's *I* show that there is a less than 10% likelihood that the clustered pattern could be the result of chance. (Moran's Index = 0.455, Expected Index = 0.002, Variance = 0.07, z-score = 1.722, p-value = 0.08).

Anselin's local Moran's *I*, cluster and outlier analysis, was conducted to identify where spatial clustering occurs. This calculation identifies clusters of high values and low values, as well as spatial outliers. The maps in Figure 4.9 show the statistically significant cluster for the lowest region group on the left, and the statistically significant cluster for the highest region group on the right.

The statistically significant cluster for region group 1 occurs in the Boston metro area. Whereas the statistically significant cluster for region group 3 is spread through New Hampshire, parts of Maine, and Vermont. This is not to say that those from region group 3 did not place nonrhoticity in the Boston metro area–they did. However, those placed in the Boston metro area were considered outliers.



(a) Statistically significant clustering of non-rhoticity for participants in Region group 1, $p < 0.05$.



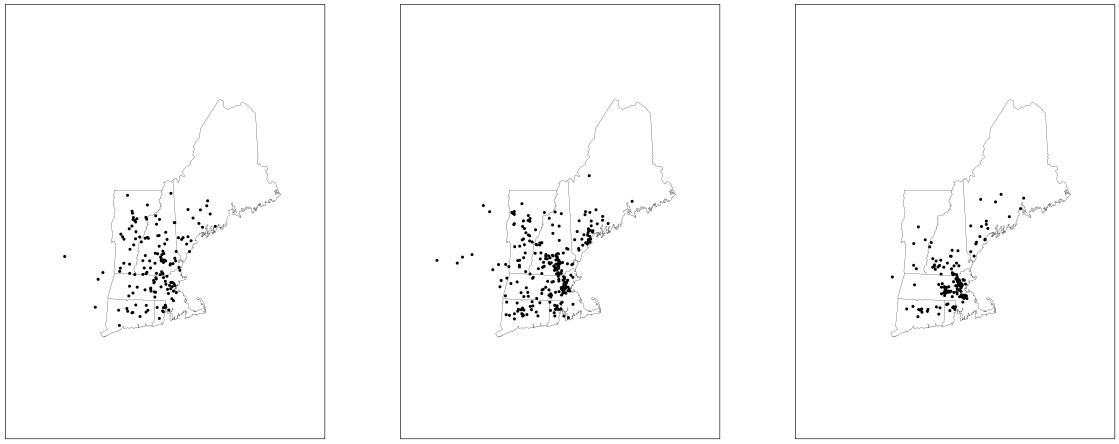
(b) Statistically significant clustering of non-rhoticity for participants in Region group 3, $p < 0.05$.

Figure 4.9: Comparison of the placement of statistically significant clustering of nonrhoticity for participants in Regionality group 1 (left) and 3 (right).

4.3.3 Socioeconomic Status

The next sociodemographic characteristic examined was socioeconomic status (SES) of the participant. Participants were broken up into one of three SES groups, related to working class, middle class, and upper class, as shown in Table 3.6. Maps 4.10a - 4.11c compare the placement of rhotic and nonrhotic stimuli within each SES group.

Figure 4.10: Placement of rhotic stimuli grouped by socioeconomic status

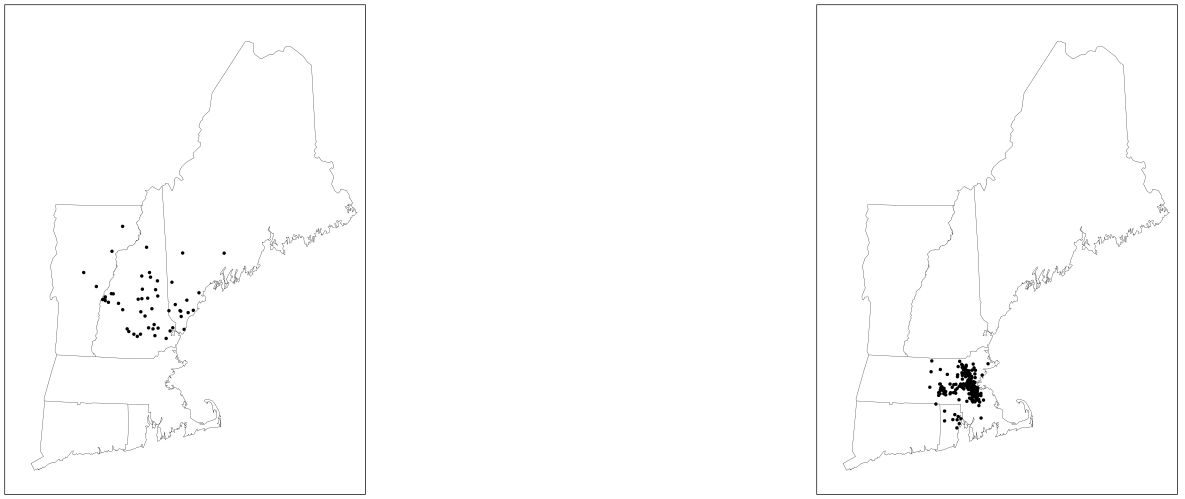


(a) SES Group 1 **(b)** SES Group 2 **(c)** SES Group 3

Figure 4.11: Placement of nonrhotic stimuli grouped by socioeconomic status

(a) SES Group 1 **(b)** SES Group 2 **(c)** SES Group 3

In each of the SES groups, there appears to be a cluster that forms in the Boston metro area when the speech signal is nonrhotic. In SES group 1, there is still a fair amount of dispersion throughout New Hampshire when the speech signal is nonrhotic. In SES group 2, there is dispersion throughout all six New England states with regard to nonrhoticity. In SES group 3, there is a tendency to place the speech sample in and around the Boston metro area regardless of rhoticity, but even more so when the speech is nonrhotic. The results of the spatial autocorrelation indicate that the spatial distribution is more spatially clustered than would be expected if underlying processes were random (Moran's Index = 0.50, Expected Index = -0.001, variance = 0.07, z-score = 1.922, p-value = 0.05).



(a) Statistically significant clustering of nonrhoticity for participants in SES group 1, $p < 0.05$.

(b) Statistically significant clustering of nonrhoticity for participants in SES group 3, $p < 0.05$.

Figure 4.12: Comparison of the placement of statistically significant clustering of nonrhoticity for participants in SES group 1 (left) and 3 (right).

Anselin's local Moran's *I*, cluster and outlier analysis, was computed to identify where the statistically significant spatial clustering or dispersion occurred. The maps in Figure 4.12 (a and b) show the statistically significant cluster for the lowest SES group (working class) on the left, and the statistically significant cluster for the highest SES group (upper class) on the right. These maps demonstrate separate clusters of the placement of nonrhoticity in New Hampshire, parts of Maine, and Vermont for those in SES group 1 and in the Boston metro area for those in SES group 3, indicating a sharp divide in the placement of nonrhoticity based on Socioeconomic Status.

4.4 Discussion

The results from this experiment suggest that while there is an *overall* tendency to place nonrhotic speech in Boston, there is still variation in the placement of nonrhoticity. However, sociodemographic characteristics about the participant listener can help explain *why* some of that variation exists. Younger speakers tend to classify nonrhotic speech as being from Boston more than older speakers. Those who have low regionality scores (interlopers) tend to classify nonrhotic speech as being from Boston more than other groups. Finally, those from the highest SES group tend to classify nonrhotic speech as being from Boston more than those from lower SES groups. These results, when compared with production data, should not be too surprising. Non-rhoticity in New Hampshire is typically found among older speakers and those from lower socioeconomic status groups[8]. The fact that some participants do not classify nonrhoticity solely with Boston, but rather other parts of New England is most likely a reflection of their linguistic world. If it is the case that participants are classifying without imbuing, then this task is simply a classification task in which participants are just recognizing who they hear nonrhoticity from. For example, working class people in New Hampshire still classify nonrhoticity as a widespread New England feature, whereas upper class participants expect nonrhoticity to occur in the Boston metro area.

In terms of the attitudinal cognitorium, when asking participants to determine where a speaker

[8]To date, the author is unaware of a production study in New Hampshire that utilized the Regionality Index score.

is from, we have moved from noticing to classifying. What we found is that some participants classify nonrhoticity with Boston, while others do not. Unlike Chapter 3, the sociodemographic variables *did* help to explain the variation present. This suggests that there is some order to the variation in the classification of nonrhoticity as being from Boston or somewhere else. Because we did not ask participants to type in the town (or city) that they associated each guise with, and there could be human error in the placement of the pin drop method, the results for this study were mainly to flesh out whether or not nonrhoticity was placed in the Boston metro area or perceived as a widespread New England feature. It could very well be the case that those who did not place nonrhoticity in Boston were choosing rural towns in New England. Unfortunately, due to the nature of the map instrument, and the task itself, there is no way to fully know this. In order to determine if New Hampshirites associate nonrhoticity with rural New England, another study would need to be conducted. A more appropriate method to examine the connection between nonrhoticity and rurality would be a matched-guise experiment using semantic differential items, such as rural $\sim$ urban. This type of study, however, would remove geometric space out of the equation. Finally, it is possible that listeners have already begun imbuing the stimulus. That is, they hear nonrhoticity and imbue some characteristic (such as crass or genuine) and that process of imbuing has happened so frequently that their positive/negative reflection is what guides their placement on the map. There is no way to tell from the study conducted here which of the two came first. However, what is evident is that we can explain the inter-individual variation present in the responses with regionality and socioeconomic status.

Chapter 5

PERCEPTUAL DIALECTOLOGY OF SOUTHEASTERN NEW HAMPSHIRE: EVALUATIONS OF BOSTON

5.1 Background

The final step in addressing the process of evaluation is imbuing. In the previous chapter, the attitude object was nonrhoticity. Results from the classification of nonrhoticity showed that some New Hampshirites classify nonrhoticity as a feature of Boston speech, whereas others classify nonrhoticity as a widespread New England feature. In the study presented in this chapter, the attitude object is Boston, rather than nonrhoticity. The aim is to examine how Boston is imbued by New Hampshirites in order to address the notion that negative attitudes towards Boston are a reason for linguistic change in New Hampshire.

A traditional method for understanding the ways in which the folk perceive and rate various dialect boundaries or regions is perceptual dialectology (PD) draw-a-map tasks (see Preston, 1989; Niedzielski & Preston, 2003). The current study asks participants to rate the correctness, pleasantness, and similarity. Correctness, pleasantness, and similarity ratings are assumed to measure competence, solidarity, and degree of sameness to one's own speech, respectively. Ryan and Giles (1982) demonstrate that the two general categories most used by speakers to evaluate speech are competence and solidarity. Preston (1999) examined a variety of evaluative dimensions used to measure speech ratings in the US and reaffirmed the findings of Ryan and Giles (1982): correctness and pleasantness are the two overwhelming groups into which all other evaluative dimensions fall into. These types of PD studies, examining the perception of dialect regions and using evaluative ratings to understand speakers' attitudes towards linguistic varieties have been carried out on a large-scale, examining broad regions (e.g., Preston, 1986; Montgomery, 2007; Long & Yim,

2002), and more localized regions (Evans, 2013; Cramer, 2010; Benson, 2003; Fridland, 2008; Fridland & Bartlett, 2006; Fridland et al., 2004; Bucholtz, Bermudez, Fung, Edwards, & Vargas, 2007). These studies help to uncover the linguistic mental maps (Gould & White, 1974) of the folk, and the ways in which people rate, or imbue, different dialect regions.

