A sociolinguistic investigation into the South African Indian speakers of Mohadin and Potchefstroom

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DECLARATION

I, Angel Nyoni, declare that this dissertation titled *A Sociolinguistic Investigation into the South African Indian Speakers of Mohadin and Potchefstroom* is my own work and has not been submitted for any degree or examination at any other university. All the sources I have used or quoted have been acknowledged by means of complete references.

I confirm that I have adhered to the ethical guidelines and principles set forth by the North-West University, particularly with respect to the collection of data, the treatment of participants, and the confidentiality of personal information.

Signature:

Date: 22 October 2024

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Then the LORD said to me,
Write my answer plainly on tablets, so that a runner can carry the correct message to others.
This vision is for a future time. It describes the end, and it will be fulfilled. If it seems slow in coming, wait patiently, for it will surely take place. It will not be delayed.
— Habakkuk 2:2-3

This dissertation is the culmination of not only my work but also the faith, encouragement, and support of many. My deepest thanks go to Jesus Christ, whose promises have strengthened me on this journey. His Word assures that "surely it will take place, it will not be delayed," and through His grace, this work has come to fruition.

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Commit to the LORD whatever you do, and he will establish your plans.
— Proverbs 16:3

ABSTRACT

This dissertation investigates the linguistic variation within the South African Indian English (SAIE) community of Potchefstroom, and Mohadin, focusing on two key phonetic variables: retroflexion and the GOOSE vowel. Situated in a post-apartheid context, this study examines how inter-ethnolinguistic mobility, social class, age, and gender influence these phonetic features, particularly comparing speakers from the town of Potchefstroom and the historically segregated township of Mohadin. The study involved a total of 32 participants, divided equally between the two areas, and further segmented by age and gender.

Utilizing a quantitative acoustic approach, data were collected through standard Labovian sociolinguistic interviews and analyzed using PRAAT and RStudio, focusing on Voice Onset Time (VOT) for /t/ and /d/ and second-formant frequencies for the GOOSE vowel, with statistical analysis performed through Welch's t-tests and conditional inference trees (ctrees), to explore the effects of social variables on linguistic variation. These methods were selected due to their robustness in handling specific data characteristics, ensuring reliable and valid statistical inferences.

Welch's t-test is an adaptation of Student's t-test designed for comparing the means of two independent groups when the assumption of equal variances is violated. Unlike Student's t-test, which assumes homogeneity of variance, Welch's t-test adjusts for differences in variance and sample size, making it more reliable under conditions where variance equality cannot be ensured (Ruxton, 2006). Given that linguistic variables such as Voice Onset Time (VOT) for /t/ and /d/, as well as second-formant frequencies for the GOOSE vowel, may exhibit different levels of variability across social groups (e.g., age, gender, and geographic location), Welch's t-test provides an appropriate statistical tool for comparing group means while mitigating the risk of Type I errors. This aligns with the recommendation that Welch's t-test should be the preferred approach in most cases of mean comparison due to its robustness and improved accuracy over Student's t-test (Delacre, Lakens, & Leys, 2017).

In addition to Welch's t-tests, this study employed conditional inference trees (ctrees) to further explore patterns of linguistic variation. Conditional inference trees are a non-parametric statistical method used to analyze the relationship between predictor variables and an outcome variable in a decision-tree format. Unlike traditional regression models, ctrees do not assume linearity or normality, making them particularly useful for linguistic data, where interactions between social factors and phonetic features may be complex and nonlinear (Tagliamonte & Baayen, 2012). According to the *Comprehensive R Archive Network* (Hothorn, Hornik, & Zeileis, 2006), ctrees operate through a recursive partitioning process that avoids overfitting by applying statistical significance tests at each node of the tree, making them a more interpretable and robust alternative to traditional classification or regression trees (CART). Given the exploratory nature of this study, examining how age, gender, and geographic location influence phonetic

variation—ctrees provide a valuable means of identifying interaction effects and patterns in the data that may not be readily apparent through traditional regression approaches.

By incorporating both Welch's t-tests and conditional inference trees, this study ensures a comprehensive statistical approach that is both theoretically justified and methodologically rigorous. Welch's t-tests allow for precise mean comparisons across social groups while accounting for variance heterogeneity, whereas ctrees facilitate an in-depth, non-parametric exploration of complex social-linguistic interactions. The use of these methods aligns with the best practices in quantitative sociophonetics and contributes to the reliability and validity of the findings.

The study reveals a significant variation in the use of retroflexion and GOOSE-Fronting, with younger speakers and women, particularly in the town of Potchefstroom, leading the linguistic shift towards more standardized English pronunciations. In contrast, older speakers, specifically women in Mohadin retain more traditional speech patterns, with greater use of retroflexion in comparison to the men. The analysis also highlights the complex interplay between social mobility, cultural norms, and language change within this unique community.

The findings contribute to the broader understanding of language variation and change in postcolonial Englishes, offering new insights into how social factors such as gender roles, geographic location, and age shape phonetic variation in multilingual contexts. This study extends existing research on South African Indian English by focusing on an under-researched community, thereby providing a valuable addition to the field of sociolinguistics.

Key terms: South African Indian English, retroflexion, GOOSE vowel, language variation, sociolinguistics, Voice Onset Time, PRAAT, Rstudio, social class, gender, phonetic variation, postcolonial English

LIST OF ABBREVIATIONS AND PHONETIC SYMBOLS

AAVE	African American Vernacular English
ADS	Adstrate (strand)
BSAE	Black South African English
Ctree	Conditional inference tree
ECLM	Ethics Committee for Language Matters
IDG	Indigenizers (strand)
IPA	International Phonetic Alphabet
IQR	Interquartile range
L1	First language
LaPASC	Language in a Post-Apartheid South African City
LVC	Language change and variation
MAE	Mainstream American English
NWU	North-West University
SAE	South African English
SAIE	South African Indian English
SD	Standard deviations
SLT	Settler (strand)
VOT	Voice Onset Time
WSAfE	White South African English
[ ]	Phonetic transcription
/ /	Phonological transcription
<	Less than

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CHAPTER 1 INTRODUCTION

1.1 Contextualization

Language is an essential aspect of human communication and expression (Piliang, 2012). It allows individuals to convey their thoughts, emotions, ideas, and experiences to others in a meaningful way. Furthermore, language is much more than just a tool for communication. It serves as a reflection of a person's identity, values, norms, and customs within a specific linguistic community(Parajuli, 2021). Language not only helps individuals express themselves, but it also plays a crucial role in shaping their cultural and social interactions. Numerous definitions of language have been proposed. Henry Sweet, a phonetician and language scholar, defined language as the expression of ideas through speech-sounds combined into words and sentences (Sweet, 1899: 70). The linguists Bernard Bloch and George L. Trager defined a language as "a system of arbitrary vocal symbols by means of which a social group cooperates" (Block and Trager 1942: 5).

Language is a complex system of communication, encompassing speech, writing, and non-verbal forms (Daniel, 2013; Moser, 1989). It is a tool for expressing thoughts, feelings, and ideas, and a carrier of culture(Prakash, 2014) . Language is an open and adaptive system of symbols and signs (Repka, 2021), and a computational cognitive system (Everaert, Huybregts, Chomsky, Berwick and Bolhuis , 2015) . It is a model for human sciences, with various perspectives being possible in terms of studying language, including humanistic, biological, historical, and systemic (Austin, 2021). Language is also defined as a powerful tool that allows individuals to express themselves, convey ideas, and share knowledge (Koraeva, 2020). Overall, language is not simply a medium of representation, but an integral part of human thinking, discourse, and practice. As such, language holds immense power and significance in our lives. While different communication systems are considered to be different languages, they share common elements and patterns.

For example, there are certain fundamental principles that underpin all forms of communication, such as the use of symbols, syntax, and semantics. Understanding these shared elements can provide valuable insights into how communication functions across the interplay of these diverse sub-systems. Sociolinguistic studies have highlighted various functions of language, including but not limited to expressing national or local identity and other social identities like ethnicity, gender and social class (Tagliamonte, 2011: 1). An essential aspect of language, according to Labov (1969), is variation. The Language Variation and Change approach was initiated in the 1960s with a focus on correlating linguistic variables with significant socio-demographic categories.

This approach is based on the idea that language changes over time. According to Trudgill, all languages change through time in different ways and places (Trudgill 2003: 7).

Tagliamonte and Sankoff have noted that variation in everyday speech is an important focus of sociolinguistic research. People use different forms to express the same thing in real-time language use, showing that variation exists at various levels - individual, group, community, and beyond (Tagliamonte 2011: 21, Sankoff, 1974). Sankoff and Thibault (1981) propose that the apparent replacement of one form by another in different contexts, such as those defined by economic, demographic, or geographic factors, may indicate ongoing language change. When considering language change, Labov (1982) emphasizes the significance of the social (and linguistic) context in which these forms occur. Language change and variation research aims to comprehend language change through the observation, identification, and testing of variation in language usage. Understanding language variation is crucial for comprehending how languages evolve over time. It allows us to analyze the factors that influence linguistic shifts and to appreciate the dynamic nature of language. Moreover, studying language variation and change helps us understand the social dynamics that shape language use and how different linguistic communities interact (Arslanoglu, 2023).

Language contact and linguistic variation and change have, arguably, become more prominent and widespread due to advancements in transportation, communication, and intercontinental mass communication devices. These advancements, such as radio, television, telephone, and the internet, have expanded the contact areas between different languages belonging to diverse language families. This has led to an increased exchange and influence between languages, affecting various aspects of language, including phonology and syntax (Antony and Tramboo, 2023). In addition, the direction and extent of this linguistic influence often depends on factors such as the cultural, economic, and political dominance of the speakers involved; a factor of particular importance when attempting to garner insights into the multicultural and multilingual nature of many modern urban spaces. These insights help us understand the complex dynamics of language use in urban environments, where multiple languages often coexist and interact. Using the aforementioned sources, it becomes evident that language contact and linguistic variation and change play significant roles in the evolution of languages. A significant amount of research has been conducted in the field of sociolinguistics since Labov's (1963) influential study on Martha's Vineyard. Initially, most studies focused on English in America and England, but the field of language change and variation has now broadened its scope to include Englishes from other countries as well as other languages. This expansion enables researchers to examine socio-cultural and linguistic factors that affect language variation and change globally.

Schneider (2011: 343) argues that all aspects of the study of so-called World Englishes are inherently sociolinguistic in nature and lend themselves to sociolinguistic inquiry. Mesthrie asserts that English, as a dominant global language, takes on different forms around the world. It now belongs to the entire world,

with interactions in English among non-native speakers likely outnumbering those among native speakers and between native and non-native speakers (Mesthrie, 1992: 1).

Platt, Weber, and Ho (1984) introduced the term ‘New English’ to refer to an English variety that has developed through the education system rather than as a first language of the home. Such Englishes are used in regions where a native variety of English is not spoken by the majority. New Englishes serve various functions such as letter-writing, government communications, literature, and as a lingua franca within a country. They have also become nativized in certain contexts, with distinct linguistic rules differentiating them from the American or British English standards (Schneider, 2003). Mesthrie (1992) and Todd (1985) argue for a broad definition of this term in order to allow it to encompass the Black Englishes of Zimbabwe and South Africa, where first-language varieties of English are still present and influential, especially in the case of the latter. Aside from the ‘ancestral’ variety of South African English, two other native varieties are Cape 'Coloured' English and South African Indian English (SAIE), the latter being classified as a language-shift English or previously-immigrant English that has become a nativized variety. As such, it is expected to share similarities with both certain Inner-Circle (The term Inner Circle, as defined by Kachru (1985), refers to countries where English is spoken as a first language (L1) and has historically developed as the native language of the majority population, such as the United Kingdom, the United States, Canada, Australia, and New Zealand. These varieties serve as reference points for linguistic comparison in studies of English in postcolonial settings.) varieties as well as New World varieties, the latter all involving a shift among a group of speakers from another language to English (Mesthrie, 1992: 5). The study of English as a global language has expanded and contributes to our understanding of the development and variety of English language use worldwide, particular in the context of its contact with other languages.

1.2 Problem statement

The research conducted in the field of English as a global language has revealed the existence of various English varieties that have developed through education systems and serve different functions within their respective societies (Miao, Kang and Meng, 2024). The New (post-apartheid) South Africa provides an opportunity to study the impact of increased inter-ethnic mobility on language variation and change, both with respect to English as well as other languages. Such research would, thus, aim to extend the application of modern variationist research into multilingual contexts and investigate the role of inter-ethnic mobility on language variation and change within the South African context. Research on the impact of this social reorganization of South African society on speech communities' linguistic patterns is still in its early stages. For example, Mesthrie (2010) has studied the emergence of a pan-racial variety of South African English that incorporates speakers from diverse non-white sectors. However, more comprehensive research is needed to connect sociolinguistic findings in multilingual South African contexts with global research on dialect and language-contact effects on language variation and change, especially related to ethnic identity differences.