Results from previous PD research in New England have suggested that there is variation in the ratings of similarly perceived areas within New England. Although people identify similar regions within New England as having an identifiable way of speaking, there appears to be variation in the ways in which that region is evaluated (Hartley, 2005; Fernandes et al., 2014; Chartier & Jones, 2018).

The study presented in this chapter is a continuation of the work conducted in Chartier and Jones (2018). There were two analyses conducted for this study. The first analysis involves all areas in New England that participants identified as having a distinct manner of speech. The second analysis examines the valence of the evaluations of Boston, and whether the variation present in the evaluative responses can be explained by age, SES, or regionality.

5.2 Methods

The data collected for this study comes from Six Views of New England, an ongoing project conducted by Ben Jones and Nicole Chartier. This study consisted of an online adaptation of the draw-a-map task methods in Preston (1986), and disseminated online, using Facebook, Reddit, Twitter, and mTurk (Chartier & Jones, 2018). Participants were presented with a map of New England and asked to draw areas on the map where they believed people speak differently and then asked to rate the areas they drew.

5.2.1 Presentation of Map Instrument

The presentation of an online format for perceptual dialectology was made possible with an application called Folk Linguistics Online Mapping (FLOM), which is an open-source suite of tools for

collecting PD maps (FLOM, 2019). Participants were told that the goal of the study was to understand how New Englanders perceive New England English. The study began with the demographic questionnaire that was used in the Acoustic Correlate Study and the Classification of Nonrhoticity Study (Chapters 3 and 4, respectively). Next, participants completed a familiarization task, in which they were presented a map of the United States and asked to draw and label three regions, in order: New England, the Midwest, and the South. This task was used to orient participants to using the map instrument, drawing areas on the map using their computer or tablet, and labelling the areas they drew. The study tasks followed the traditional draw-a-map methods (Preston, 1986), participants were provided with a map of New England, devoid of city or town names, highways, and any other social or physical landmarks with the exception of state boundaries, and asked to perform the following tasks (in order):

1. Draw and label areas in New England where they believe people have a distinct, identifiable way of speaking. Participants could draw as many or as few regions as they wished. Participants were asked to use labels that described the region, the people, or the manner of speaking in the area drawn.
2. Rate the areas drawn (0 - 5 rating scale) on the following dimensions:
    - *Pleasantness*: How pleasant does the area sound to you?
    - *Similarity*: How similar is the area to your own speech?
    - *Correctness*: How correct does the area sound to you?
3. Provide any known stereotypes of the areas drawn.

For the purposes of this dissertation, the focus will be on the first two tasks: the geographic areas drawn by New Hampshirites as places where they believe people have an identifiable way of speaking, and the explicit ratings that were provided for those drawn areas. The method for rating in this study is a departure from the method used in Preston (1986), Fernandes et al. (2014),

among others. Instead of asking participants to rate pre-defined areas, such as states, the rating task used in this study asks participants to rate the areas that they drew (as used in Cramer, 2010, 2016), making a more explicit connection between the task of drawing and labelling the map with the rating task. The ratings for each of the dimensions was on a scale of 0 - 5, 0 being the lowest possible score and 5 being the highest possible score.

5.2.2 Sample

The sampling method for this study was online convenience sampling using Facebook, Reddit, Twitter, and mTurk. There were a total of 64 participants from New Hampshire. In terms of demographic distribution, there was an even distribution with regard to gender for this sample. 29 participants identified as men; 33 participants identified as women; 1 participant identified as non-binary; and 1 participant chose not to answer. The following tables (Tables 5.1, 5.2, and 5.3) show the distribution of participants by age, regionality and SES. Participants were grouped by age, regionality and SES in the same manner as the previous study. Age Group 1 represents those born before 1970; Age Group 2 represents those born between 1970 and 1990; Age Group 3 represents those born after 1990. Region Group 1 represents the interlopers (Chambers, 2000): those with the fewest multi-generational links to New Hampshire. Region Group 2 represents the in-betweeners, those with an index score between 4 and 6. Region Group 3 represents the indigenes (Chambers, 2000): those with the highest number of multi-generational links to New Hampshire. SES Group 1 represents working class; SES Group 2 represents middle class; SES Group 3 represents the upper class.

Table 5.1: Distribution of NH participants by age cohorts.

Age Group 1	Age Group 2	Age Group 3
9	36	19

Table 5.2: Distribution of NH participants by regionality group.

Region Group 1	Region Group 2	Region Group 3
9	17	38

Table 5.3: Distribution of NH participants by SES group.

SES Group 1	SES Group 2	SES Group 3
18	21	25

The distribution of participants across age groups is not ideal: the distribution is skewed towards those born after 1970, with those born before underrepresented. However, this distribution is not surprising for an online study. Further, the representation in Age Group 2 is almost double that in Age Group 3. This is most likely due to the fact that Age Group 2 represents a 20 year time span (1970 - 1990), whereas Age Group 3 represents only those born between 1990 and 1999.

In terms of regionality, participants are also not evenly distributed. Those with the highest regionality scores (the highest number of multi-generational links to New Hampshire) are overrepresented compared especially to those with the fewest number of multi-generational links to New Hampshire. The skew towards higher regionality scores in this data is most likely due to the way in which Jones and Chartier identified participants from a particular state within New England[1]. It is important to note that a participant's regionality score is not a reflection of their age. Within each Age Group, the average Regionality Index is between 6.5 - 6.8.

[1]In order to handle migration within the New England states, Jones and Chartier used where a person grew up as the state that a person represented. Therefore, a person who grew up in Massachusetts but now lived in New Hampshire would be categorized as MA. In this way, the majority of participants who were categorized as New Hampshire participants in their data grew up in New Hampshire. Those participants that did not grow up in New Hampshire also did not grow up in New England.

Each socioeconomic status group is well-represented in this data. Those in SES Group 1 represent working class, SES Group 2 represents middle class, and SES Group 3 represents upper class.

5.3 Data Processing

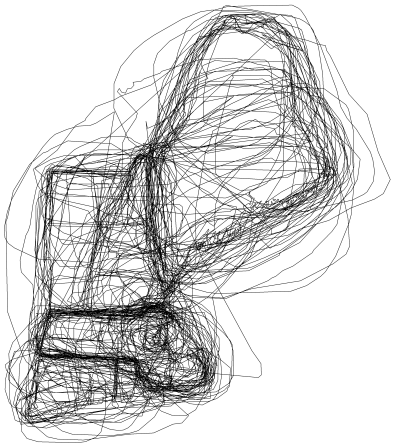


Figure 5.1: Map of the collection of the areas drawn by all participants overlaid on state outlines of the six New England states

There was a total of 215 areas drawn by the participants in this study (Figure 5.1). The FLOM application produces a dataframe that combines the areas drawn, called polygons in GIS, by all participants. This dataframe can then be input to GIS software in order to create a shapefile that is geo-referenced to the region. With the combined polygons in a single shapefile, the geometric union of the polygons was calculated in ArcGIS (ESRI, 2019). This process discovers overlap between polygons (Figure 5.2). In the areas where polygons overlap, the attribute information (such as labels and ratings) of the overlapping polygons are added to the output. For example, in Figure 5.2, if Polygon 1 had a label of ”Boston” and Polygon 2 had a label of ”Bostonian”, Polygon 3, created by the union process, would include the labels ”Boston” and ”Bostonian” as attribute features of the output polygon.

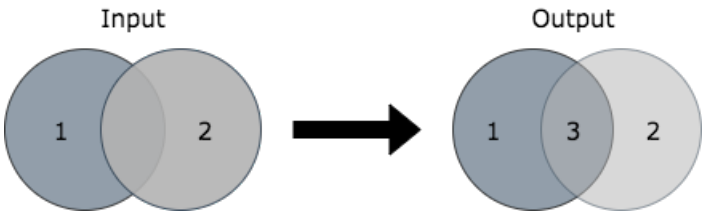


Figure 5.2: Process of calculating the geometric union of each polygon in the dataset.

Next, the centroid (geometric center) for each of the unioned polygons is found, and then a frequency of each centroid is calculated. This information provides XY (latitude and longitude) coordinates of the centroid of each of the polygons, which can then be counted to obtain the frequency of each centroid within the shapefile. Each output polygon from the union process has a centroid and a frequency count associated with it. It is this frequency from which the frequency of consensus on all the maps in the chapter (Figures 5.3 - 5.7) are based.

Finally, the shapefile is converted to a raster dataset. This process utilizes the frequency counts from the centroids of each polygon as the feature from which to rasterize. Cells are given the value of frequency found at the center of each cell to determine the value (i.e. color) of the raster pixel. The distribution of the frequency is then displayed in the raster by varying greyscale density (Montgomery & Stoeckle, 2013). Map 5.3 is the output raster map that shows the frequency of consensus for dialect areas identified by NH participants.

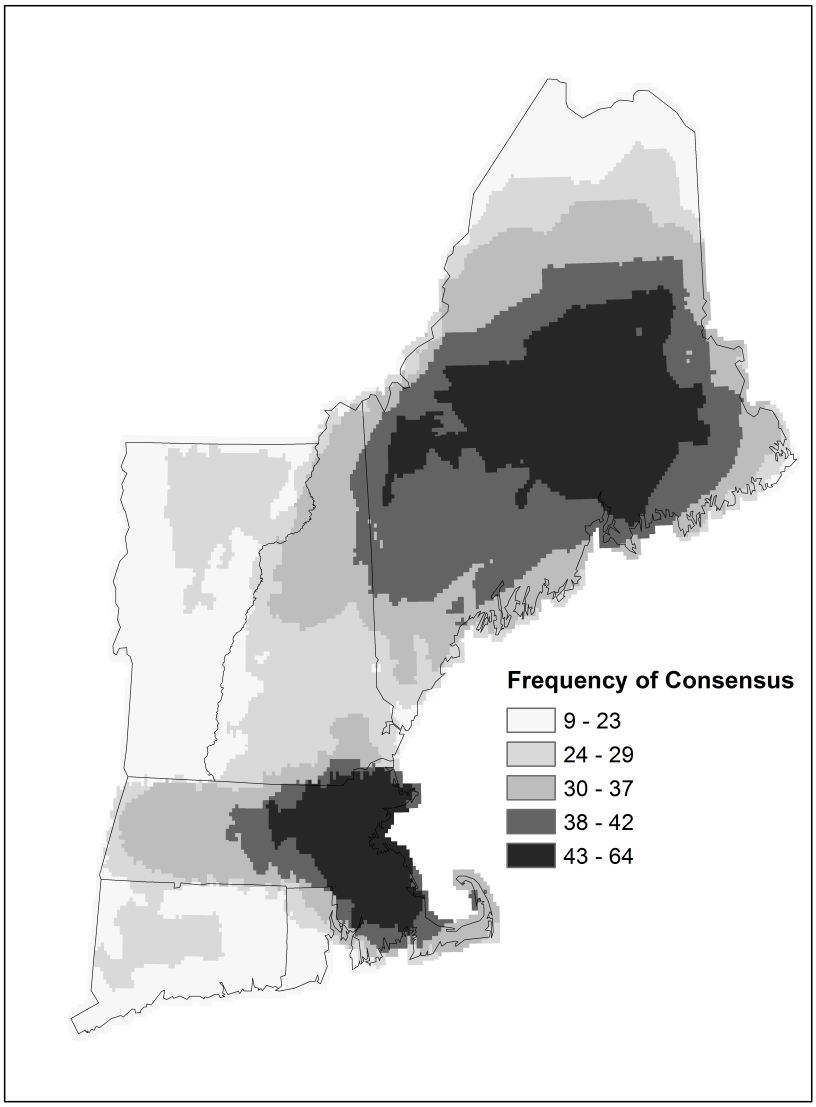


Figure 5.3: Frequency of consensus: dialect areas identified by participants

The highest frequency of overlap is 64. The most frequently identified regions are Boston and central Maine. In comparison, Vermont, most of Rhode Island, and most of Connecticut are the

least circled areas. This would be interpreted as Boston and central Maine are frequently identified as places where people have a distinct or identifiable way of speaking, whereas Vermont is not identified as such.

5.4 Results: Evaluations of New England

The results are broken into two main analyses. The first deals with the ratings of pleasantness, correctness, and similarity across all of New England. The second analysis examines the evaluation of Boston. Initial inspection of the ratings suggested that the scores provided did not have a normal distribution. Instead, multimodal distributions for the ratings of pleasantness, correctness, and similarity were identified. However, these ratings pertained to ratings for all of the polygons drawn throughout New England. As such, the distribution of the rating scores could simply be a reflection of ratings for different areas. In order to address the multimodal distribution, the data was divided into tertiles for each of the rating dimensions. Using tertiles provides a manner for normalizing the responses into the highest 1/3, middle 1/3, and lowest 1/3 values by using the distribution of scores. The reason for using tertile classification rather than equal interval classification is that the scores 0-5 on a Likert-type scale are in some ways meaningless on their own. For example, one participant's score of 2 may correspond to another participant's score of 3. By using the ratings for all of the polygons drawn throughout New England, we get the full distribution of the ways in which each participant rates. A frequency of consensus raster was created for each tertile to visualize and compare the distribution of scores on each dimension. The maps should be interpreted as the frequency that a specific region was identified (circled) and given a particular score.

5.4.1 Pleasantness

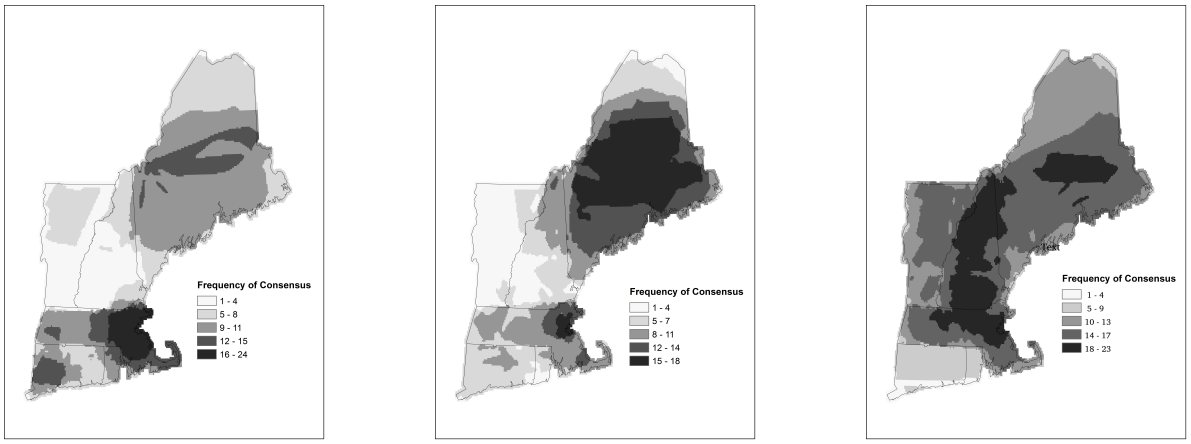
Participants were asked to rate each area they drew in terms of how pleasant the way of speaking is in that area. Pleasantness has been shown to be correlated with the notion of solidarity (Preston,

1999). The process for creating the pleasantness raster was the same as the process outlined above, with each tertile (low, mid, high) (Table 5.4) being subset before starting the process.

Based on the distribution of scores throughout New England, a low score for pleasantness was identified as being between 0 and 1.96; a mid score was identified as being between 1.97 and 3.26; and a high score was identified as being between 3.27 and 5. The range of values for pleasantness are similar to the ranges of equal intervals. This suggests that participants were equally distributed in their ratings of low, mid, and high scores on the dimension of pleasantness.

	Low Score	Mid Score	High Score
Rating	0 - 1.96	1.97 - 3.26	3.27 - 5

Table 5.4: Breakdown of low, mid, high categories for the Pleasantness ratings.



(a) Pleasantness Scores between 0 and 1.96

(b) Pleasantness Scores between 1.97 and 3.26

(c) Pleasantness Scores between 3.27 and 5

Figure 5.4: Comparison of the distribution of low, middle, and high Pleasantness ratings.

Figures 5.4a - 5.4c show the frequency of consensus in each of the scoring tertiles for pleasantness. The process for creating these maps was the same as above, with each tertile (low, mid, high) being subset before starting the process. Maps 5.4a - 5.4c show the frequency of consensus in each of the scoring tertiles for pleasantness.

These maps should be interpreted as the frequency with which a particular area was identified ***and*** given a particular score. In Map 5.4a, this means that the darkest regions were identified 16-24 times and given a pleasantness score between 0 and 1.96. In Map 5.4b, the darkest regions were identified 15-18 times and given a score between 1.97 and 3.26. Finally, in map 5.4c, the darkest regions were identified 17-23 times and given a score between 3.27 and 5.

What these maps help to highlight is the fact that Boston is the darkest region (or one of the darkest regions) in each of the three tertiles. This demonstrates the multimodal distribution found in the data inspection is not only describing different areas in New England, but rather, Boston appears to be evaluated with high scores, low scores, and mid scores. The geographic spread of the Boston metro area within each tertile is different as well. In the lowest tertile, the spread of Boston is quite large–larger than the middle tertile. In the highest tertile, the Boston region appears to be connected to New Hampshire, which may be playing a role in the the high ratings for Boston.

5.4.2 Correctness

The ratings for correctness were obtained by asking participants to rate the areas they drew in terms of how correct they believe the way of speaking is in that area. Correctness has been shown to correlate with competence (Preston, 1999; Ryan & Giles, 1982). Because the values for the tertile ranges are based on the distribution of the scores, the cutoff points for low, mid, and high scores (Table 5.5) for correctness are different from the values for pleasantness.

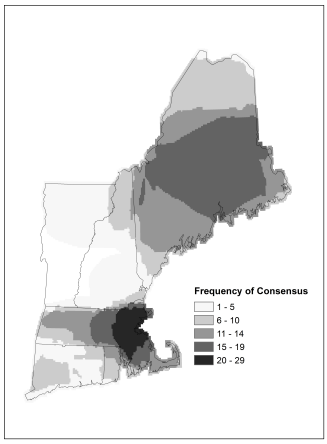
A low score for correctness was identified as being between 0 and 1.76. A mid score for correctness was identified as being between 1.77 and 2.82. A high score for correctness was identified as being between 2.83 and 5. The range of values for these tertiles are not as similar to equal

	Low Score	Mid Score	High Score
Rating	0 - 1.76	1.77 - 2.82	2.83 - 5

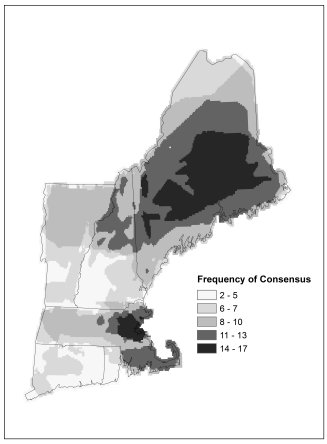
Table 5.5: Breakdown of low, mid, high categories for Correctness ratings.

intervals as the pleasantness scores, especially in the mid and high tertiles. This suggests that for correctness, there was not an equal distribution across scores, but rather there was a tendency for areas drawn to be given scores that were not high.

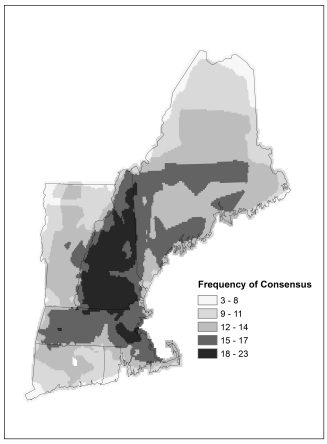
The process for creating the correctness rasters was the same as above, with each tertile (low, mid, high, Table 5.5) being subset before starting the process. Maps 5.5a - 5.5c show the frequency of consensus in each of the scoring tertiles for correctness.



(a) Correctness Scores between 0 and 1.76



(b) Correctness Scores between 1.77 and 2.82



(c) Correctness Scores between 2.82 and 5

Figure 5.5: Comparison of the distribution of low, middle, and high correctness scores.

Among the areas that were identified and given a correctness score in the lowest tertile, the Boston metro area was the most frequent (Map 5.5a). The Boston metro area was also one of the most frequently identified regions with a correctness score in the mid tertile, along with Maine.

New Hampshire is frequently identified and given a high score for correctness, suggesting that New Hampshirites are linguistically secure (Labov, 1966; Preston, 1996). These results mirror Fernandes et al. (2014), who also found a high degree of linguistic security among younger New Hampshirites. However, the second most identified region given a high score of correctness was Massachussetts, including the Boston metro area. Similar to the maps that visualize the tertiles for pleasantness, the geographic distribution of Boston changes with each tertile for correctness. In the lowest tertile, the spread of Boston appears to be much larger than the middle tertile.

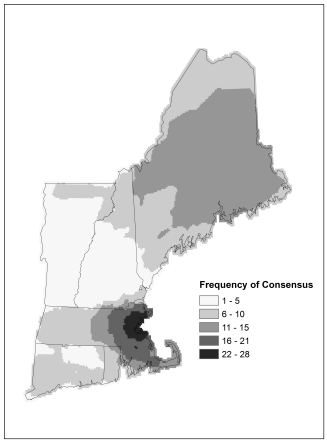
5.4.3 Similarity

The similarity ratings were obtained by asking participants to rate the areas they drew in terms of how similar they believe the way of speaking is to their own speech. The values for the tertile ranges for similarity are different from both pleasantness and correctness (Table 5.6).