Most studies on SAIE have been conducted by Rajend Mesthrie and have focused on large cities and metropoles in South Africa such as Cape Town, Durban, Johannesburg, and a few rural communities along the eastern coast of KwaZulu-Natal (Mesthrie, 2010: 8). However, little to no research has been done on other rural or semi-urban communities which are prevalent in the inner reaches of central and eastern South Africa. This motivates the current investigation, which aims to shed light on the effects of social reorganization in post-apartheid South Africa by investigating language variation and change in the Indian community of Mohadin and the growing offshoot population in the neighboring and historically predominantly white town of Potchefstroom. Specifically, the research will explore the use of retroflex variants of /t/ and /d/, as well as the degree of fronting of the GOOSE vowel in the South African Indian English of this speech community. These specific variables were chosen because retroflex /t/ and /d/ sounds are prominent in Indian languages and play a role in the English spoken by Indian speakers of South Africa (Mesthrie, 2012). Additionally, so-called GOOSE-Fronting is a prominent feature of 'ancestral' (traditionally white) South African English (Mesthrie, 2010). What the effects of South Africa's recent social reorganization have been on the social trajectories of these two variables in SAIE remains to be seen.

1.3 Research questions:

The aim of this study is to investigate and enhance our understanding of language variation and change within rural and semi-urban South African communities, in particular focusing on the South African Indian English speakers of Mohadin and Potchefstroom.

1. What are the effects of increased inter-ethnolinguistic mobility on language change and variation in SAIE in the broader Potchefstroom area?
2. Will a similar outcome to that of Mesthrie's (2010) study conducted in the big metropole of Cape Town , where English is dominant, occur in an Afrikaans dominated small town such as Potchefstroom?
3. To what degree are L1-SAIE speakers, who have moved into the main (previously whites-only) town of Potchefstroom, retaining, or losing retroflexion and fronting their GOOSE vowel in comparison to those who have remained in Mohadin?
4. Is retroflexion receding and GOOSE-Fronting accelerating more among younger individuals as compared to mature individuals?
5. Is retroflexion receding and GOOSE-Fronting accelerating more among females than males?

1.4 Objectives:

1. To determine the effects of increased inter-ethnolinguistic mobility on language change and variation in SAIE as used in the broader Potchefstroom area.

2. To determine whether a similar outcome to that of Mesthrie's (2010) study conducted in the big metropole of Cape Town, where English is dominant, will occur in an Afrikaans-dominated small town such as Potchefstroom.

3. To determine the degree to which L1-SAIE speakers, who have moved into the main (previously whites-only) town of Potchefstroom are retaining or losing retroflexion and fronting their GOOSE vowel in comparison to those who have remained in Mohadin.

4. To determine whether retroflexion is receding and GOOSE-Fronting accelerating more among younger individuals as compared to more mature individuals.

5. To determine whether retroflexion is receding and GOOSE-Fronting accelerating more in females than males.

1.5 Hypotheses:

1. There will be significant effects of increased inter-ethnolinguistic mobility on language change and variation across SAIE in the Potchefstroom area.

2. A different outcome (especially less GOOSE-Fronting as a white English variable) to that of Mesthrie's study conducted in the big metropole of Cape Town will occur due to the dominance of Afrikaans and not English in Potchefstroom.

3. L1-SAIE speakers who have moved into the main (previously whites-only) town of Potchefstroom are losing retroflexion and fronting their GOOSE vowel more in comparison to those still living in the 'traditional' Indian community of Mohadin.

4. Retroflexion is receding more while GOOSE-Fronting is accelerating more among the younger speakers as compared to older speakers because of social interactions with people from other ethnic groups.

5. Retroflexion is receding more while GOOSE-Fronting is accelerating more among females than males because women - especially middle-class women - tend to use more of the standard or prestige variants than men do (Tagliamonte, 2012: 128).

1.6 Methodology

Broad approach

The research used a quantitative approach and the standard Labovian method for sociolinguistic interviews to collect data. This approach allowed me to closely examine the forms of two linguistic variables and to observe which features of the context coincided with these forms. With a sufficient amount of data, we

were able to draw certain relatively robust conclusions about the likelihood of co-occurrence between certain variable forms and contextual features of interest (Tagliamonte, 2002: 118). Therefore, since the study is a form of sociophonetics, it combines acoustic analysis with statistical analysis to study patterns of sounds and the social factors influencing them. This approach was employed using computer software for the quantitative measurement of tokens, with a particular focus on duration (milliseconds) and vowel formants (Hz).

1.6.1 Data collection

Labov developed methods that have been widely used to collect data, with the most famous one being the sociolinguistic interview. According to Labov (1984: 32), the sociolinguistic interview is defined as "a well-developed strategy" with a number of goals. The primary goal is to record one to two hours of speech and gather a full range of demographic data for each speaker within the sample design. Another objective is to collect naturalistic (i.e., relatively unmonitored) speech. Therefore, we conducted standard Labovian interviews familiar in sociolinguistics, including young and older speakers of SAIE in Mohadin and Potchefstroom, both male and female.

1.6.2 Data analysis

The dependent variables include certain acoustic qualities of /t/, /d/ and the GOOSE vowel, while the independent variables consist of self-declared biological sex, age-cohort, and place-of-residence as a proxy for social class; as well as a couple of other linguistic variables that will be dealt with later. The data was gathered from recorded interviews and tabulated to display the results. My analysis focuses on Voice Onset Time (VOT) of /t/ and /d/, based on Sukmawijaya, Mahdi, and Yuliawati's work in 2020, and on the second-formant of the GOOSE vowel as an acoustic correlate of fronting. All analysis was conducted using the PRAAT software developed by Boersma & Weenink (2021).

Further analysis was conducted using RStudio which is a popular software among R programming language users and those working with Kaggle. It is utilized for various data analysis tasks including importing, accessing, transforming, exploring, plotting, and modelling data. In this instance, it was used to statistically determine the impact of several independent (social and linguistic) variables on three dependent variables using t-tests and ctree analysis (Galecki & Burzykowski, 2013).

1.7 Ethics

Given the nature of this study, there were specific ethical considerations that required careful attention. Initially, all participants, including myself, had to follow governmental Covid-19 regulations regarding sanitation. Participants were treated with respect and consideration for demographic factors such as ethnicity/race and sex/gender. Confidentiality and anonymity of the participants were ensured, and permission was obtained for the audio recording of interviews. Additionally, participants had the option to

request changes or deletion of recordings. They were not compelled to discuss any topic they did not want to address. To avoid influencing the participants' behavior (Observers Paradox) before sociolinguistic interviews (Mesthrie 1992: 39), full disclosure only occurred after these interviews took place.

1.8 Dissertation outline

This study will offer insight into the broader-Potchefstroom SAIE speech community in the North West province of South Africa. No data has been collected on this speech community prior to this study, and the current study will thus add to our existing knowledge about SAIE, particularly in an Afrikaans-dominated environment. This may inspire further investigations of the SAIE speech community in locations beyond those already researched by Rajend Mesthrie. The first chapter introduces the sociolinguistic study and contextualizes the research gap that motivated it. Chapter 2 provides an extensive literature review on relevant sociolinguistic research. Chapter 3 takes a look at the SAIE speech community of Potchefstroom and also discusses the methodologies employed during the study as well as describing in detail each tool's appropriateness and its contribution to answering the various research questions. Following chapter 3 is chapter 4, which presents the results and analyses and interprets this data. Finally, chapter 5 concludes the study by reiterating the problem statement, summarizing main points made in previous chapters briefly, and providing recommendations.

CHAPTER 2 LITERATURE REVIEW

2.1 Introduction

This chapter discusses the primary influences on language variation and change as indicated by existing literature. It provides a brief introduction to important paradigms and theories, as part of looking at key social factors such as ethnicity, age, gender, social class, and place. These factors have been extensively studied in sociolinguistics as illustrated in this chapter and are known to significantly influence language use and linguistic variation as they interact and intersect with each other, shaping language use and linguistic variation in a multifaceted way. This highlights the need for a comprehensive understanding of their connections within specific speech communities.

2.2 Language and Ethnicity

This sub-section explores the intricate relationship between language and ethnicity by examining how linguistic practices shape and reflect ethnic identity. It begins by defining key concepts such as ethnicity and ethnolects, illustrating how language serves as a marker of cultural identity. The discussion then delves into various sociolinguistic theories, including Social Identity Theory and Ethnolinguistic Vitality Theory (Giles, Bourhis, & Taylor, 1977), which provide frameworks for understanding how language influences and is influenced by ethnic identity. Following this, the sub-section addresses language maintenance and shift within ethnic communities, highlighting factors such as immigration, intermarriage, and social networks. The role of bilingualism and multilingualism is explored, along with linguistic phenomena such as code-switching, borrowing, and linguistic crossing, which illustrate how individuals navigate their identities in multilingual contexts. Finally, the emergence of World Englishes is discussed, emphasizing the adaptability of English in diverse linguistic and cultural settings and its role in expressing and negotiating ethnic identity. Through this structured approach, we aim to provide a comprehensive understanding of the intricate connections between language and ethnicity.

2.2.1 Ethnolects and ethnicity

Language and ethnicity are often intertwined, although they represent separate ideas. Ethnicity is the cultural identity of a person based on shared characteristics such as ancestry, history, customs, and traditions; it is commonly associated with race, nationality, and cultural practices. Fishman *et al*. (1999: 4) defined ethnicity as the perception and expression of connections to one's own group that presumably have deep historical roots and share ancestral origins leading to corresponding rights and obligations.

Later, Fishman reflected on the relationship between language and ethnic identity in this way: “although language has rarely been equated with the totality of ethnicity, it has, in certain historical, regional and disciplinary contexts, been accorded priority within that totality” (Fishman, 1999: 4).

While the relationship between language and ethnic identity is often strong, it is neither simple nor straightforward. As linguists began to examine diverse speakers and communities, the connections between language and ethnicity became increasingly complex. At the outset, human biologists have been unable to find any scientific foundation for classifying human beings into racial groups (Zelinsky, 2001). Therefore, the concept of ethnicity as a social construct should be considered, as it can be observed and provides valuable insight into how individuals understand and embrace their ethnic identity in their daily lives. Sociolinguists examine the complexities of ethnic identity over time and in different situations (and of course in relation to language), offering a deeper understanding of its dynamics.

Sociolinguistic research has shown how linguistic practices can greatly influence and even change ethnicity. According to Bucholtz (1995: 355), the connection between language and ethnicity is so strong that using linguistic practices associated with a particular ethnic group may be enough for an individual to be accepted as a member of that group. Language is thus a critical marker of ethnic identity. For instance, the Cockney dialect, which is prevalent in parts of East London, is a significant aspect of the Cockney cultural identity. Similarly, the use of Mandarin Chinese and its regional varieties are closely tied to the cultural and ethnic identity of Chinese people (Saleem, 2022). A person's dialect typically reflects their geographical origins or current place of residence as well. Individuals may also utilize a blend of dialects, which collectively make up their unique idiolect. An individual's idiolect refers to their unique use of language, all of which reflects a range of factors that contribute to our ethnic identity, including where we were born, our current place of residence, the places our parents have lived, the languages we speak, and our cultural practices.

Sociolinguists use the term ‘ethnolect’ to refer to a language variety that is specific to an ethnic group. It can be thought of as a combination of ‘ethnic group' and 'dialect'. Since ethnolects are spoken by ethnic communities, they serve as an important expression of ethnic identity. One example of an ethnolect is African American Vernacular English (AAVE). It is an ethnolect that creates a sense of community and belonging for African Americans in the United States and this variety has a rich cultural background, becoming a substantial part of a person's identity (Labov, 1972). Ethnolects can develop through various processes, such as the influence of a group's ancestral language on their use of the dominant language, as well as the need for group members to maintain a distinct linguistic identity within a multicultural society. The study of ethnolects involves examining how language variation and change are shaped by a number of social factors, including migration, community cohesion, and intergroup dynamics.