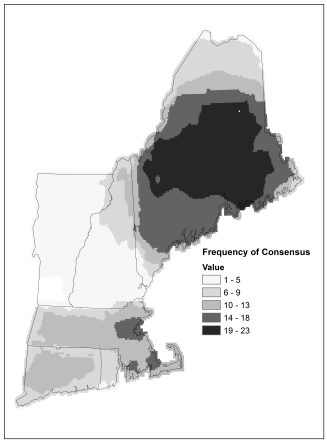
	Low Score	Mid Score	High Score
Rating	0 - 1.16	1.17 - 2.12	2.13 - 5

Table 5.6: Breakdown of low, mid, high categories for the Similarity ratings.

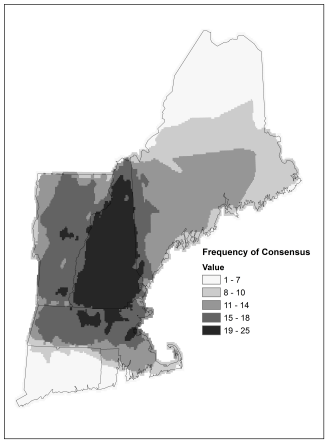
Based on the distribution of scores, a low score for similarity is between 0 and 1.16. A middle score is between 1.17 and 2.12. A high score is between 2.13 and 5. The range of values that represent a high score is the largest of the three evaluative dimensions. This suggests that there was a tendency for the regions drawn to be given scores on the lower end of the rating scale. Maps 5.6a - 5.6c show the frequency of consensus in each of the tertiles for the similarity ratings.



(a) Similarity Scores between 0 and 1.16



(b) Similarity Scores between 1.17 and 2.12



(c) Similarity Scores between 2.13 and 5

Figure 5.6: Comparison of the distribution of low, middle, and high similarity scores.

Unsurprisingly, New Hampshire is most frequently identified and given a high score for similarity. Boston is the most frequently identified area that is given a low similarity score. However, Boston is also frequently identified and given a score in the middle, and highest tertiles for similarity.

The findings for the highest tertile of similarity scores both confirm and contradict the findings from Fernandes et al. (2014): Vermont has a tendency to be identified and given a high score of similarity, but Massachusetts, including the Boston area, appears to also have a tendency to be identified and given a high score of similarity. Fernandes et al. (2014) found that New Hampshirites, especially younger ones identified more frequently with Vermont, supporting their notion that the change in mental maps was a reflection of the change in production (reported in Chapter 1).

These results suggest that some New Hampshirites have given Massachusetts (and Boston) high scores for similarity, which are potentially contradictory to (Fernandes et al., 2014). This could be

due to a variety of reasons. First, it is possible that those who gave Boston a higher score tended to be older, whereas those who gave Boston a lower score tended to be younger. If this were the case, the results here would confirm the findings in Fernandes et al. (2014). Second, the lower bound of the high tertile for similarity is 2.13, and the greyscale variation reflects the frequency of consensus that a score within that range (2.13 - 5) was provided. It could be the case that the dark regions in Massachusetts were given a score of 2.5, whereas the dark regions of Vermont were given a score of 5. Because of the method of analysis and visualization presented here, that distinction cannot be made. Further, the way in which the similarity scores were processed in this study and in Fernandes et al. (2014) are different. In their study, the authors found a mean score for the ratings, whereas the process described here is a frequency of consensus for tertiles of scores. Examining the frequency of consensus of Vermont across each tertiles, it appears that a mean score for Vermont would be a high value. Vermont is not frequently identified and given a low score, nor is it frequently identified and given a mid score. Boston, on the other hand, is frequently identified and given a low score. This distribution of the ratings of Boston would suggest that its mean would be lower than the mean for Vermont.

5.5 Results: Evaluations of Boston

Before examining the ratings of Boston, it was necessary to determine which polygons should be included in the analysis. Boston was geographically defined in the following manner. First, the latitude and longitude coordinates of Boston were added to ArcGIS. Next, all of the polygons that contained the geographic coordinates of Boston were subset. Finally, the polygons were manually inspected to ensure accuracy. This involved examining the geographic distribution of the polygon along with the label provided to ensure that the boundaries of a nearby polygon did not include the coordinates for Boston. After this process, there was a total of 61 polygons. The process outlined above for unionizing and rasterizing the data was then conducted to produce the map below (Figure 5.7), which shows the frequency of consensus among participants for the area drawn that relates to

Boston. Darker shades indicate higher overlap among polygons.

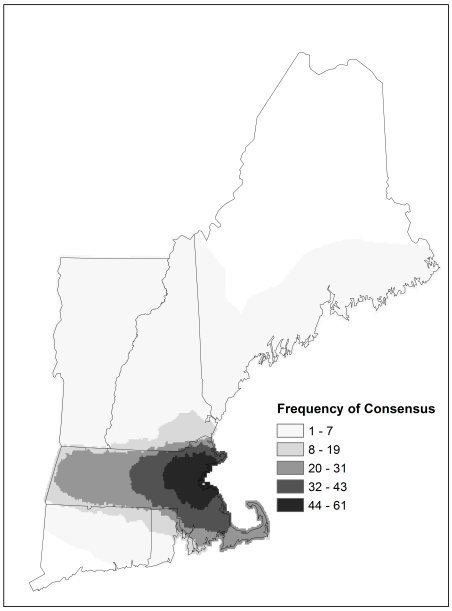


Figure 5.7: Frequency of consensus for the identification of Boston by New Hampshire participants

The geographic distribution of Boston identified by participants is most frequently centered on the Boston metro area. The frequency of consensus reduces as the distance from the Boston metro area increases. We see that 20 - 31 polygons were drawn to include all of Massachusetts as part of the Boston dialect region, and fewer participants indicate parts of New Hampshire, Maine, and Vermont as part of the same dialect region.

The maps in the previous section (Figures 5.4 - 5.6) suggest that Boston appears to be identified with low scores, mid scores, and high scores for pleasantness, correctness, and similarity. If negative evaluations for Boston were monolithic, we would have expected to see a high frequency of consensus in the low tertiles only. Rather than simply obtaining a mean value for each dimension, linear regression models were conducted to determine if age, regionality, socioeconomic status, or

a combination of any of the three, predicted participants' ratings on each dimension.

5.5.1 Pleasantness

Results of the linear regressions indicated that neither age nor SES were significant predictors of pleasantness ratings (F(2, 58) = 0.65, p = 0.52) for age; F(2, 58) = 0,98, p = 0.38 for SES). Region score was a significant predictor of participants' ratings of pleasantness (F(2, 58) = 2.74, p = 0.05).

The table below shows the mean rating for pleasantness based on region group. Participants with lower region scores gave lower scores for pleasantness than participants with higher region scores.

	n	Pleasantness Rating Mean
Region Group 1	8	0.95
Region Group 2	16	2.56
Region Group 3	37	2.65

Table 5.7: Mean ratings for Correctness scores by Region Group

What this suggests is that New Hampshirites with more multi-generational links to New Hampshire (indigenes) are more likely to find the way of speaking in Boston as pleasant than those with fewer multi-generation links to New Hampshire (interlopers). The mean values in each of these region groups, however, is not high. If we compare these values to the tertiles created in the previous section, we see that those in Region Group 1 tend to give ratings in the lowest tertile, whereas those in Region Groups 2 and 3 tend to rate Boston in the middle tertile.

5.5.2 Correctness

Results of the linear regression indicated that neither age nor SES were significant predictors of correctness ratings (F(2, 58) = 0.44, p = 0.65 for age; F(2, 58) = 0.80, p = 0.45 for SES). The

overall model using region score as a predictor was not significant (F(2, 58)=2.034, $p > 0.14$); however, the coefficients of the model were statistically significant or nearing significance. A post-hoc ANOVA to determine if there were statistically significant differences between groups indicated that the differences between groups was not statistically significant.

The table below shows the mean score for Correctness across the three region groups:

	n	Correctness Rating Mean
Region Group 1	8	1.11
Region Group 2	16	2.12
Region Group 3	37	2.20

Table 5.8: Mean ratings for Correctness scores by Region Group

Overall, the scores for correctness are low, suggesting that New Hampshirites do not believe Boston speech to sound correct. Comparing these mean values to the tertile breakdowns from the previous section, those from Region Group 1 had a tendency to provide ratings in the lowest tertile, whereas those in Region Groups 2 and 3 gave ratings in the middle tertile. However, these differences are not statistically significant.

5.5.3 Similarity

Results of the linear regression indicated that age, SES, nor regionality were significant predictors of similarity ratings. (F(2, 58) = 0.18, $p = 0.83$ for age; F(2, 58) = 0.30, $p = 0.74$ for SES; F(2, 58) = 1.61, p = 0.21 for region). The overall mean rating for similarity was 1.69, suggesting that New Hampshirites, overall, believe themselves to be linguistically distinct from the Boston area.

To compare these ratings with those found in Fernandes et al. (2014), the following table shows the mean score for similarity across the three age groups in the present study:

	n	Similarity Rating Mean
Age Group 1	6	1.40
Age Group 2	40	1.67
Age Group 3	15	1.84

Table 5.9: Mean ratings for Correctness scores by Age Group

Age Group 1 represents the oldest participants in the sample: those born before 1970. Age Group 3 represents the participants born after 1990. The oldest speakers in this sample do not appear to rate Boston as more similar to their own speech as younger speakers. These results may be due to the fact that the sample size for Age Group 1 is too small.

5.6 Discussion

This chapter has examined the collective mental maps of New Hampshirites with regard to New England, paying close attention to the variation in the evaluation of Boston. Utilizing tertiles to examine the distribution, rather than creating a single-point measure, highlights the variation that is present. What becomes clear is that the ratings for Boston are not homogenous, but rather are distributed as high scores, mid scores, and low scores. Overall, however, it appears as though the ratings for Boston were not high for pleasantness and correctness, and low for similarity. These ratings suggest that participants tend to imbue Boston either negatively or neutrally.

The fact that age did not play a role in the process of imbuing was surprising, as previous research has suggested that a shift in imbuing can be seen in apparent time (Fernandes et al., 2014). However, this could be due to the fact that the data in this study is skewed, with the oldest age group underrepresented. It is interesting to note that SES was not a significant predictor to the variation present on any of the rating dimensions, especially because it was shown to spatially correlate with the classification of nonrhoticity.

Turning to the evaluative process and the attitudinal cognitorium, the results from this study

suggest that overall, the microconcepts that are activated by Boston appear to be negative or neutral, based on the ratings provided by participants. New Hampshirites tend to imbue Boston with lower ratings for pleasantness, correctness, and similarity. However, when taking regionality scores into account, there is a statistically significant difference between evaluative scores of pleasantness. Those with the fewest multi-generational links to New Hampshire are different in their pleasantness ratings of Boston than those with the highest number of multi-generational links to New Hampshire. The lowest evaluations for Boston came from participants who did not grow up in New Hampshire. This suggests that there is some structure in the variation found in the evaluative step of imbuing. Thus the microconceptual network activated by those with low regionality scores appears to be different from the microconceptual network activated by those with high regionality scores with regard to pleasantness.

It is important to keep in mind that those with a low regionality score did not grow up in New England. As such, it should not be surprising that they do not evaluate Boston high for pleasantness, as it is often a proxy for solidarity. Recall in Chapter 4 that regionality played a role in the classification of nonrhoticity. Those with the fewest multi-generational links to New Hampshire were more likely to classify nonrhoticity as a Boston feature, whereas those with higher multi-generational links to New Hampshire were more likely to classify nonrhoticity as a widespread New England feature. It would seem, then, that those who classify nonrhoticity as a New England feature are more likely to imbue Boston more positively than those who classify nonrhoticity as a Boston feature. Those with few multi-generational links to New England appear to be less likely to feel a sense of solidarity with the cultural hub of the region.

Chapter 6

GENERAL DISCUSSION AND CONCLUSIONS

6.1 Summary of Results

The studies reported in this dissertation were concerned with empirically and systematically addressing the evaluation problem of linguistic change in New Hampshire, the primary aim of which was to understand if the evaluations of nonrhoticity and Boston were uniform and mostly negative. In order to fully address the evaluation problem of linguistic change, three studies were conducted to answer three inter-related research questions, which were used to empirically examine the three steps (noticing, classifying, and imbuing) of the underlying process that give way to evaluative responses, as suggested by Preston (2010a). Study one, the acoustic correlate study, focused on the first step of the process: noticing. The purpose of the acoustic correlate study was to determine the proximity of $F2$ and $F3$ necessary for a listener to notice the speech signal as rhotic. Study two, the nonrhoticity classification study, focused on the second step of the process: classifying. The purpose of the nonrhoticity classification study was to determine where and with whom New Hampshirites classify rhoticity and nonrhoticity. Study three, the Boston ratings study, focused on the third step of the process: imbuing. The purpose of the Boston ratings study was to explore the ways in which New Hampshirites rate Boston and other areas of New England in terms of pleasantness, correctness, and similarity.

Of particular interest in this dissertation was whether the responses provided by participants were more or less uniform, and if not, whether there were sociodemographic factors that explained the variation that was found. The following sections will highlight the key findings of the three studies (acoustic correlate study, nonrhoticity classification study, and Boston ratings study), discuss the variation found in the responses by participants, and explain their relationship to the eval-

uation problem and the attitudinal cognitorium.

6.1.1 Acoustic correlates of rhoticity

The first study conducted in this dissertation was a traditional phonetic forced-choice identification task aimed to uncover the proximity between $F2$ and $F3$ that is necessary for an untrained listener to perceive /ɹ/ in the speech signal. This study used a seven step continuum between nonrhotic *father* and rhotic *farther*. The aim of the study was twofold. The first goal was to examine the acoustic correlates of rhoticity for untrained listeners to use for work on the classification of nonrhoticity. The findings showed that, in general, participants tend to perceive rhoticity (as a phoneme) when the distance between $F2$ and $F3$ is between 1150 and 980 Hertz. Approximately 46% of participants identified the signal as rhotic when the proximity of $F2$ and $F3$ reached 1150 Hertz, and approximately 81% of participants identified the signal as rhotic when the proximity of $F2$ and $F3$ reached 980 Hertz. This is not to say that these 980 Hertz is an absolute value, but rather, this proximity is what cues rhoticity for this speaker with a preceding /a/. The second aim was to compare the perception of rhoticity in a region that is characterized as traditionally nonrhotic (NH) to one that is characterized as rhotic (WA) to determine if the perception of rhoticity being present or absent in the signal was variable due to the speech community a person is from. In other words, the goal was identify whether the perception of rhoticity between the different steps in the continuum could be explained by taking the state from which the listener was from into account. Regression analysis suggests that region was statistically insignificant in explaining the variation in the identification of rhoticity in the signal. Thus, the task of noticing a sound does not appear to be influenced by social factors of the listener in this task.

6.1.2 New Hampshirites' classification of nonrhoticity

Study two was a geographic open-ended classification task using a three step continuum of multiple speakers. The goal of this study was to uncover *where* in New England New Hampshirites believe

nonrhoticity occurs. It is important to bear in mind that the results from this study do not measure, or even collect, participants' *evaluations* of nonrhoticity. The purpose of the study was to identify *where* New Hampshirites believe nonrhoticity is used within New England.

The results of this study suggest that there is variation with regard to the classification of nonrhoticity. Participants classified nonrhoticity as both a widespread New England feature and a Boston feature. However, incorporating regionality and socioeconomic status of the listener into the analysis demonstrated that the variation is structured. Interlopers are more likely to associate nonrhoticity with Boston, whereas indigenes are more likely to classify nonrhoticity as a widespread New England feature (Moran's Index = 0.455, Expected Index = 0.002, Variance = 0.07, z-score = 1.722, p-value = 0.08). Upper class folk are more likely to classify nonrhoticity with Boston, whereas working class folk are more likely to classify nonrhoticity as a widespread feature (Moran's Index = 0.50, Expected Index = -0.001, variance = 0.07, z-score = 1.922, p-value = 0.05).

6.1.3 New Hampshirites' attitudes towards Boston

The third study presented the mental maps of New Hampshirites in order to examine (1) New Hampshire participants' perceptions of dialect regions in New England and (2) how New Hampshirites evaluate the dialect regions they drew. The main focus of the third study was to examine how New Hampshirites imbue Boston. The study consisted of an online implementation of the draw-a-map task (FLOM, 2019; Preston, 1986). The ratings of pleasantness, correctness, and similarity were then explored. Examining the results in terms of the distribution, rather than a single-point measure, highlights the variation of the evaluative responses by participants, especially with regard to Boston.

In general, the ratings of Boston were not high for pleasantness nor correctness, and were low for similarity. This suggests that, overall, participants imbue Boston negatively (or neutrally). Using a linear regression to determine if social factors predicted participants' ratings showed that

region score was a significant predictor of pleasantness ($F(2, 58) = 2.74$, $p = 0.05$).nInterlopers gave significantly lower scores than in-betweeners and indigenes. However, correctness and similarity were not predicted by age, SES, or regionality score.

6.2 General Discussion

6.2.1 Structured Heterogeneity in the Evaluative Tendency of an Attitude Object

The three studies reported in this dissertation were a means to examining the individual steps of the evaluative response process (Preston, 2010a) (noticing, classifying, and imbuing). This process, which occurs within the attitudinal cognitorium, was used to unpack the evaluative tendency of an attitude object. The aim of separating the steps into individual experiments was to understand whether or not there was systematic variation in the evaluative tendency that would help to explain the evaluation problem of nonrhoticity in New Hampshire. We wanted to deepen our understanding of the "subjective correlates of the several layers and variables in a heterogeneous structure" (Weinreich et al., 1968, 186). What we found was that there was variation in the evaluative response process, especially in the classifying and imbuing steps. However, the results from these three studies suggest that there is structured heterogeneity in the evaluative tendency of an attitude object.

The acoustic correlate study explains how listeners perceive the speech signal, or the attitude object, when it is in a neutral environment. This noticing is of the attitudinal object *before* it is classified and imbued with social information. While there was some variation in terms of which step participants began to perceive rhoticity, no social or extralinguistic variables used in this study were able to predict the variation. This finding is not too surprising. It suggests that, in general, listeners hear certain sounds similarly, especially when social information about the speaker is held constant. It is important to bear in mind that the process of noticing, as it was defined in this dissertation, did not occur inside of the attitudinal cognitorium.

The classification study focuses on the activation of microconcepts within the attitudinal cog-

nitorium based on noticing the attitudinal object. The variation that was present in the classification study suggests that different microconcepts are activated for different listeners when they hear nonrhoticity. However, this variation was shown to be structured: a person's social class and multi-generational links to New Hampshire provided a means of explaining the variation in the activation of microconcepts. This suggests some degree of structured heterogeneity within the attitudinal cognitorium with regard to classification.

The Boston ratings study also focuses on the activation of evaluative microconcepts with the attitudinal object. In this study, the attitudinal object was Boston with the goal of understanding how Boston, as a region, is imbued. Overall, the microconcepts that are activated by Boston appear to be negative or neutral for New Hampshirites, based on the ratings provided by participants. However, there was also variation present in the process of imbuing, and that variation could partially be explained by one of the sociodemographic factors used in this study. This suggests, again, that there is structure to the variation found in evaluative responses.

The variation within the classifying and imbuing steps of the evaluative response process, i.e. the steps that take place within the attitudinal cognitorium can, in part, be explained by understanding sociodemographic characteristics of the listener. In other words, there appears to be a predisposition for certain microconcepts to be connected and activated within the attitudinal cognitorium, depending on specific sociodemographic information about the *listener*. Thus, it is not just the social information about the speaker that can bias the listener, but also the social information about the listeners themselves. As such, we would expect to find that members of a speech community would react to changes in progress in different ways, depending on what microconcepts are activated for them when they hear a particular linguistic variant. The subjective correlates, then, are not homogenous, but heterogeneous, and that heterogeneity appears to be structured.

6.2.2 Are Attitudes Towards Boston a Reason for Change?

The findings from this dissertation suggest that further research into the subjective correlates (attitudes) of a linguistic feature is needed. Research that examines the variation found in evaluative responses furthers our understanding of the evaluation problem of linguistic change, an integral problem to understanding language variation and change. Preston (1993) argues:

> [w]ithout knowledge of the value-ridden classifications of language and language status and function by the folk, without knowledge of where the folk believe differences exist, without knowledge of where they are capable of hearing major and minor differences, and, most importantly, without knowledge of how the folk bring their beliefs about language to bear on their solutions to linguistic problems, the study of language attitudes risks being: 1) a venture into the investigation of academic distinctions which distort the folk reality or tell only a partial truth or, worse, 2) a misadventure into the study of theatrically exaggerated speech caricatures (p. 252).

The research described in this dissertation can't fully support the notion that negative attitudes towards Boston are playing a role in linguistic change in the region. The first reason for this is that nonrhoticity is not associated solely with Boston for New Hampshirites. What the results from Chapter 4 suggest is that for some New Hampshirites, Boston is activated when hearing nonrhoticity, whereas for other New Hampshirites, it is not; instead, hearing nonrhoticity activates other parts of New England. This suggests that whether or not nonrhoticity is associated with Boston depends on social factors of the listener. Those New Hampshirites who are more likely to use non-rhoticity (see Kim et al., 2018; Stanford, 2019) view it as widespread throughout northern New England. Those who are less likely to use nonrhoticity view it as a Boston feature. It would be imprudent, then, to assert that nonrhoticity is on the decline because of attitudes towards Boston because nonrhoticity is also associated with other parts of New England. Whether or not New Hampshirites have negative attitudes towards those regions will have to be examined in future work. The sec-

ond reason that the research described here cannot support the the notion that negative attitudes towards Boston are playing a role in linguistic change in the region is that Boston is not evaluated negatively by all participants. What this work demonstrates is that the lowest evaluations of pleasantness for Boston came from people who did not grow up in New Hampshire (or New England for that matter). Further, even if participants provide negative evaluations of Boston for pleasantness, correctness, and similarity, this does not necessarily mean that they have negative evaluations of nonrhoticity.