Sociolinguists have used the term to explore diverse ethnolects globally, such as the above-mentioned African American Vernacular English (AAVE), and others such as Chicano English, Singaporean English (Singlish), and Jewish English, to understand how ethnic identity is expressed and preserved through language (O’Toole, 2018). These ethnolects are characterized by distinct discourse features and language use; AAVE is, for example, characterized by distinctive phonological, syntactic, and lexical patterns

including features like consonant cluster reduction (e.g., "tes" for "test"), the habitual "be" (e.g., "He be working" to mean "He is usually working"), and unique vocabulary items (Labov, 1972: 203-204).

Chicano English[1] on the other hand, includes phonological features such as the use of a more tense vowel sound in words like "feel" and "fill" and the merging of the sounds "v" and "b", for instance; thus "very" and "berry" might sound the same or very similar. It also has distinct syntactic and lexical elements influenced by Spanish (Fought, 2003: 25-30). Similarly, Singapore English, otherwise known as Singlish, blends English with elements from Chinese dialects, Malay and Tamil. It includes particles like "lah," "leh," and "lor" to convey different nuances and pragmatic meanings, as well as unique syntactic structures (e.g., "Wah, you see that new movie already ah?" "Not yet leh. You go watch already?" "Yeah lah, super good. You should go watch lor" (Gupta, 1994: 5-7).

Lastly, Jewish English incorporates Yiddish and Hebrew loanwords, unique intonation patterns, and certain syntactic structures that reflect Yiddish influence. For instance, phrases like "Do you want to come with?" which lacks the object ("me" or "us") exhibit Yiddish syntactic influence. It serves as a marker of Jewish identity and religious practice, maintaining connections to Jewish cultural heritage primarily in the United States, Canada, the United Kingdom, and other English-speaking countries (Benor, 2010: 163). These diverse ethnolects exemplify how language evolves and adapts within ethnic communities, incorporating elements from both heritage languages and the dominant language to create distinct linguistic varieties that reflect cultural identities and social experiences.

2.2.2 Ethnolinguistic theories

Two theories are important within the context of language and ethnicity. The first is *Social Identity Theory* (Tajfel & Turner, 1986), which posits that individuals derive part of their identity from the social groups to which they belong, including linguistic groups. Language is a crucial component of these groups, contributing to a sense of belonging and differentiation from others. For instance, Phinney, Romero, Nava, and Huang's (2001) study illustrated the close connection between language usage among adolescents in immigrant families and their sense of ethnic identity and belonging. In their study, adolescents who maintained a strong proficiency in their heritage language (Spanish) alongside English reported a stronger sense of ethnic identity. They felt more connected to their ethnic group and displayed higher levels of ethnic pride; as opposed to those who predominantly used English and had lower proficiency in Spanish: such individuals reported weaker ethnic identity and a diminished sense of belonging to their ethnic group (Phinney *et.al*, 2001: 498-500).

[1] Chicano English is an ethnolect primarily spoken by Mexican Americans, particularly in the southwestern United States, including California, Texas, New Mexico, and Arizona.

The second theory is *Ethnolinguistic Vitality Theory* (Giles, Bourhis, & Taylor, 1977), which suggests that the vitality of an ethnic group's language is influenced by its status, demography and institutional support. High ethnolinguistic vitality contributes to language maintenance while low vitality can lead to assimilation and language shift. Status factors that influence language maintenance, assimilation and shift include 1) the perceived and actual economic success and opportunities available to the ethnic group; 2) the prestige and recognition of the ethnic group's language and culture within the larger society; 3) historical events and relationships that impact the group's status; and 4) the perceived and actual importance of the group's language in various domains, such as education, government, and media. There are also demographic factors such as 1) the number of speakers of the ethnic language and their geographical concentration; 2) higher birth rates and a younger population can contribute to language maintenance and; 3) patterns of migration and rates of intermarriage with other ethnic groups can influence language retention or shift. The last general factor is institutional support. For instance, the French-speaking community in Quebec, Canada, benefits from high ethnolinguistic vitality due to strong institutional support, including French-language education, media, and governmental services, which helps maintain the French language despite the dominance of English in North America (Bourhis, 2001: 28; Landry *et.al*., 2007: 57-59). In addition, the cases of Catalan in Spain and Welsh in the UK illustrate how high ethnolinguistic vitality enables minority languages to assert and maintain ethnic identity. These communities have bolstered their languages through robust educational programs, dedicated media outlets, and cultural events, ensuring the preservation and promotion of their unique identities (Carli *et al*., 2003: 45-47).

According to Edwards (2009), language loyalty is a significant factor in sustaining ethnic group identity, particularly in multicultural societies, where maintaining a strong ethnic language presence can enhance community cohesion and resilience (Edwards, 2009: 39: 41). Conversely, the indigenous languages in many parts of Australia face low ethnolinguistic vitality. Due to historical policies of assimilation, lack of institutional support, and the dominance of English, many Aboriginal languages are endangered or have already experienced language shift (Schmidt, 1990; McConvell & Thieberger, 2001).

Another example is the Maori language in New Zealand, which experienced low vitality but has seen revitalization efforts through institutional support such as Maori-language education programs and media, which has helped to strengthen its use and status somewhat within the community (Benton, 1991:9; King, 2001: 78). Research on the Hispanic community in the United States shows a complex interplay between maintaining Spanish and adopting English.

2.2.3 Language Maintenance and Shift

Moving to the context of immigration, Zentella (1997) shows in her study on Puerto Rican communities in New York City that first-generation immigrants[2]tend to maintain Spanish, demonstrating higher ethnolinguistic vitality due to strong community ties and cultural practices. However, subsequent generations increasingly adopt English, reflecting a decrease in ethnolinguistic vitality as the influence of the dominant English-speaking environment becomes more pronounced (Phinney *et al*., 2001: 498). This shift highlights how varying levels of institutional support, demographic changes, and the perceived status of the language within the broader society can impact language maintenance and shift within ethnic communities (Zentella, 1997: 81-83). Additionally, Smits (2010) notes that intermarriage between people from different language backgrounds can accelerate language shift as families often choose to use a common language. This can reduce the ethnolinguistic vitality of the minority language. Conversely, close social networks within the ethnic community can help maintain the original language by creating opportunities for regular language usage, thereby enhancing its vitality. These networks can include community centers, religious institutions, and cultural organizations that provide spaces for language practice and cultural expression, helping to sustain the language across generations (Bourhis, 2001: 27-28).

Language maintenance and shift is thus influenced by a myriad of factors, including economic pressures, social dynamics, and policy decisions. Efforts to preserve minority languages often require concerted efforts from both the community and external institutions to provide support and resources for language education and cultural activities (Hornberger, 2008: 199). These initiatives can help reinforce ethnic identity by fostering a sense of pride and cultural continuity within the community, counteracting the forces of assimilation (King, 2001: 78-79). While immigration and integration into new societies can challenge the vitality of minority languages, strong community networks and supportive policies can mitigate against these effects, ensuring the preservation of linguistic and cultural heritage. Understanding the factors that influence language maintenance and shift is crucial for developing effective strategies to support ethnic communities in maintaining their unique identities in an increasingly globalized world (Carli *et al*., 2003: 45-47).

2.2.4 Linguistic repertoires

As ethnic communities navigate these linguistic landscapes, phenomena such as bilingualism, multilingualism, code-switching, style-shifting, and linguistic crossing (and of course the development of ethnolects) become integral to how individuals express and manage their identities. Bilingualism and

[2] First-generation immigrants are individuals who were born in one country and later moved to another country.

multilingualism provide individuals with the ability to communicate across cultural and linguistic boundaries, enriching their social interactions and broadening their cultural understanding (Wei, 2000: 4-6). These linguistic abilities enable individuals to access multiple cultural worlds, allowing them to engage more fully in diverse communities (Bialystok, 2009: 104). According to Wei (2000: 4), "bilingualism is not a uniform phenomenon; it exists in many forms and involves different languages, contexts, and social factors." This diversity in bilingual experiences underscores the complexity of linguistic and cultural interactions.

In multilingual contexts, individuals make deliberate language choices that reflect their identities and social affiliations, demonstrating agency and flexibility in navigating their roles within different communities (Pavlenko & Blackledge, 2004: 11). When speakers of different native languages or language varieties come into contact[3], they often adapt their language use to facilitate communication and interaction. This adaptation is evident in, for example, the contact between Spanish and English within the Hispanic community in the United States (Zentella, 1997). In such contexts, speakers may engage in code-switching, which involves alternating between two or more languages or language varieties within a single conversation, depending on the situation and their linguistic needs (Poplack, 1980: 614; Myers-Scotton, 1993: 33; Zentella, 1997: 89). This multilingual ability enables individuals to express different facets of their identity, encompassing their ethnic heritage and their integration into dominant societal groups (Meierkord *et al*., 2015: 45).

In addition to code-switching, extensive borrowing of vocabulary and expressions from one language to another is a common phenomenon in multilingual communities. Borrowing allows speakers to enrich their language repertoire, incorporating words and phrases that capture specific cultural or contextual nuances. This blending of languages not only facilitates communication but also reflects the dynamic and evolving nature of linguistic identities within diverse communities.

Code-switching and borrowing serve as powerful tools for individuals to demonstrate a sense of community and belonging within a social group, as using a shared language can strengthen group identity and solidarity. Conversely, these linguistic practices can also create distance from others who do not belong to the same social group, as those unfamiliar with the language variety may find it challenging to participate fully in the conversation. By way of example, Holmes (2017) observed that second[4] and third-generation immigrants [5]in the UK, who were not able to speak the language of their community fluently, would still

[3] Language contact refers to the interaction between two or more languages that mix and influence each other.

[4] Second generation immigrants= The children of immigrants.

[5] Third generation immigrants= The grandchildren of immigrants.

code-switch between English and their heritage language to convey a distinct ethnic identity tied to the language of their community. This ability to code-switch allowed them to maintain a connection to their cultural roots and assert their ethnic identity, even in environments where the dominant language is different. In his Bradford study, Ives (2009) interviewed eight Pakistani-background teenage boys from a school in Bradford with a strong Pakistani influence. The boys discussed their language use and code-switching practices. They viewed code-switching between Punjabi and English as a natural occurrence, attributing it to where they were born and raised (Ives, 2009). However, Ives found that the British Asian boys consciously code-switched as a way to distinguish themselves from those that were still new to the country (Ives, 2009: 98-100).

Ethnic individuals may adjust their speech patterns to navigate different social settings and interlocutors, reflecting their linguistic flexibility and adaptability (Rickford & McNair-Knox, 1994: 235-276). As in the above-mentioned study, the boys' language included certain slang words like 'heavy' and 'bare', as well as Punjabi swear words. Hence, through code-switching, the boys were able to emphasize their group identity and exclude those from other ethnicities who could not understand the language (Ives, 2009: 100). Borrowing plays a significant role alongside code-switching, as it allows speakers to incorporate words and phrases from one language into another, enriching their expression and reflecting cultural influences. This practice highlights the strategic use of linguistic resources to navigate identity and manage social dynamics within multicultural environments (Ives, 2009: 98-100).

Beyond code-switching, there is style-shifting, which involves varying language use within a single language to align with social contexts. Style-shifting is a subtle and nuanced linguistic behavior where speakers adjust their speech patterns, including vocabulary, pronunciation, and syntax, depending on the social setting, the topic of conversation, or the audience they are addressing. This practice allows individuals to navigate different social environments and fulfil various communicative purposes effectively. Rickford and McNair-Knox (1994) illustrate this phenomenon in their study of African American Vernacular English (AAVE) and Mainstream American English (MAE), where speakers alternate between linguistic varieties based on social context. The following examples, adapted from sociolinguistic research on style-shifting, illustrate how an African American speaker proficient in both AAVE and MAE might adjust their language use:

Casual Setting with Peers (AAVE-influenced speech): "Yo, what's up? We chillin' tonight or what?"

Formal Setting with Colleagues (MAE-influenced speech): "Hello everyone, I hope you're all doing well. I wanted to discuss the upcoming project."

In a Family Gathering (Mix of AAVE and MAE): "Hey y'all, how's it going? I was just thinking about how we gonna plan Grandma's birthday party next month."

In this example, the speaker demonstrates style-shifting, adjusting their language register based on the social context and audience. The use of AAVE reflects informal, comfortable settings with peers or family members, where linguistic features such as slang and informal greetings are appropriate and expected. Conversely, the shift to MAE in formal or professional settings aligns with standard norms of communication, conveying professionalism and respect for the context. Style-shifting, similar to code-switching among ethnic individuals, reflects linguistic flexibility and adaptability, enabling speakers to navigate diverse social environments while maintaining connections to their cultural and ethnic identities (Rickford & McNair-Knox:1994, 235-276).