The principle of multiple causes states, "it is unlikely that any single contextual factor alone can explain the variability in the data....the question for the researcher is thus not which single factor is associated with variation but what the relative weight of the different factors associated with variation is" (Young & Bayley, 1996, 254). It is possible that attitudes towards Boston are playing some role in the linguistic change occurring in New Hampshire; however, based on the results from these studies, it does not appear to be playing a large role in linguistic change. Roberts (2006, 2007); Stanford (2019) have used outward orientation (Labov, 2012) as a framework to address the ongoing linguistic changes in New England. Outward orientation describes the notion that "children select a particular speech community as their model for acquisition, even if it does not include their parents' speech" (Stanford, 2019, 283). Stanford (2019) argues that both education and interpersonal contact with migrants from outside of New England play a role in the dialect leveling throughout New England, suggesting that children learn in school that nonrhoticity (and other Eastern New England dialect features) are not shared by everyone. This could potentially be the reason that regionality played a role in the classification of nonrhoticity and ratings of pleasantness for Boston. In other words, those with fewer multi-generational links to New Hampshire may be more likely to be exposed to "outsider" speech communities from which to make their model. This suggests that the social meaning of nonrhoticity is potentially different for different groups.

6.3 Future Research

Although this dissertation addresses how New Hampshirites classify nonrhoticity, it does not address how they imbue nonrhoticity. It would be prudent to address how New Hampshirites evaluate nonrhoticity. More specifically, it would be important to examine how New Hampshirites evaluate nonrhotic speech produced by other New Hampshirites. This could be examined by creating a matched-guise study using the stimuli sentences from Chapter 4.

One area for future research involves further examining the use of social factors to help explain variation in the evaluative tendency of speakers in other dialect regions. Using macro-level sociodemographic factors, such as those used in this dissertation, increases the replicability of language regard studies, a necessary aspect of building an empirical answer to the evaluation problem. This is not to say that every sociodemographic factor will have the same significance in every speech community, or that localized meanings are not significant, but rather that using broad-scale social factors provides us the ability to make generalizable hypotheses regarding the subjective correlates of a linguistic feature. Further, the studies here suggest that macro-level social factors *do* play a role in the evaluation of a linguistic variant.

One social factor used in this dissertation that would need to be reconsidered is socioeconomic status. That is not to say that social class does not play a role in evaluative responses, but rather a better metric for social class should be examined. One such metric that appears fruitful is the model for social class proposed and tested by Savage et al. (2013), in which the researchers operationalize social, economic, and cultural capital in the United Kingdom. This measure of social class is a more robust multi-dimensional model that incorporates the social network and leisure activities of the individual.

Another social factor that needs further investigation is age. Previous research in New England suggests that age is a factor in both the production of nonrhoticity (and traditional Eastern New England features) and the perception of dialect regions within New England. However, the age distribution for this study was skewed, and the oldest age cohort was under-represented. Future

work should include a more balanced distribution across the age cohorts in order to examine the role that age plays in the evaluative tendency. Further examination of the middle age cohort (those born between 1970 and 1990) also needs to be examined. This age cohort was over-represented in the classification study and the evaluations of Boston study, but further investigation may show that there is an interaction between age and another social factor which will help to explain the variation present in this age cohort.

Another avenue for future research is to incorporate qualitative analyses, especially with regard to imbuing. Attitudes are, after all, subjective. And to only address subjective correlates using objective measures (such as ratings scales) risks only telling part of the story. The labels and stereotypes provided by participants in the perceptual dialectology study would be a way of qualitatively addressing the evaluative responses, and is frequently used in PD research (Evans, 2011; Cukor-Avila, 2018; Bucholtz et al., 2007, among others). This type of content analysis, examining the connotation of the label or stereotype provided, has been shown to be useful as a means of understanding the underlying ideologies of participants and the ways in which they relate to the dialect spoken in a given region.

Another manner of addressing attitudes qualitatively would be more systematic analyses of ethnographic fieldwork in the region. Ethnographic methodologies could potentially help to understand the nuances of the social meaning of both nonrhoticity and traditional Eastern New England dialect features within the region. The type of ethnographic fieldwork envisioned to address the evaluation problem would need to ask participants explicit questions about their personal ties to their communities and to New England, their personal experiences with speakers not from New England, and their views on language use and change in the region, taking a bottom-up approach to the connection between an individual's social world and their attitudes towards traditional Eastern New England dialect features.

6.4 Conclusion

The studies discussed in this dissertation aimed to bring together the fields of sociophonetics and language regard. As such, there was a large quantity of information that was synthesized. There is much more to be examined at greater length in both language regard data, addressing the evaluation problem, and the ways in which these two avenues play a role in linguistic change. For example, there is more data from the studies in Chapters 3 and 4 that were excluded from the study as they did not directly relate to the research question. However, they may be of use to researchers interested in sociophonetic perception and language regard. For example, the filler continua used in Chapter 3 could be used to examine whether or not New Hampshirites can perceive FATHER-fronting, a traditional New England variable that is dissipating. There is a wealth of data with regard to labels and stereotypes of the mental maps that was not utilized in this study but may be useful in qualitatively exploring the evaluations of New Hampshire participants.

The introduction to this dissertation expressed the hope to further investigate the evaluation problem with the goal of understanding the role that it plays in linguistic change. It was expressed that this would be achieved by incorporating methodology from sociophonetic perception and language regard. The work reported to here adds a detailed acoustic characterization of the acoustic correlates associated with rhoticity along with a detailed acoustic and social account of the classification of nonrhoticity within New England. Further, this work offers a new method for analyzing and understanding variation in evaluative responses. What becomes evident is that the stereotype of nonrhoticity as a widespread New England feature lives free among certain groups but has died among others.

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Appendix A

WORD LIST FOR RHOTIC CONTINUA

balm

belt

bomb

bowl

built

bull

calmer

common

fall

farm

father

farther

fat

feet

fit

fought

Appendix B

FORMANT CONTOURS OF FILLER CONTINUA

B.1 Balm-bomb continuum

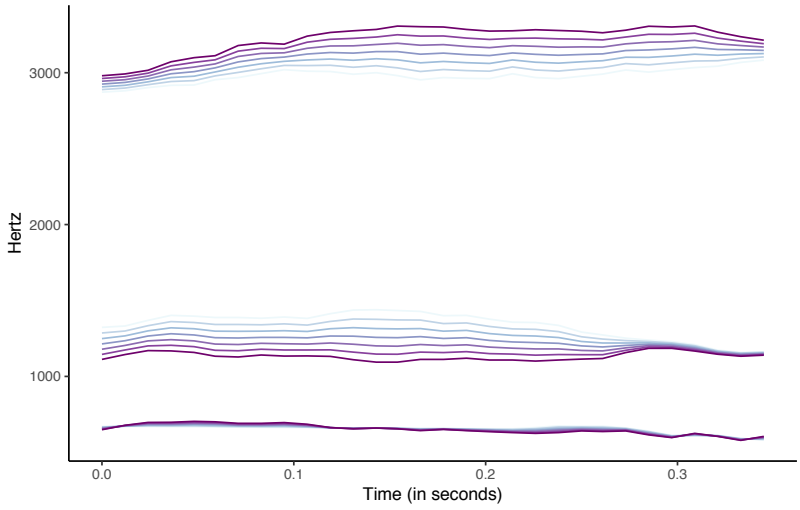


Figure B.1: Representation of the first three formants in each step of the *balm-bomb* continuum. $F1$, $F2$, and $F3$ of each step in the continuum is represented by a different color.

B.2 Bowl-bull continuum

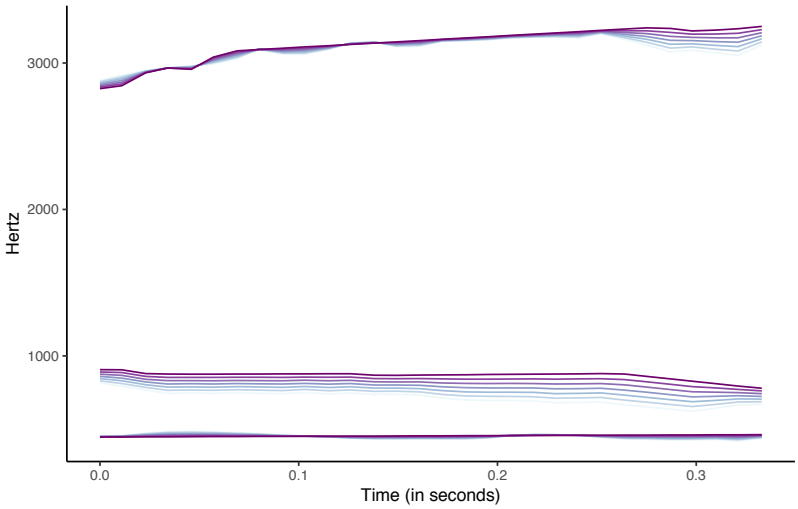


Figure B.2: Representation of the first three formants in each step of the *bowl-bull* continuum. $F1$, $F2$, and $F3$ of each step in the continuum is represented by a different color.

B.3 Calmer-common continuum

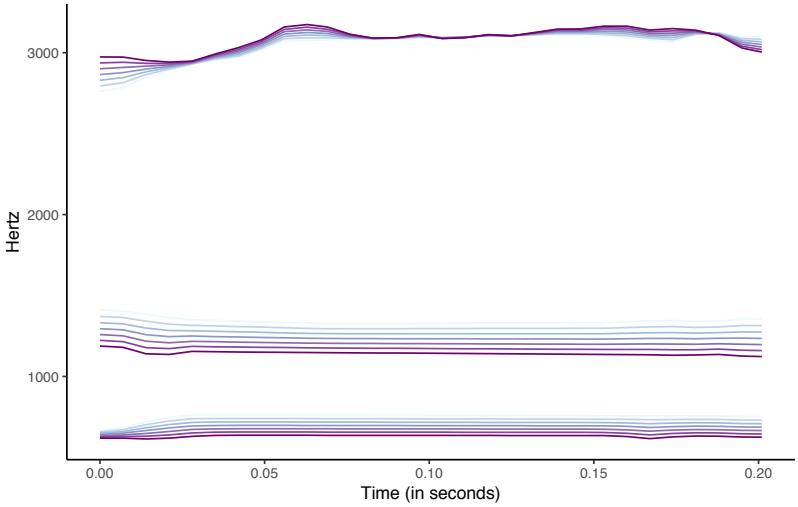


Figure B.3: Representation of the first three formants in each step of the *calmer-common* continuum. $F1$, $F2$, and $F3$ of each step in the continuum is represented by a different color.