Sociolinguistic research has also found that individuals or communities sometimes appropriate a code that originates outside their ethnic group, using it to construct their ethnic identity. This phenomenon is often referred to as "crossing," a concept notably explored by sociolinguist Rampton (1995). In his research, Rampton examined how individuals in multi-ethnic urban settings in the UK employed language crossing to negotiate their identities and social relationships (Rampton, 1995). Crossing allows speakers to align themselves with a particular group, often signaling solidarity or a desire to be associated with that group's identity. It can be a way for them to navigate social boundaries and express their multifaceted identities. In diverse urban settings, young individuals frequently engage in linguistic crossing, selectively adopting distinctive features from various ethnic dialects present in their surroundings. For instance, adolescents in London may utilize elements of Jamaican English, South Asian English, or Cockney vernacular, regardless of their own ethnic background (Rampton, 1995). This practice of crossing is highly context-dependent, as the social acceptability and implications vary based on the specific situation, the relationships between speakers, and the broader social and cultural context. Crossing can be understood as a form of code-switching or style-shifting, where speakers fluidly navigate between different linguistic varieties depending on the social context and their interlocutors.

Such linguistic crossing, where individuals adopt features from ethnic dialects outside their own backgrounds, has been observed across a range of minority groups. From Korean-Americans using African American English (Chun 2001) to British children of Caribbean descent incorporating Panjabi elements (Rampton 1995), this phenomenon extends beyond just individual behavior. At the community level, Wolfram's (1974) research on Puerto Rican American speakers found many adopting aspects of African American English as well. While linguistic crossing can foster solidarity and multicultural appreciation, it also raises important concerns around authenticity and cultural appropriation, especially when dominant groups borrow linguistic markers from marginalized communities without fully respecting their cultural significance.

2.2.5 World Englishes

As individuals navigate their cultural identities through these various linguistic practices, they contribute to the broader tapestry of global linguistic diversity. The widespread prevalence of the English language through colonialism has had consequences on the use of heritage languages and cultures as mentioned throughout this section. This is further reflected in the emergence of World Englishes, a term that captures the varied forms of English that have developed across different regions and cultures worldwide. These distinct varieties of English are shaped by local languages, cultural practices, and historical contexts, offering a unique lens through which to examine the interplay between language and ethnicity. Schneider (2007) explores the evolution of English into new dialects in postcolonial settings worldwide and proposes a unified developmental model for these "New Englishes," arguing that despite their unique historical conditions and contexts, they undergo similar sociolinguistic and language-contact processes. The model outlines five stages of development: Foundation, Exonormative Stabilization, Nativization, Endonormative Stabilization, and Differentiation.

Here is an overview of the five stages of development in the model proposed by Schneider (2003) for the evolution of New Englishes in postcolonial settings:

1. Foundation

- **Description:** This stage marks the initial contact between English speakers (often colonizers) and local populations. English is introduced as a foreign language through trade, colonization, or missionary activities.

- **Characteristics:**

- Limited use of English among the local population.
- English serves primarily as a tool for communication between colonizers and locals.
- Initial borrowing of vocabulary and basic structures from English into indigenous languages.

2. Exonormative Stabilization

- **Description:** In this stage, English becomes established as the language of administration, education, and law, often modelled after the colonizer's variety.

- **Characteristics:**

- English gains prestige and is used in official domains.
- There is a reliance on external norms (e.g., British or American English) for language standards.

- English is primarily spoken by the educated elite and those in power.

3. Nativization

- **Description:** The local population increasingly adapts English, incorporating elements of indigenous languages and cultural influences, leading to the development of a distinct local variety.
- **Characteristics:**
  - Structural changes occur as English adapts to the local linguistic environment.
  - Phonological, grammatical, and lexical features reflect local influences.
  - Code-switching and borrowing are common, blending English with native languages.

4. Endonormative Stabilization

- **Description:** A sense of local linguistic identity emerges, and the new English variety gains acceptance and legitimacy within the community.
- **Characteristics:**
  - Development of local norms and standards for the English variety.
  - Increased literary and cultural production in the local variety of English.
  - Recognition of the local English as a marker of national or ethnic identity.

5. Differentiation

- **Description:** The local variety of English further evolves, diversifying into sub-varieties based on regional, social, or ethnic differences.
- **Characteristics:**
  - Emergence of distinct dialects and sociolects within the local English variety.
  - Language change continues as the local variety adapts to ongoing social and cultural shifts.
  - The local variety becomes an integral part of the community's linguistic landscape.

The evolution of New Englishes across the globe through this framework exemplifies the dynamic interaction between English and various ethnic identities, as seen in studies conducted in diverse cultural contexts such as New Zealand, India (Holmes, 1997), Hong Kong (Lin, 1996), England (Hewitt, 1996), and

the Philippines (Bautista, 1997). These studies highlight how English adapts to and is influenced by local languages and cultural practices, leading to the creation of distinct linguistic varieties that embody both regional heritage and global influences.

In New Zealand, for example, the interplay between English and Maori has produced unique linguistic customs that reflect both indigenous and global elements, contributing to the development of distinctive English varieties influenced by Maori (Bell, 1993: 77; Macalister, 2010: 130). This illustrates the Nativization stage in Schneider's model, where English is increasingly localized and influenced by native languages. Conversely, in regions with stringent official language policies, such as Hong Kong, ethnic minorities may face pressure to linguistically assimilate, which can threaten the survival of their native languages. The dominance of English and Cantonese in Hong Kong poses significant challenges for other ethnic languages, exemplifying the tension between language maintenance and shift (Mak & Lin, 2019: 310; Wong, 2014: 150).

In the Philippines, Bautista (1997: 54) examined how English proficiency coexists with the use of Filipino languages, illustrating the complex linguistic choices faced by diaspora communities as they navigate multiple linguistic influences. This reflects the processes of Endonormative Stabilization and Differentiation, where local English varieties gain recognition and further diversify. Sociolinguistic research also reveals substantial variation in English dialects spoken by different ethnic groups, as seen in England, where Hewitt (1996: 82) documented the distinctive features of London Jamaican English. This dialect reflects the linguistic influence of the Jamaican community and demonstrates how English varieties adapt to and incorporate elements from diverse ethnic identities. These examples underscore the adaptability and diversity of World Englishes, highlighting the intricate relationship between language and ethnicity and how English serves as a medium for expressing and negotiating cultural identities within various sociolinguistic contexts.

The study of language and ethnicity is an ongoing endeavor that reveals the complex ways in which language acts as a potent marker of ethnic identity, reflecting and reinforcing cultural heritage and social belonging. Linguistic phenomena such as code-switching, style-shifting, borrowing, and linguistic crossing illustrate the dynamic strategies individuals employ to navigate their multifaceted identities in diverse social contexts. These practices highlight linguistic flexibility and adaptability, enabling speakers to align with different social groups and effectively manage social interactions. The rise of bilingualism and multilingualism underscores the capacity of individuals to express and negotiate their ethnic identities across multiple linguistic domains. This linguistic dexterity allows for the maintenance of cultural ties and the adoption of new linguistic features that resonate with broader social experiences. The global proliferation of English has placed it at the forefront as a lingua franca, symbolizing a new age of interconnectedness and serving as a bridge across cultural and geographical divides (Abdullah & Chaudhary, 2013). English's adaptability and integration into local contexts have given rise to World

Englishes, which embody the unique cultural identities of their speakers (Seidlhofer, 2009). However, the relationship between language and ethnicity is just one aspect of the broader sociolinguistic landscape. Other social factors such as age, gender, social class, and geographic location also play integral roles in shaping linguistic behavior and identity formation (Berns, 2009).

2.3 Language and Age

This section explores the intricate relationship between language and age, examining how linguistic expression evolves over an individual's lifetime and the factors influencing this change. We delve into the concepts of chronological and apparent time to understand how age impacts language use. The section begins by discussing the theories of apparent time and age grading, highlighting how linguistic features can signal change-in-progress or reflect different life stages. We then consider the influence of adolescence, emphasizing how social interactions shape linguistic development. This section also addresses the middle-aged bias in sociolinguistic research and the role of institutions in shaping language use across different age groups.

Through these discussions, we aim to provide a comprehensive understanding of how age influences linguistic variation and contributes to the dynamic nature of language within communities.

According to Eckert (1998:151):

> Aging is central to human experience. It is the achievement of physical and social capacities and skills, a continual unfolding of the individual's participation in the world, construction of personal history, and movement through the history of the community and of society. If aging is movement through time, age is a person's place at a given time in relation to the social order: a stage, a condition, a place in history. Age and aging are experienced both individually and as part of a cohort of people who share a life stage, and/or an experience of history.

It is evident that language use varies between older and younger people, indicating a strong correlation between age and linguistic expression. Sociolinguists employ two primary methods to understand this phenomenon (Schreier, 2021). The first involves analyzing linguistic features over chronological time, examining, in real time, how language evolves in and across different age groups. The second, more insightful approach uses the construct of apparent time, which serves as a valuable analytical tool for studying linguistic variation (Bailey *et al*., 1991: 242). Age-related differences in language use are viewed as temporal analogues, reflecting historical stages of linguistic change. As such, an increasing or decreasing frequency of a linguistic feature across different age groups can be interpreted as a sign of language change-in-progress (Sankoff, 2006: 105).

Tagliamonte (2011: 43) describes apparent time as a proxy for chronological, or real time, allowing linguists to examine the history of a linguistic process from a contemporary perspective. Through this approach,

changes within a speech community can be identified by examining linguistic patterns associated with different age groups. In some cases, the entire community may shift its language use, while in others, individuals might alter their speech as they age. Occasionally, both types of change can occur simultaneously. To understand these dynamics, it is essential to uncover and interpret these linguistic patterns. Tagliamonte (2011: 69) explains that during linguistic change, individuals typically acquire the frequency of particular linguistic variables from their caregivers. This frequency may increase during adolescence and even undergo reorganization, indicating a change-in-progress. According to Labov (1994: 84), by late adolescence (around age 17), a person's linguistic system generally stabilizes and remains consistent throughout their life. This stabilization results in gradual increases in the linguistic values adopted by individuals from one generation to the next, leading to language change within the community.

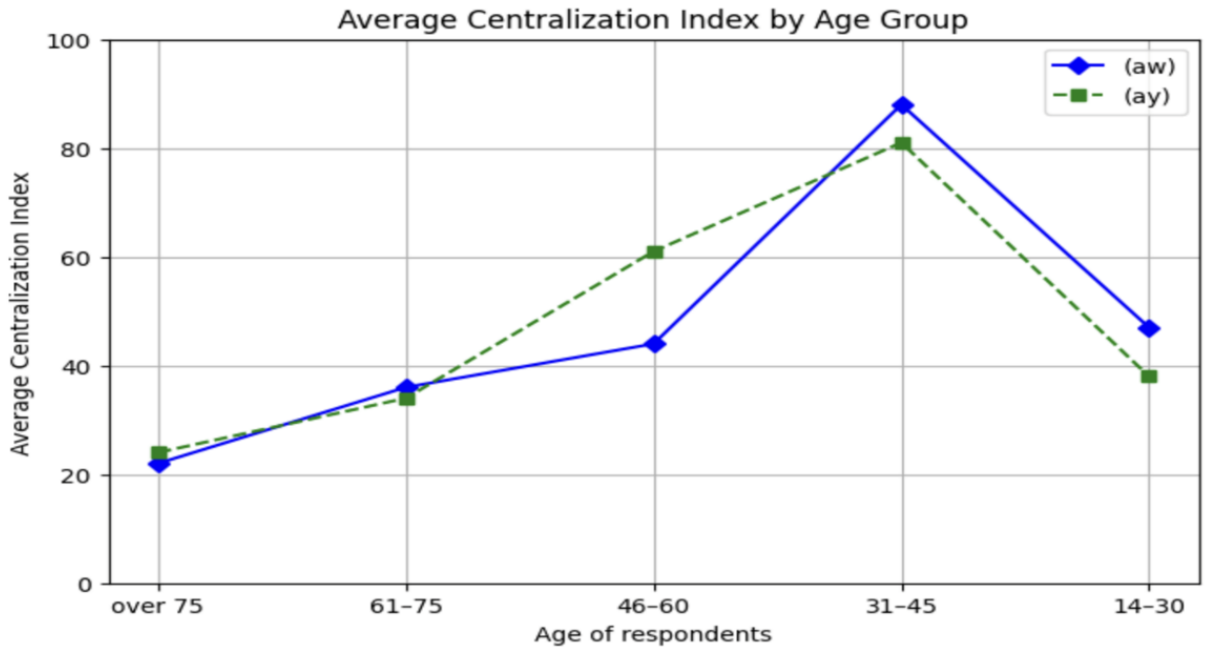

Figure 2.1 Centralization Index by age group for (aw) and (ay) on Martha's Vineyard (Adapted from Tagliamonte, 2011:27)

For example, Labov (1963) observed an increase in the use of centralized onsets of the(ay) /aɪ/ and (aw) /aʊ/ vowels in apparent time, as illustrated in his research depicted in Figure 2.1. He proposed that this pattern reflected a diachronic increase in the use of these features within the community of Martha's Vineyard. The horizontal axis represents age groups, starting with the oldest speakers on the left and progressing toward the youngest speakers on the right. The vertical axis represents the Average Centralization Index, which quantifies the degree of centralization for the (aw) and (ay) vowels. The blue solid line represents the (aw) vowel, while the green dashed line represents the (ay) vowel.

This kind of observation helps to link changes observed among different age groups to broader historical linguistic shifts within the community. Observing linguistic traits across different age groups in apparent

time studies does not necessarily signal ongoing changes in language use, however. Instead, these variations may illustrate age grading, where individuals at various life stages naturally display different linguistic patterns.

Wardaugh (2002: 194) explains that individuals typically use "speech appropriate to their age group." Additionally, Labov (1994: 23) expands on this idea by stating, "if individuals adjust their linguistic behavior over their lifetimes while the community does not change, this phenomenon is defined as age grading." According to Labov (1994: 111–112), age-grading usually involves linguistic features that either possess a high level of social awareness or, as noted by Wolfram and Fasold (1974: 90), “have a rapid life-cycle” (linguistic features that are adopted quickly by speakers but may also fade out or change relatively swiftly over time). An example of this phenomenon is the evolution of the term "bro" and its phonetic variants. Originally an abbreviation of brother, it has spawned forms such as "bruh," "brah," and "bra," each carrying distinct social meanings and associations. These variations are particularly prevalent in African American Vernacular English (AAVE) and have spread into mainstream usage through digital media and social interaction (Arifin & Dewi, 2023). The term “bruh,” for instance, is frequently used to convey casual camaraderie or exasperation, and while it remains widely recognized, its prominence in youth speech may decline over time as language trends evolve. Tagliamonte (2011: 47) supports this by stating that features subject to age grading are often those that individuals can consciously control.

Community studies on language variation often reveal that as people age, they tend to adopt more conservative speech patterns. This makes it challenging to determine whether the community's language is evolving over time or if individuals are simply becoming more conservative with age—or perhaps both—when relying solely on apparent time data. According to Sankoff (2006: 105), to ascertain whether age-related variation truly indicates a change-in-progress, it is necessary to examine evidence from real time studies. Several studies have attempted to bridge the gap between real-time analysis and apparent-time data by integrating information on language variation with sources detailing earlier stages of the language. Researchers have used resources such as old recordings (Kemp & Yaeger-Dror, 1991), geographical evidence (Eckert, 1980), and historical accounts (Labov, 1966, 1972) of the dialects being studied. These sources help establish whether current age differences are indicative of an ongoing change process while also providing context for contemporary linguistic data. Similarly, we review existing historical accounts to explore whether present age-related variations reflect ongoing linguistic changes.

Studies conducted by researchers such as Hermann (1929) in Charmey (Suisse Romande), Cedergren (1984) in Panama, Fowler (1986) in New York, and Trudgill (1988) in Norwich confirm that many, but not all, age-stratified variables represent change-in-progress. Over 20 years later, after Gauchat (1905) found apparent-time evidence of five changes in Charmey, Hermann (1929) revisited Charmey and compared the speech of 40 speakers with Gauchat's earlier evidence. The five changes documented by Gauchat included shifts in vowel articulation, the simplification of certain consonant clusters, and the raising or lowering of

specific vowels in dialectal speech. Hermann found evidence of change in four out of the five changes that Gauchat reported (Gauchat, 1905) (Hermann, 1929). Similarly, Eckert (1998: 167) notes that Bailey *et al.* (1991: 241) compared apparent time data from the *Phonological Survey of Texas*, collected in the late 1980s, with data from the *Linguistic Atlas of the Gulf States* (Pederson *et al*., 1986), collected in the mid-1970s. The apparent-time data from the later sample indicated changes-in-progress, which were confirmed by differences between the two samples (Eckert, 1998: 168). Trudgill (1988), when revisiting Norwich two decades later, discovered that linguistic variants previously observed only in the speech of younger people had gained popularity and were spreading across different age groups. Cedergren (1984), in her longitudinal study of Panama City, compared two age-graded samples taken 20 years apart. By comparing these samples at two historical points, she found that changes in real time were reflected in differences between successive cohorts of the same age, while age grading was shown by variations within cohorts over the two periods. Her research provided evidence of both historical change and age grading in apparent time, demonstrating that the same linguistic change affecting an entire community can also impact individuals' speech throughout their lifetimes. This shows that adult speakers can be active participants in sound change (Cedergren, 1984: 141).

Community studies of variation depend immensely on chronological age to categorize speakers, as most Western social scientists equate age with chronological age. However, due to various factors related to social and biological development that do not adhere to a linear progression with chronological age or to align with each other, chronological age only offers an approximate measure of a speaker's age-related position in society (Eckert, 1998: 151). To demonstrate that individual linguistic change occurs over a person’s lifespan, a detailed examination of development and the social changes associated with chronological age is necessary. Community studies often face challenges in achieving precise age differentiations with statistical significance due to the broad range of ages involved (Wagner, 2012). This challenge often necessitates grouping speakers into relatively broad age categories. Researchers have defined these speaker categories using both etic and emic approaches (Hoffman & Walker, 2010).

The etic approach groups speakers into arbitrarily defined but equal age spans, such as decades (Trudgill, 1974; Labov, 1966). Conversely, the emic approach groups speakers based on shared experiences related to time, which can be linked to life stages or historical context (Eckert, 1998: 160). Chambers (1992) specifically identified five main age periods: childhood, adolescence, early/young adulthood, middle age, and old age (Chambers, 1992: 148). With a particular focus on adolescents, (Kerswill, 1996) argue that the language initially introduced to children by their caregivers often evolves as they progress into adolescence. Consequently, adolescents utilize linguistic resources distinct from those of infants, young adults, adults, and the elderly. As they interact with their peers, adolescents tend to distance themselves from other family or societal members, adopting new forms of speech that differ from what they previously learned. This leads them to vary their language in ways unique to their social groups and networks (Eckert, 1998: 157).

This language is mostly marked by in-group slang and other non-standard forms that are typically viewed as stigmatized and less prestigious by wider society (Wardhaugh, 2006: 87). However, as individuals move into adolescence, the inherent variability of language enables them to employ it more flexibly, reaching its peak in the young adult (post-adolescent) stage. Research indicates that during this period, speakers begin to shift their language towards a more "standardized" form, aiming for decency and prestige (Eckert, 1998: 162). This shift is likely due to increased self-awareness and the realization that they are approaching adulthood, necessitating behavior that aligns with societal expectations. It is also necessary to recognize that a middle-aged perspective pervades social research. Sociolinguistic studies frequently embody this bias, resulting in a more static treatment of middle-aged speech compared to that of other age groups. Several researchers, including Baltes *et al*. (1980), have highlighted this middle-aged bias in social science research (Eckert, 1998: 164). Thus, according to Eckert (1998), researchers often perceive adult language patterns as defining variation, which leads them to view these patterns as the sole target of linguistic development. Consequently, the development of variation patterns is seen as following early language development and reliant on the emergence of adult-like social awareness (Eckert, 1998: 165). Treating middle-aged language as a universal norm and developmental target obscures the fact that speech patterns at any life stage are part of the community's structuring of language use. Furthermore, the linguistic resources utilized at any stage in life carry social significance for individuals within that particular life stage.

Sankoff and Laberge (1978) argue that awareness of standard language is closely tied to the "standard language market," which is defined by participation in institutions such as education and commerce, along with the social networks that support these institutions. While schools dominate the lives of children and adolescents, adult lives are more focused on the workplace, and many elderly individuals are influenced by retirement or nursing homes (Sankoff and Laberge, 1978: 239). These institutional contexts limit and guide speakers, significantly impacting various aspects of their lives. They shape social networks and influence the need for specific language varieties. Labov (1964) emphasizes that the focus in the field of variation on the vernacular and standard language as poles of social stratification and stylistic range has led to a perception of language development that involves a growing awareness of the standard language (Labov, 1964: 88). Understanding this progression helps explain how different life stages and institutional affiliations contribute to linguistic variation and social meaning.

2.4 Language and Gender

The intricate relationship between language and gender has long been a subject of extensive academic inquiry, as researchers across various disciplines seek to unravel the complex interplay between these two fundamental aspects of human experience. From the early anthropological observations of sex differences in non-Western languages to the more recent critical examinations, this field of study has evolved significantly over the past several decades (Valentine, 2008). Gender is a socially constructed concept that

differs from biological sex (Conte, 2018). A key sociolinguistic principle is the observed differences in language use between males and females. First of all, the biological differences between males and females have long been recognized as a fundamental factor in shaping language use and patterns. For example, studies have found that women tend to have more developed language centers in the brain (Shaywitz *et al*., 1995) and that hormonal differences can influence communication styles (Arnold & Gorski, 1984). Chambers (2003) further reiterated this by stating that biologically there is a longstanding notion that women possess an inherently superior linguistic ability compared to men (Chambers, 2003: 149–153).

Sociolinguistic research has identified distinct linguistic features and preferences that tend to be associated with each gender, such as the use of precise, fact-oriented language by men and the more expressive, emotion-laden speech styles of women (Wodak, 2015). According to sociolinguistic research, gender is one of the most important factors to consider when examining phonetic variation within a speech community. As Simpson (2009: 633) suggests, when we observe the sounds produced by women and men in the same community, we should expect that some of the observed differences between the genders are a direct result of how they communicate differently. Biological differences, including the size of the mouth, throat, and vocal folds, contribute to differences in sound production between males and females. For example, males typically have longer and thicker vocal folds, leading to slower vibrations and a lower pitch (Titze, 1989: 38). This results in the average female pitch being higher than the average male pitch. However, the extent of the difference between the maximum and minimum pitch used in an utterance by females and males is a subject of ongoing debate (Graddol & Swann, 1989: 106).

In addition to differences in voice quality arising from variations in the size and shape of the vocal folds and voice pitch, the most significant distinction between males and females is vocal tract length. These differences in vocal tract length have important implications for certain aspects of sound production, as the vocal tract modifies the main sound-source generated at the glottis. In addition to differences in phonetic and phonological features, studies have also identified gender-based differences in other linguistic domains, such as lexical and syntactic choices (Leongómez. *et al*., 2014; Larson, 1982; Schultz. *et al*.; 1984). However, such gender-based linguistic variation cannot be solely attributed to innate biological traits, as it is also heavily influenced by the sociocultural norms and expectations that shape an individual's language use (Munira, Hossain & Nessa, 2020). Two prominent models have been significantly influential in this regard.

The Dominance Model, pioneered by Robin Lakoff, posits that language differences between genders reflect societal power imbalances, with women's speech characterized by politeness, tentativeness, and deference. In contrast, Deborah Tannen's *Difference Model* suggests that men and women belong to distinct "speech communities," each with their own conversational norms. *The Dominance Model* was developed by sociolinguist Robin Lakoff in her seminal work "Language and Woman's Place" (1975). Key features of this model are that women's language is characterized by features such as hesitations (e.g., "kind of,"

"sort of," "maybe") to soften statements and express uncertainty, tag questions for instance "It's a nice day, isn't it?", rising intonation in declaratives, disclaimers, and requests rather than commands. These linguistic features supposedly reflect the subordinate social status of women, as they demonstrate deference, politeness, and uncertainty. Research by Zimmerman and West (1975) found that in mixed-gender conversations, men were more likely to interrupt women, thereby asserting conversational dominance. For example, in a meeting, a man might interrupt a woman mid-sentence to make his point, whereas women are less likely to interrupt and more likely to be interrupted.

The Difference Model, developed by linguist Deborah Tannen, takes a more nuanced view, suggesting that the differences in language use between men and women are not necessarily indicative of power imbalances, but rather reflect distinct "genderlects" or speech styles shaped by different cultural norms and socialization patterns (Akbar, Khan & Chaudhary, 2021). Tannen coined the term "genderlect" to describe the distinct ways in which men and women use language. This term reflects the idea that each gender has its own unique "dialect" or speaking style. It combines "gender" and "dialect", suggesting that gender differences in language are systematic and deeply ingrained in cultural norms, much like regional dialects. Therefore, genderlect can be defined as a form of speech that is characteristic of a particular gender group. According to this model, men's speech, for instance, is often characterized by a focus on status, independence, and the exchange of information, while women's speech tends to emphasize rapport, connection, and the sharing of feelings and experiences.