B.4 Feet-fit continuum

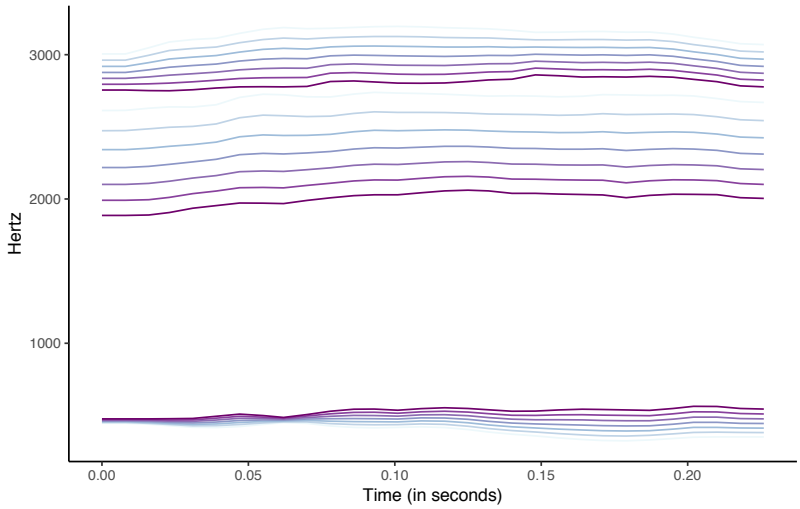


Figure B.4: Representation of the first three formants in each step of the *feet-fit* continuum. $F1$, $F2$, and $F3$ of each step in the continuum is represented by a different color.

Appendix C

LOCATIONS SELECTED AS WHERE SPEAKER WAS FROM IN ACOUSTIC CORRELATE STUDY

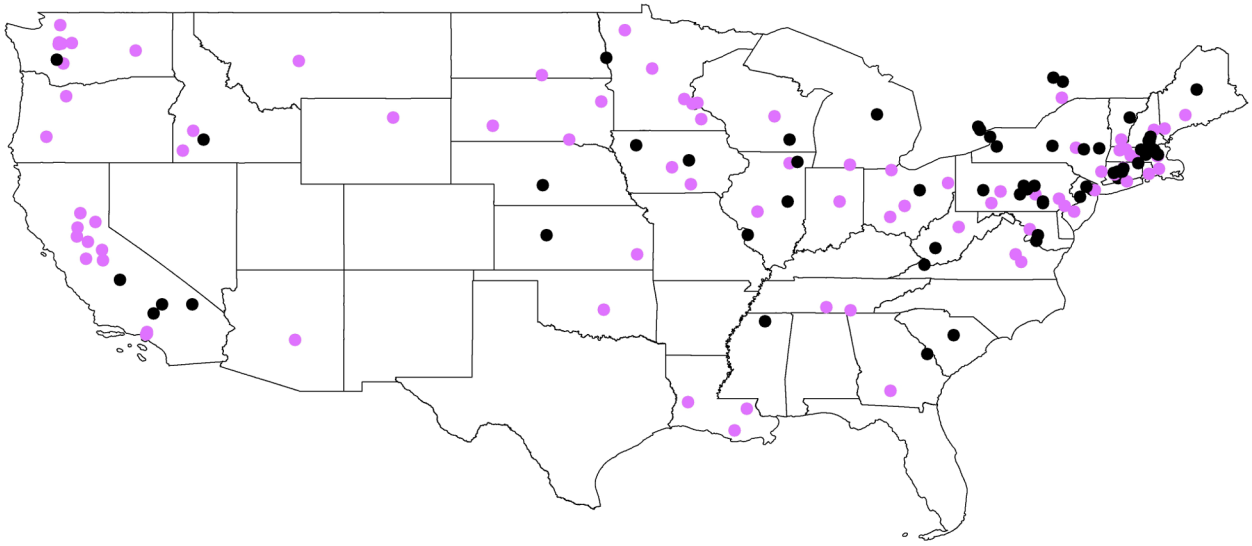


Figure C.1: Locations identified as where speaker was from in Acoustic Correlate Study. Black indicates the location was selected by a NH participant. Pink indicates the location was selected by a WA participant.

Appendix D

FORMANT CONTOURS FOR THE RHOTIC-NONRHOTIC CONTINUA USED IN CLASSIFICATION STUDY

D.1 Formant Contours of *farm* and *heart* for Speaker 1 (f)

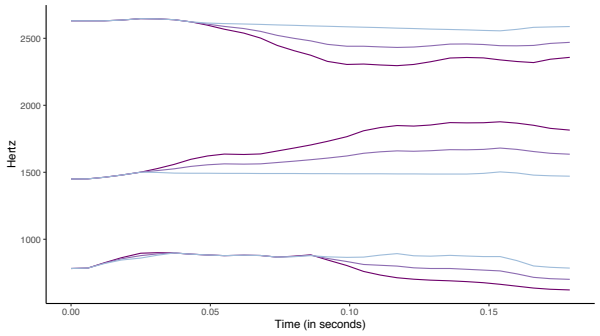


Figure D.1: Representation of the first three formants in each step of the rhotic-nonrhotic continuum for the word *farm* for Speaker 1. $F1$, $F2$, and $F3$ of each step in the continuum is represented by a different color.

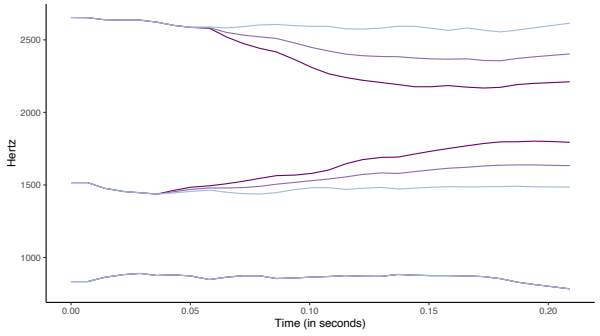


Figure D.2: Representation of the first three formants in each step of the rhotic-nonrhotic continuum for the word *heart* for Speaker 1. $F1$, $F2$, and $F3$ of each step in the continuum is represented by a different color.

D.2 Formant Contours of *farm* and *heart* for Speaker 2 (f)

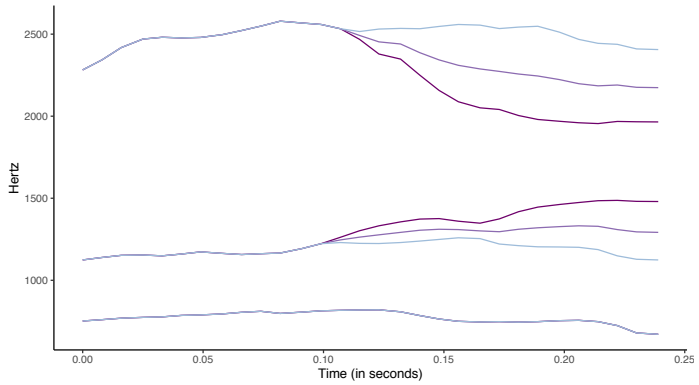


Figure D.3: Representation of the first three formants in each step of the rhotic-nonrhotic continuum for the word *farm* for Speaker 2. $F1$, $F2$, and $F3$ of each step in the continuum is represented by a different color.

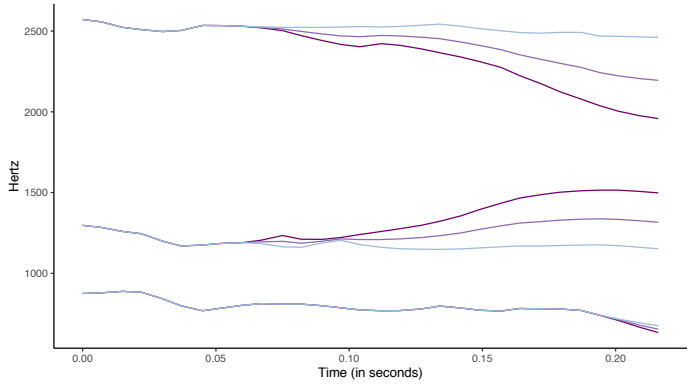


Figure D.4: Representation of the first three formants in each step of the rhotic-nonrhotic continuum for the word *heart* for Speaker 2. $F1$, $F2$, and $F3$ of each step in the continuum is represented by a different color.

D.3 Formant Contours of *farm* and *heart* for Speaker 3 (f)

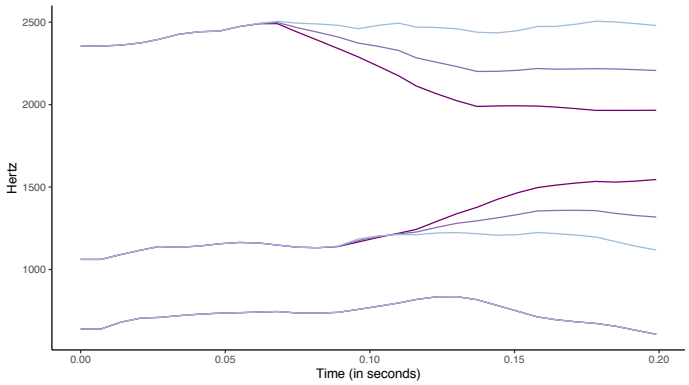


Figure D.5: Representation of the first three formants in each step of the rhotic-nonrhotic continuum for the word *farm* for Speaker 3. $F1$, $F2$, and $F3$ of each step in the continuum is represented by a different color.

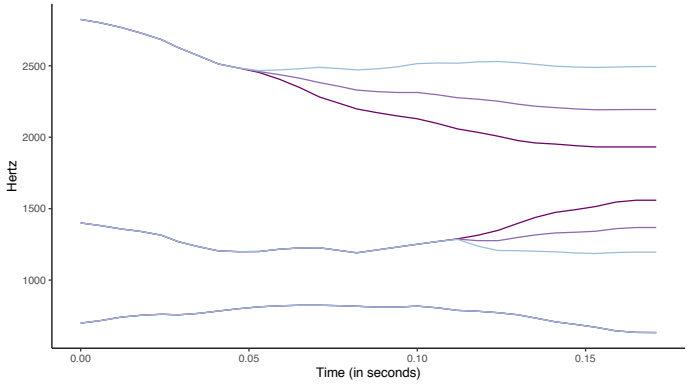


Figure D.6: Representation of the first three formants in each step of the rhotic-nonrhotic continuum for the word *heart* for Speaker 3. $F1$, $F2$, and $F3$ of each step in the continuum is represented by a different color.

D.4 Formant Contours of *farm* and *heart* for Speaker 4 (m)

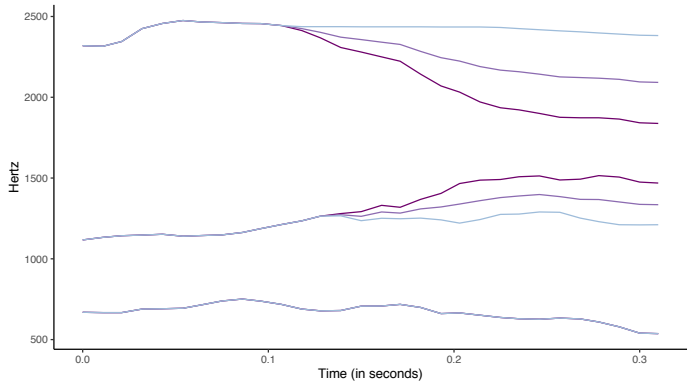


Figure D.7: Representation of the first three formants in each step of the rhotic-nonrhotic continuum for the word *farm* for Speaker 4. $F1$, $F2$, and $F3$ of each step in the continuum is represented by a different color.