For example, women might engage in conversation to share experiences and create intimacy ("How was your day?"), while men might focus on exchanging facts and demonstrating knowledge ("The meeting went well; we closed the deal") (Tannen, 1990) (Coates, 2004). Also, during a conversation, a woman might frequently nod and say "yes" to show she is listening, while a man might listen silently and only interject with questions or comments (Aryani, 2016). These differences in communicative styles can lead to misunderstandings and breakdowns in cross-gender communication, as each party may interpret the other's speech through the lens of their own cultural expectations (Jing, 2008). A woman, for example, may interpret a man's direct style as rude or insensitive, while the man may perceive the woman's more tentative speech as a lack of confidence or assertiveness (Ju, 2008).

The key ideas from these theoretical frameworks have been extensively explored and debated within the field of sociolinguistics. Empirical studies have provided both support for and challenges to the two models, highlighting the complex interplay between gender and linguistic behavior (Larson, 1982; Lakoff, 1973; Akbar, 2021). More recently, scholars have critiqued these earlier frameworks, arguing that they oversimplify the relationship between gender and language and fail to account for the diversity of linguistic practices within and across genders. Such scholars emphasize that gender is a fluid, contextual, and performative construct, and that individuals can strategically deploy different linguistic styles to navigate social interactions and power dynamics (Leongómez, Varella, González-Santoyo, & Valentova, 2014;

Larson, 1982; Holtgraves & Leaper, 2014; Davis & Reynolds, 2018). Additionally, some researchers have drawn attention to the ways in which language can be used to construct, negotiate, and resist gender identities (Leongómez *et al*., 2014; Davis & Reynolds, 2018). Furthermore, the magnitude and direction of gender differences in language use are heavily influenced by various contextual variables, such as the setting, topic, and the interlocutors involved. As Coates observes, "language is a powerful resource for the construction of gender identity, and gender is a key factor in the study of language variation and change" (Holtgraves *et al*., 2014).

Key elements that intersect with gender are style [6]and register[7]. Research has found that, all else being equal, men tend to exhibit less stylistic variation, while women demonstrate more flexibility in their linguistic repertoire. According to sociolinguist Tagliamonte (2011: 35), exploring style thus requires analyzing linguistic variables across diverse social settings, contexts, and communication mediums. Speech style varies significantly between genders, reflecting societal expectations and socialization patterns.

According to Tannen (1990), women often employ a "rapport" style of communication, which is oriented towards building relationships and maintaining social harmony. In contrast, men tend to use a "report" style that focuses on asserting information and status. As Tannen (1990: 77) observes, "for women, talking is often a way to establish connections and negotiate relationships. For men, talk is primarily a means to preserve independence and negotiate and maintain status in a hierarchical social order". Men and women may use different registers depending on the context. Women might prefer a more formal register in professional settings to gain credibility and authority, while men might use a more informal register to assert dominance and camaraderie. As Coates (1996) notes, women and men often adopt different linguistic registers to align with their perceived roles and expectations in various settings. Coates (1996: 120) observes that "women are more likely to adopt a collaborative conversational style that includes the use of a formal register, whereas men often use an informal register to establish rapport through shared activities or humor". However, both men and women may engage in code-switching, altering their language style and register to suit different social contexts and audiences.

This is particularly evident in professional environments where gender expectations are prominent. Baxter (2010) explores the concept of gendered language and code-switching, noting that "women often navigate multiple identities through language, shifting their style and register to balance professional expectations with gendered norms of communication" (Baxter, 2010: 95). Lakoff's work in particular led to many studies

[6] style refers to an individual's linguistic repertoire.

[7] register involves the specific vocabulary, grammar, and expressions suited to particular social situations or professional fields.

exploring female-male language differences in word choice and other forms of usage (Eckert & McConnell-Ginet, 2013). Sociolinguistic research from the Labovian perspective has also uncovered gender-based differences in speech patterns since the field's beginnings (Gandarillas, 2022). These studies often confirmed Lakoff's (1975) claim that women use more standard language features than men (Meyerhoff, 1994). However, the research also revealed a counterintuitive pattern: while women use more standard forms, they are often the innovators driving language change (Janet, 2012) For instance, studies on vowel shifts in Philadelphia (Labov, 1990), the Northern Cities Shift in the U.S. (Eckert, 1989), and linguistic changes in New Zealand English (Holmes, 1997) demonstrate how women lead phonetic innovation in different speech communities. Similarly, Tagliamonte and D'Arcy (2009) show that women are at the forefront of grammatical innovations, such as the rise of the discourse-pragmatic marker like (Hazenberg, 2019).

According to Labov's (2001) principles, for stable language features, women tend to use more prestigious variants than men. Labov's studies indicate that for such variables women are generally more likely to adopt and use linguistic forms that are considered socially prestigious. In contrast, men are more likely to use vernacular or stigmatized forms in an effort to assert their masculinity and status (Labov, 2001: 266). In studies of American English, for example, women were found to use the standard pronunciation of vowels and consonants more frequently than men. Women were likewise more likely to use standard grammatical constructions, avoiding nonstandard forms like double negatives ("I don't have none") (Labov, 1990: 210). Not only that but women were shown to adopt new and innovative forms earlier than men, such as new slang and colloquial expressions. Here are a few examples by (D'Arcy, 2007), (Jacobs-Huey, 2006), (Eckert, 2018) where women, particularly young women, have been at the forefront of linguistic innovation:

- **"Like" as a Discourse Marker**:
- **Usage**: "I was, like, so surprised when she said that."
- **Explanation**: The use of "like" as a discourse marker or quotative (introducing direct speech or thought) has been widely adopted by young women and has spread across different English-speaking communities. It serves to soften statements, introduce quotes, or indicate approximation (D'Arcy, 2007).
- **"Slay"**:
- **Usage**: "She slayed her performance last night."
- **Explanation**: "Slay" means to do something exceptionally well or to impress greatly. This term has been widely adopted in social media and is often associated with female empowerment and success (Jacobs-Huey, 2006).

- **"Basic"**:

- **Usage**: "That outfit is so basic."

- **Explanation**: Originally used pejoratively, "basic" describes someone who is unoriginal or mainstream, often in a way that's seen as stereotypically feminine. It was popularized through social media and internet culture, primarily by young women (Eckert, 2018).

These examples illustrate the significant role women play as linguistic innovators and provide valuable insights into the mechanisms of linguistic change and the social factors that influence them. The intersection of gender, class, and language change is a significant area of study in sociolinguistics. Labov (2001) distinguished between two types of language change: change-from-above and change-from-below. Both types of changes are often led by women, but they emerge from different parts of the social-class spectrum (Labov, 2001: 274-292).

Change-from-below refers to unconscious changes that emerge from the lower or working classes and spread upwards. In such changes women have been seen to use higher frequencies of innovative forms than men do (Labov, 2001: 292). These changes are often part of the vernacular and are initially below the level of conscious awareness of speakers. For example, women have been documented as leading The Northern Cities Vowel Shift found in the urban centers around the Great Lakes in the United States. The vowel in "cat" [æ] is raised and fronted to sound more like [eə], for example "cat" pronounced more like "cayat" (Eckert, 1989). Similarly, women have been reported to be leading vis-à-vis the California Vowel Shift, particularly prominent among younger speakers in California, where the back vowel /u/ in "dude" is fronted to sound more like [ʉ], "dude" pronounced more like "dood "/duːd/ (Fought, 1999). Women have also been observed to be leading with respect to Canadian Raising, where the diphthongs /aɪ/ and /aʊ/ are raised before voiceless consonants. The diphthong in "out" [aʊt] is raised to [ʌʊt] before voiceless consonants, "about" pronounced more like "aboot "/əˈbuːt/ (Chambers, 1973). These are just to name a few amongst others such as glottalization in British English (Milroy & Milroy, 1993), and fronting of /s/ in New Zealand English (Holmes, 1997). A non-phonetic example is Ritchart & Arvaniti's (2014) exploration of the use of Uptalk in Southern Californian English. They found that Uptalk, which involves using a rising intonation at the end of declarative sentences, making them sound like questions, was mostly led by young women.

Example:

- **Sentence**: "I'm going to the store?"

- **Phonetic Feature**: The intonation rises at the end of the statement (Ritchart and Arvaniti, 2014).

Change-from-above refers to conscious changes that originate in the upper or middle classes and with regard to these changes women adopt prestige forms at a higher rate than men. These changes are typically

associated with increased social mobility and efforts to gain or maintain social status. In Labov's (2006) study of New York City, the pronunciation of the postvocalic /r/ (e.g., in "car" or "four") was considered prestigious. Middle and upper-middle-class women were found to lead the adoption of this feature as part of an effort to align with the standard, prestigious speech norms of the time (Labov, 2006). Labov also found that women from the middle class often exhibit hypercorrection, where they over-apply perceived standard rules, aiming to achieve a higher status. For example, "Whom is going to the party?" instead of "Who is going to the party?" i.e., in places where a form might not standardly be used, as an attempt to align more closely with formal, prestigious speech (Labov, 2006).

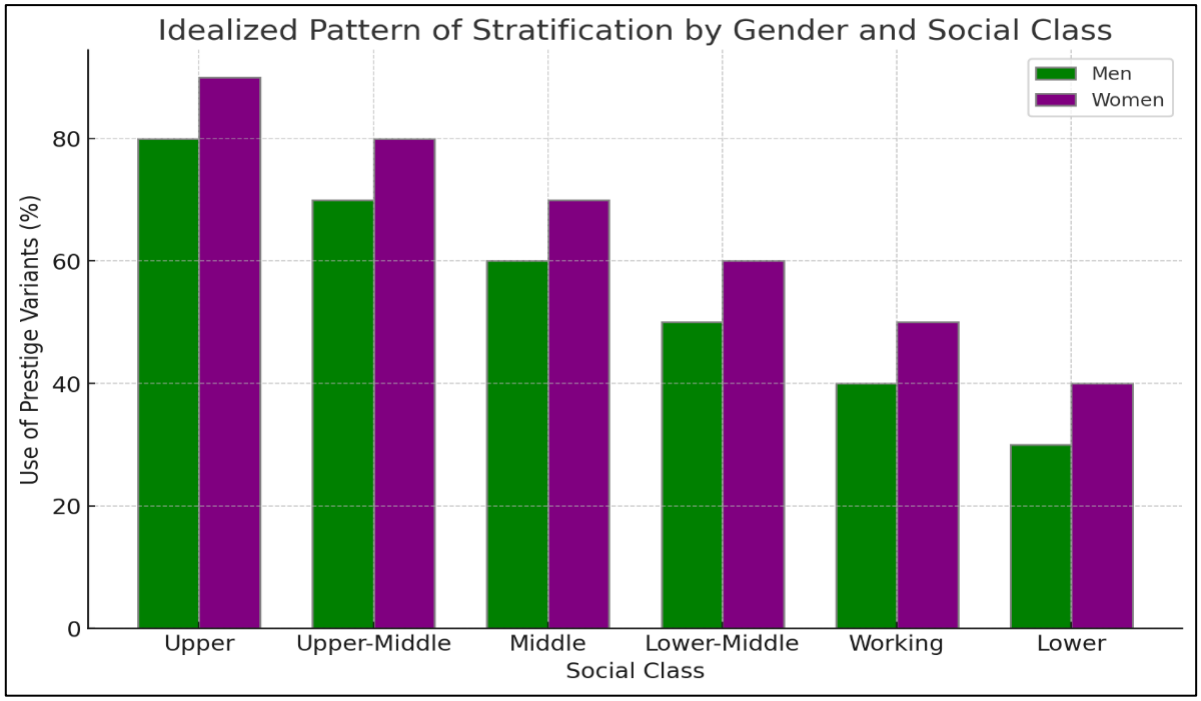

Figure 2.2 Idealized pattern of stratification by gender and social class (Created based on Tagliamonte, 2011: 32)

Figure 2.2 illustrates the interaction between social class, gender, and language use. It provides a visual representation of how linguistic variation is stratified along social lines and how women tend to adopt prestigious forms more readily than men. The graph above shows the use of prestigious language variants (%) across different social classes for both men and women. The social classes range from "Upper" to "Lower," and the percentage of prestigious variants used increases from lower to higher social classes. The graph illustrates that woman, regardless of social class, use a higher percentage of prestigious variants compared to men. The higher use of prestigious variants by women across all social classes supports the idea that women act as conservators of the standard language, maintaining and propagating standard forms as a means of adhering to social norms and seeking upward mobility. This behavior forms one side of the gender paradox. As mentioned, the other side is that women are also leaders of linguistic innovation, particularly in 'change from below,' where they adopt vernacular forms earlier than men. Thus, while

women preserve the standard language, they also drive linguistic change, a paradoxical role that has been well-documented in sociolinguistic studies (Labov, 1990).

Gender significantly affects language use, reflecting and reinforcing broader social and cultural patterns. While biological factors, such as vocal fold differences, shape the physiological aspects of speech, socialization and societal norms play a major role in how men and women use language differently. For instance, women may demonstrate more stylistic variation in their speech, adhering to standard forms in formal settings to conform to societal expectations, while also leading linguistic changes from below in informal settings. Men, on the other hand, often show less stylistic variation. However, it is not only gender that influences these differences—other social factors, such as class and geographic location, can significantly shape language use across genders.

2.5 Language and Social Class

Some of the most important divisions in sociolinguistics are associated with differences in social prestige, wealth, and power in many societies (Guy, 1988: 159-160). Class divisions are defined by the status and power an individual has in a society. Status can be understood as the degree of honor or prestige attached to one's position in society (Schizzerotto, 2010). Social stratification is associated with the ability of individuals to live up to certain ideals or principles regarded as important by the society or a social group within it; whereas, power is associated with the social and material resources a person can command, the ability to have influence on events and make decisions that impact certain aspects in the society (Brennan, 2020).

Sociolinguists generally see "class as a relatively continuous scale on which individuals are ranked according to assorted personal characteristics such as level of education, income, occupation, etc., which collectively imply a certain degree of social esteem" (Guy,1988: 163). It is these that have to be examined in order to understand class differences in the use of language. Guy (1988) states that the significance of class for linguistics is rooted in the predominantly social nature of language: further stating that language exists so that people can communicate with each other and not for private, individual pursuits. Guy (1998: 160) describes language as a social product and a social tool, adding that "our understanding of any tool will be immeasurably enhanced by a knowledge of its makers and users and uses. If class is one of the main organizing dimensions of society, then this fact should be reflected in the evolution and utilization of language." The investigation of the correlation between language use and social class began with the inception of the field of language change and variation. According to Labov (1972: 212), "the social situation is the most powerful determinant of verbal behavior" and the meaningful correlation of linguistic variables with class was consistently demonstrated in early sociolinguistic research. It was shown that certain variants are used more frequently by the highest status classes and less frequently by the lowest status classes and at intermediate frequencies by the classes in between.

Labov (1972: 8) suggests that social class is a key determinant in the distribution of linguistic variants, with each class occupying distinct layers within the community. Additionally, Labov (2001) contends that breaking down this hierarchy into at least four categories is essential for meaningful results (Labov, 2001: 114). However, other studies on social class have effectively used simpler binary divisions, such as middle-class versus working-class, or white-collar versus blue-collar (e.g., Cravens and Giannelli, 1995). Chambers (2003: 42) further emphasizes that this binary distinction is central in many speech communities where sociolinguistic research has been conducted. The relationship between social status and the usage of particular linguistic variants has been reinforced by consistent findings across various studies involving diverse languages and dialects. This connection between linguistic forms and social categories is partly encapsulated in the concept of indexicality, which refers to the broader link between language and social meaning (Silverstein, 2003: 193).

Sharp Stratification

A wide gap between middle-class and working-class subgroups is referred to as "sharp" social stratification according to Trudgill (1974). Figure 2.3 illustrates the typical pattern of sharp stratification.

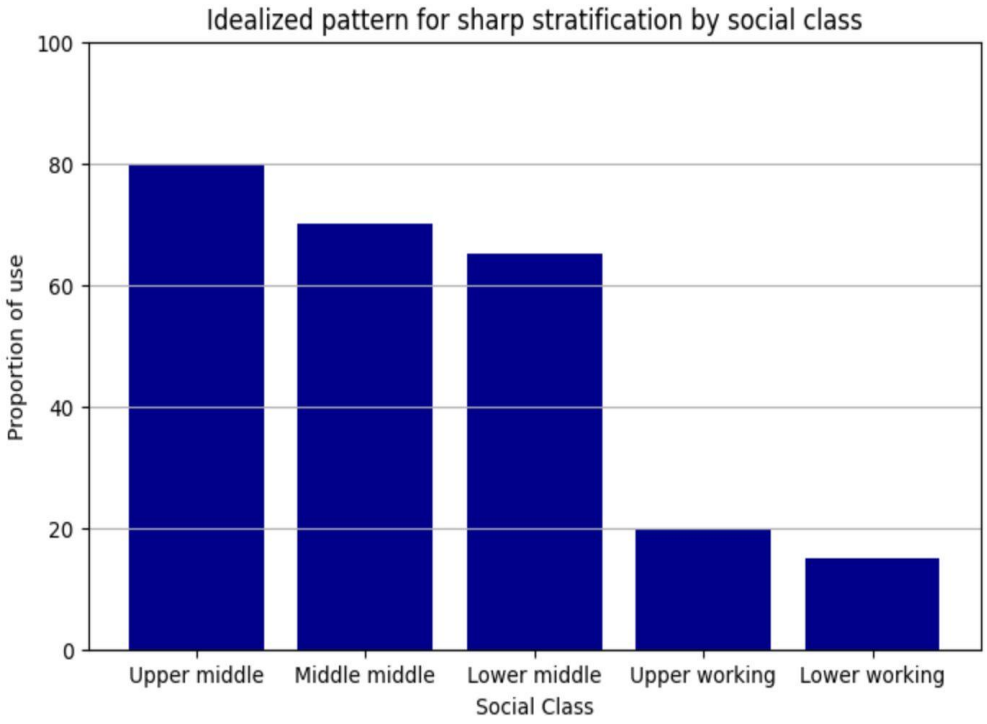

Figure 2.3 Idealized pattern for sharp stratification by social class (Adapted from Tagliamonte, 2011: 26)

The graph shows a steep decline in the proportion of use as we move from the upper middle class (highest proportion) to the lower working class (lowest proportion). The middle-class groups (upper middle, middle, and lower middle) cluster together at a high rate of feature use, whereas the working-class groups (upper working and lower working) show a significant drop-off in usage. This pattern aligns with Trudgill's (1974) findings, where middle-class speakers tend to use prestige variants at significantly higher rates, while

working-class speakers favor non-standard or vernacular forms, creating a sharp linguistic division between these groups. Notably, examples of sharp phonological distinctions in social stratification have often emerged from England, where class divisions, particularly before the 1970s, were highly pronounced (Tagliamonte, 2011: 26).

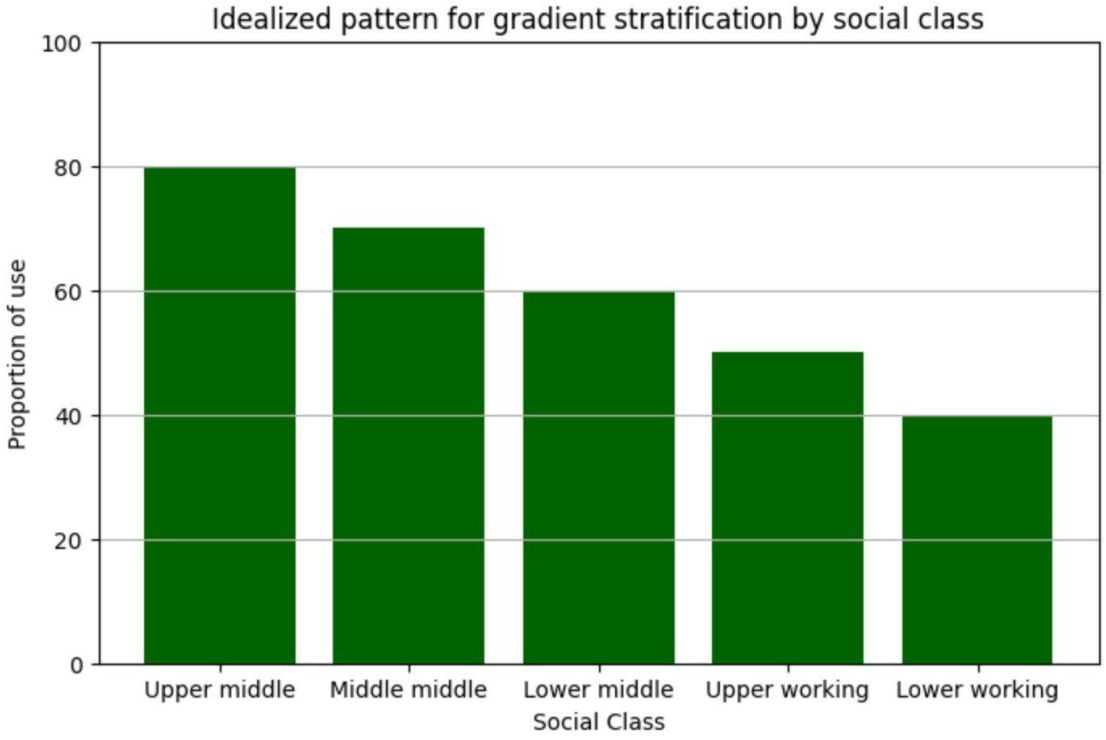

Figure 2.4 Idealized pattern for gradient stratification by social class (Adapted from Tagliamonte, 2011: 27)

As shown in Figure 2.4, gradient social stratification is characterized by a continuous, step-by-step pattern across different social groups. This pattern is sometimes referred to as a "monotonic function" of social class (Labov, 1972: 240; 2001: Chapter 5), where there is a steady decrease in the usage of certain linguistic features as one moves down the social class spectrum. An important aspect related to social class is style. Originally, style was defined based on how much attention speakers paid to their speech, ranging from informal vernacular to more structured speech forms, such as minimal pairs in a wordlist (Tagliamonte, 2011: 27). The nature of speech in interview contexts can fluctuate, with casual speech often differing significantly from one individual to another.

As noted by Labov (1972: 80), "the degree of spontaneity or warmth in the replies of individuals may vary greatly." In contrast, more structured speech contexts such as reading, wordlists, and minimal pairs tend to be more predictable. Despite the variability in casual versus careful speech, sociolinguistic variation research (LVC) suggests that patterns of variation across these different styles remain consistent within a speech community (Tagliamonte, 2011: 28). Labov (1972: 237) introduced the classification of linguistic variables that correlate with social class into three main categories: indicators, markers, and stereotypes. According to Tagliamonte (2011: 28), an indicator is a linguistic variable that correlates with social class

but remains consistent across different speech styles. Therefore, speakers use indicators similarly in both formal and informal settings. Moreover, indicators are not stratified by age, meaning they are not associated with language change in progress (Tagliamonte, 2011). Figure 2.5. illustrates an idealized pattern for stratification by social class and style where the linguistic variable is classified as an indicator.

Figure 2.5 Idealized pattern for stratification by social class and style- indicator (Adapted from Tagliamonte, 2011: 28).

When variables exhibit stratification both by class and style, they are known as 'markers.' Labov (1969) describes these markers as more highly developed features within the speech community. Speakers tend to be more consciously aware of these variations, indicating a more advanced stage in the sociolinguistic diffusion of the feature (Labov, 1969: 237).

Figure 2.6 illustrates an idealized pattern for stratification by social class and style where the linguistic variable is a marker.

Figure 2.6 Idealized pattern for stratification by social class and style- marker (Adapted from Tagliamonte, 2011: 29).

In contexts with distinct regional dialects, like in England, the differentiation between linguistic indicators and markers becomes critical due to the ways these features function in shaping social identity and perception. Indicators typically operate beneath the level of conscious awareness, meaning that speakers use these features without being aware of their use, and listeners may not consciously notice them either. These features are often deeply embedded in regional dialects and can serve as subtle cues to a speaker's background without overt recognition. In contrast, markers are more likely to be consciously noted both by speakers and listeners, as they often signal shifts in social identity and context (Labov, 1972: 237; Tagliamonte, 2011: 28). For example, certain vowel shifts, or consonant realizations might be tied to specific regions but are not necessarily associated with social judgments about the speaker. In England, regional indicators like the Northern English vowel in words like "strut" pronounced as [stɪʊt] instead of the more typical Southern British English realization [stɪʌt] might exist across regions without being consciously noticed or socially marked. In contrast, markers are often recognized both by the speaker and the listener. They reflect aspects of the speaker's identity, including social class, education level, or regional background, and can influence social judgments (Trudgill, 1974).