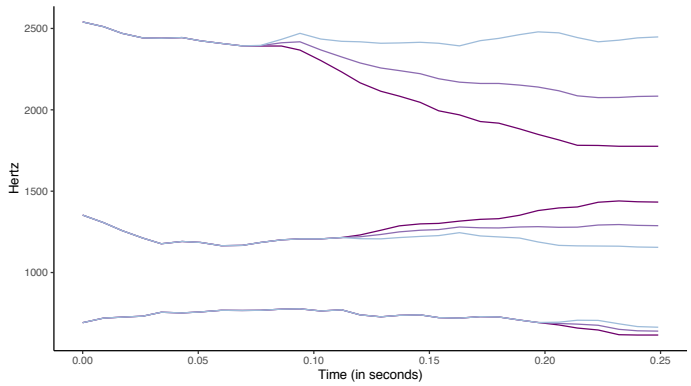


Figure D.8: Representation of the first three formants in each step of the rhotic-nonrhotic continuum for the word *heart* for Speaker 4. $F1$, $F2$, and $F3$ of each step in the continuum is represented by a different color.

D.5 Formant Contours of *farm* and *heart* for Speaker 5 (m)

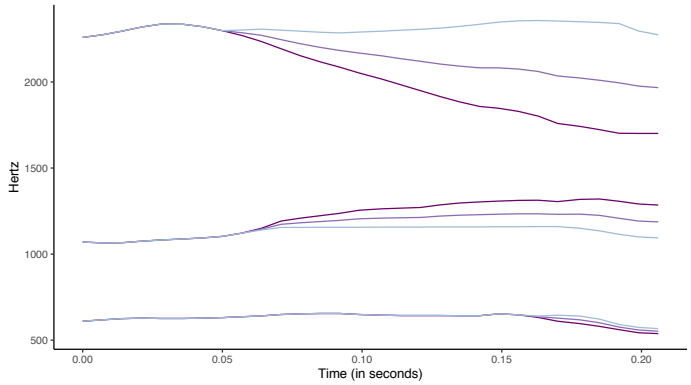


Figure D.9: Representation of the first three formants in each step of the rhotic-nonrhotic continuum for the word *farm* for Speaker 5. $F1$, $F2$, and $F3$ of each step in the continuum is represented by a different color.

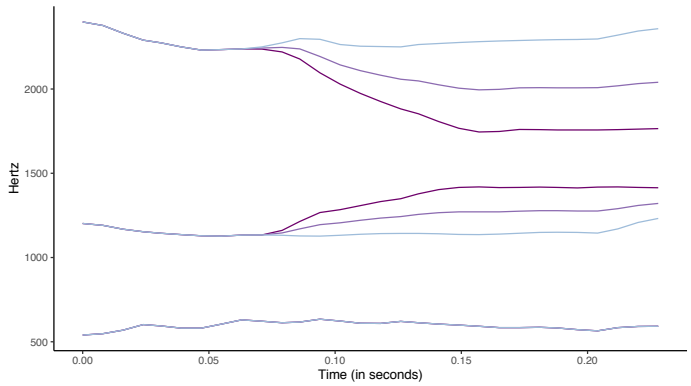


Figure D.10: Representation of the first three formants in each step of the rhotic-nonrhotic continuum for the word *heart* for Speaker 5. $F1$, $F2$, and $F3$ of each step in the continuum is represented by a different color.

Appendix E

LOCATIONS IDENTIFIED WITH STEP 2 OF CONTINUA FOR CLASSIFICATION

E.1 Location of ambiguous stimuli (Step 2)

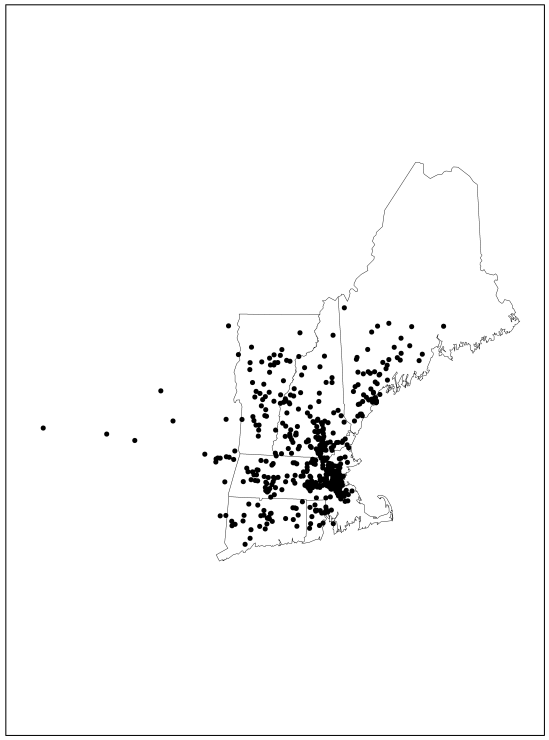
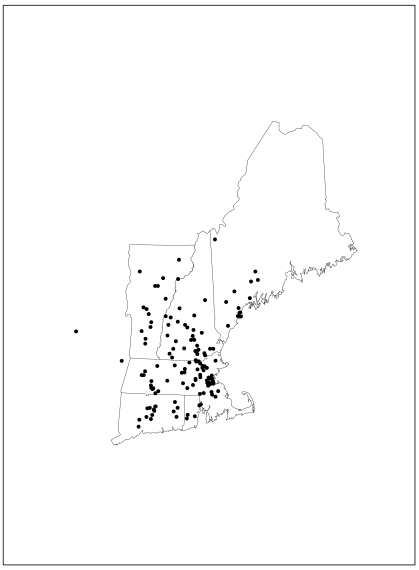


Figure E.1: Distribution of placement based on ambiguously rhotic (step 2) of continua.

E.2 Location of ambiguous stimuli based on age group

(a) Age Group 1

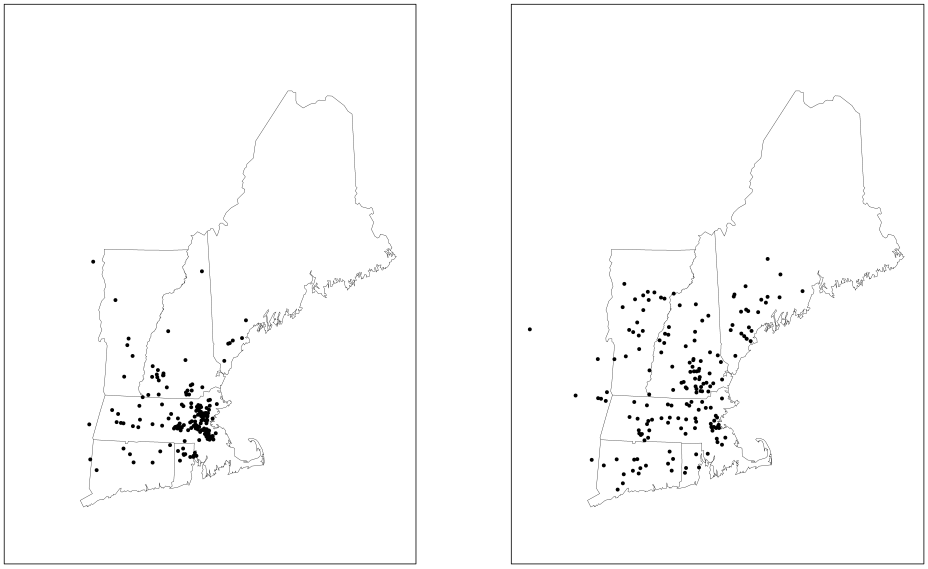
(b) Age Group 2



(c) Age Group 3

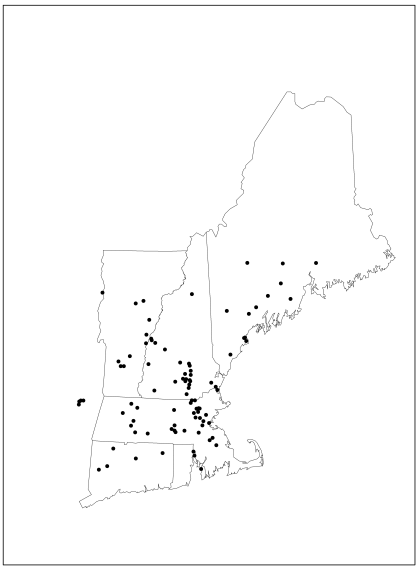
Figure E.2: Placement of ambiguous stimuli based on age group.

E.3 Location of ambiguous stimuli based on region group



(a) Region Group 1

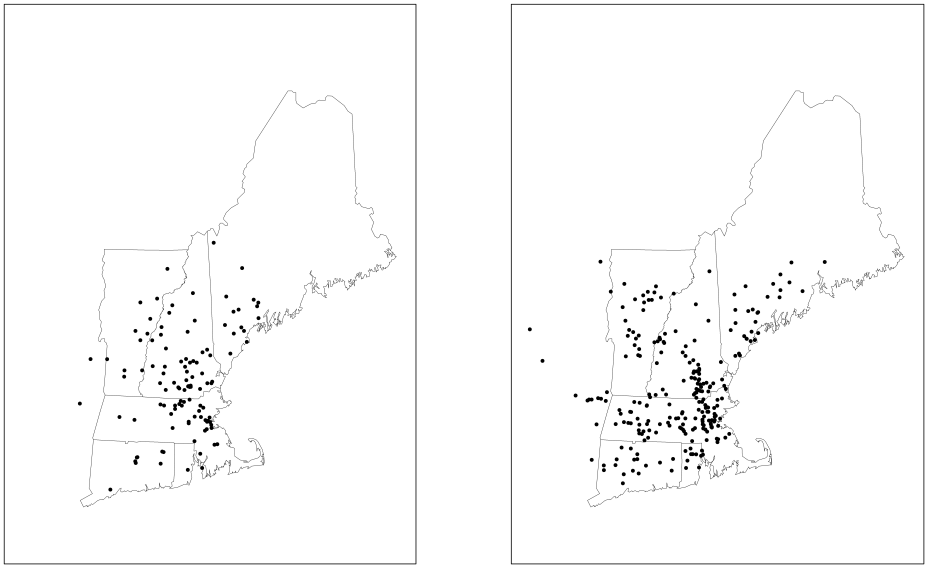
(b) Region Group 2



(c) Region Group 3

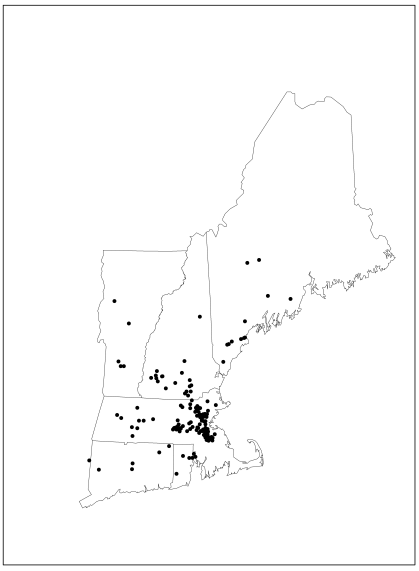
Figure E.3: Placement of ambiguous stimuli based on region group.

E.4 Location of ambiguous stimuli based on SES group



(a) SES Group 1

(b) SES Group 2



(c) SES Group 3

Figure E.4: Placement of ambiguous stimuli based on SES group.