Regional markers, such as the dropped /h/ in Cockney English or the use of [ʔ] (glottal stop) for /t/ in Estuary English, are consciously or subconsciously linked to stereotypes or evaluations about the speaker's background or social status. In England, markers such as the use of the non-rhotic /r/ in Southern England may signal specific class or regional identities (Wells, 1982). Typically, these features carry strong social stigma. For instance, the absence of (r) in New York City's dialect is often ridiculed in phrases like "toity-toid street" instead of "thirty-third street" (Labov, 1972). In Ocracoke island, North Carolina, the phrase "hoi toide" for "high tide" highlights the regional accent (Wolfram & Schilling-Estes, 1995), while in

Canada, the phenomenon of Canadian Raising is famously depicted with “oot” for “out” (Chambers, 1991). While speakers primarily use language to communicate information, they simultaneously reveal significant details about their social and personal backgrounds through linguistic features such as accent, dialect, and pronunciation.

In this sociolinguistic sense, language serves as an index of one's social class, and certain speech features act as markers that reflect an individual's social standing or background. These features are not random, but signal access to particular lifestyles and social networks associated with a given speech pattern (Mesthrie, 2009: 6). This concept of indexicality, while complex, centers on the principle that linguistic behavior has a social interpretation (Tagliamonte, 2011: 30). It’s clear that specific linguistic features, be they phonetic or lexical, often point to a speaker's place within the social hierarchy. However, linguistic changes and innovations do not typically originate at the extremes of the social spectrum. Labov’s (2001) "Curvilinear hypothesis" showed that such changes often begin in the middle class and gradually permeate through society (Labov, 2001: 32).

Figure 2.7 presents an idealized depiction of this pattern, showing a monotonic distribution of the variable by age (not depicted) (Labov, 2001: 32), with the individuals in the study sample being adults (Labov, 2001: 460). This suggests that linguistic variables are more dynamic in these social strata, which are marked by professional distinctions such as white-collar versus blue-collar labor (Tagliamonte, 2011: 31). In much the same way that language indexes social class, it also reflects place, as place can be deeply intertwined with social structures and identities, acknowledging that geographic distinctions often align with social ones (Summerby-Murray, 1999) (Nerbonne & Heeringa, 2007).

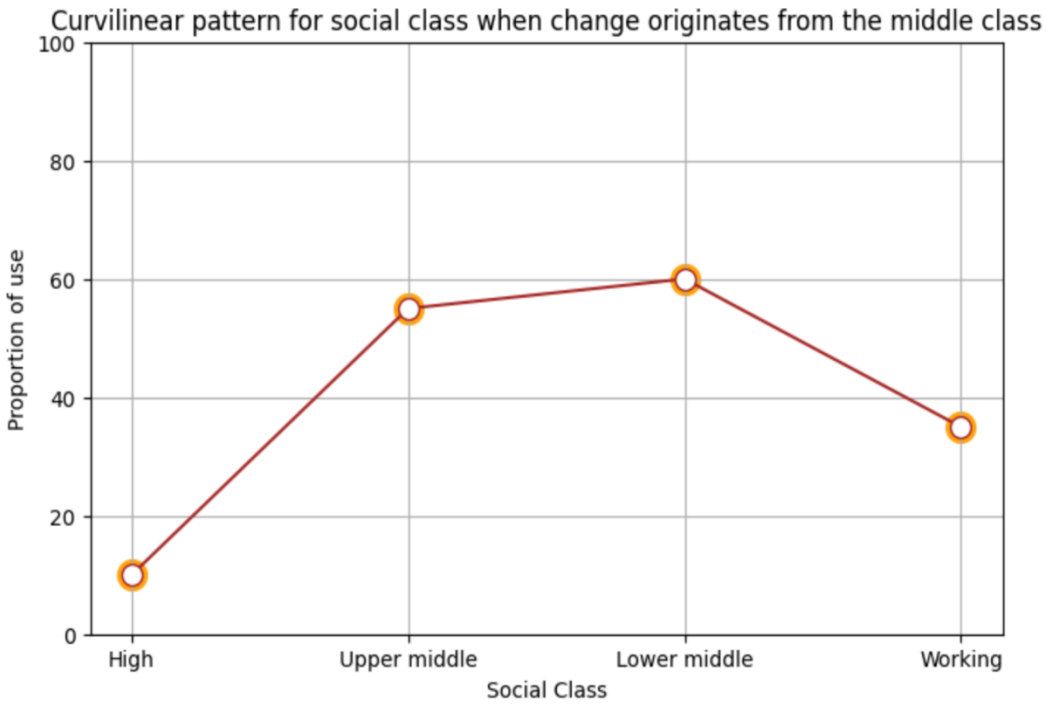

Figure 2.7 Curvilinear pattern for social class when change originates from the middle class (Adapted from Tagliamonte, 2011: 31)

The variation in language based on place similarly signals an individual's connection to certain regional lifestyles or socio-economic environments, acting as a further form of indexicality (Mansfield, Leslie-O'Neill, & Li, 2023). Just as the middle classes often lead linguistic changes, places—particularly urban versus rural settings—are often associated with distinct linguistic innovations and shifts (Nerbonne & Heeringa, 2007). Thus, the relationship between language and social class extends to the geographical context. Variations in language based on place are not merely a reflection of physical location but a manifestation of broader socio-economic structures (Stell, 2012). We see how geographic markers, like social markers in the graphs discussed in this section, can reveal much about a speaker's identity, social networks, and linguistic practices. This connection between place and class will be explored in greater detail in the final section of this chapter, demonstrating how regional linguistic features function similarly to social class indicators in signaling group membership and social status (Levshina, 2012).

2.6 Language and Place

Sociolinguists have consistently shown concern for the influence of place, whether it be on the national, regional, county, city, neighborhood, or even block level. Place has long been recognized as a crucial factor in linguistic variation, with geography often playing a central role in explaining patterns of language use. Geographic location not only affects language at a mechanical level—such as phonetic distinctions, but also shapes social interactions and community identity, underscoring the notion that language reflects the social fabric within which it operates (Bernstein, 1960).

Entrikin (1991) argues that an individual's experience of place is influenced not only by the physical characteristics of the environment but also by the personal and social contexts through which they interpret that space. For example, two people residing in the same mountain-surrounded town may inhabit the same physical landscape, but their personal experiences, shaped by distinct life histories and the cultural narratives they encounter, can lead them to perceive and interact with the environment differently (Entrikin, 1991: 45). Buttimer (1993) expands on the concept of place by noting that people experience locations both through their immediate, sensory perceptions—such as smells, sights, and sounds—and in more abstract, reflective ways. Kretzschmar (2009) further emphasizes this by arguing that a region is defined not just by its geographical boundaries, but by the ways in which individuals behave and interact with the environment within that space. He asserts that a location devoid of human activity cannot be considered a cultural area, as it lacks the interaction between people and their surroundings that gives rise to distinctive cultural practices (Buttimer, 1993; Kretzschmar, 2009: 25).

Zelinsky (1992: 179-181) deals with the so-called “vernacular region” or “perceptual region”: both terms describe regions that are defined by the perceptions, feelings, and beliefs of the people who live within or near them, rather than by formal, official boundaries. These regions exist in people's minds and are shaped by cultural and social factors, including local dialects, traditions, and identities. Vernacular or perceptual regions are thus socially constructed areas, often associated with the ways people understand and relate to their environment. For example, terms like "the South" in the United States or "the Midlands" in the UK refer to areas with cultural connotations rather than strict geographical borders (Johnstone, 2004). Vernacular regions are often closely tied to a community's sense of identity, traditions, language, and customs (Labov, 2006). The region exists because people believe it does, and this belief is shaped by their shared experiences, historical narratives, and local practices. This includes how people speak, the traditions they follow, and the collective memories they share. For instance, in the United States, "Dixie" or "the Bible Belt" are vernacular regions associated with certain cultural values, religious practices, and historical narratives (Reed, 1976). Similarly, "New England" is a vernacular region known for its historical importance in early American history, with distinct traditions and a strong regional identity (Fischer, 1989).

The language spoken within vernacular regions often serves as a marker of identity. Dialects and linguistic features can define or reinforce the boundaries of such regions. For instance, Southern American English, with its unique pronunciation and vocabulary, helps to delineate "the South" as a distinct cultural and linguistic region in the United States (Labov, 2006). The boundaries of vernacular regions are not fixed; they can shift over time as people's perceptions and cultural practices change (Trudgill, 1983). Social factors, such as migration, urbanization, or cultural exchange, can influence how people define or redefine these regions (Johnstone, 2004).

Dialectologists have investigated how the physical environment influences language variation and change by shaping social interactions among speakers (Eckert, 2000: 67). Additionally, other studies focus on how language can socially construct places through discussions about language and how speech patterns are

linked to specific physical and political locations via discourse on language use (Johnstone, 2010: 205). At the start of the 1980s, Lesley Milroy and James Milroy introduced social network theory to the field of sociolinguistics. Through this theory, they investigated how the complexity and density of individuals' social relationships—specifically, the number of people they interacted with and the diversity of their interactions—could explain the extent to which local linguistic features were preserved (Milroy & Milroy, 1987: 49). According to Johnstone (1999: 210), individuals with numerous connections within their local community—where their neighbors are also their colleagues, friends, and fellow worshippers—and limited exposure to outsiders are more inclined to continue using local linguistic forms. This is because they have fewer opportunities to encounter innovative language forms and are consistently exposed to local ones through repeated interactions.

Britain (2002: 612-613) demonstrated how physical geography, cultural landscapes, and social location can work together to promote linguistic differentiation. He highlights the presence of a bundle of isoglosses that distinguishes the region surrounding Wisbech from that around King's Lynn in the English Fens. Britain (2002) notes that these two towns are geographically isolated, and the area between them is sparsely populated, in part due to the marshy terrain. Additionally, the towns to the west of the dialect boundary are linked by bus routes with Wisbech, while those to the east are connected with King's Lynn. Consequently, the built environment reinforces this linguistic separation, illustrating the interaction between human communities and their physical surroundings. Britain (2002: 612-613) also notes that the residents of Wisbech and King's Lynn perceive the two areas as distinct, often harboring negative stereotypes of one another, leading to rivalry between the communities. This social divide is reflected in people's daily activities, such as shopping and visiting, which are oriented toward one town or the other. These patterns of interaction both influence and are shaped by the physical and social separation of the two regions.

Following the discussion on the impact of physical geography and social interaction on linguistic variation, it is crucial to recognize that place can also serve as a proxy for social class in sociolinguistic studies. Sociolinguists have long explored how certain geographical areas, often characterized by distinct economic and social conditions, reflect divisions in social class. Just as the physical and social environments of Wisbech and King's Lynn shape linguistic boundaries, urban environments often mirror broader class distinctions. Labov's (1966) research on social stratification in New York City is a prime example, where place (in this case, department stores) was used as a proxy for social class (see Labov, 1966). The study highlighted how different locations reflected broader class structures and how linguistic variation could be tied to both social class and geographic location. Similarly, in Trudgill's (1974) study of Norwich, place became a significant factor in understanding how different social groups used language, with social class and neighborhood closely aligned (see Trudgill, 1974). These studies illustrate how geographic locations can symbolize class-based linguistic patterns, reinforcing the relationship between place and social stratification. By examining such examples, we can better understand how place functions as a stand-in for social class, influencing language use across different communities.

2.7 Conclusion

In this chapter, we have explored the intersection of language with key sociolinguistic variables such as ethnicity, age, gender, social class, and place. Through a comprehensive review of the literature, it becomes evident that language functions as a complex marker of identity, reflecting the intricate social structures and cultural dynamics of the communities in which it is used. Ethnicity shapes linguistic practices, as demonstrated by the concept of ethnolects, with examples like African American Vernacular English and Chicano English, illustrating how language reinforces and reflects ethnic identity. Age, another significant factor, not only highlights the differences in language use across life stages but also points to the dynamic process of language change in apparent time, with older generations often adhering to more conservative forms and younger speakers driving linguistic innovations. The review of gender and language further underscores the significant influence of social norms and societal expectations on linguistic behavior; thus, gendered variation serves as a foundation for understanding broader linguistic trends within society, and it intersects with factors such as class and place, as demonstrated by the studies of Milroy and Milroy (1987) and Britain (2002), which examined how social networks and physical geography can affect language maintenance and change. Place, in particular, emerged as a vital lens through which sociolinguists can study class-based linguistic patterns, serving as a proxy for social class in various contexts. Studies by Labov (1966) and Trudgill (1974) have shown that the geography of a community, whether rural or urban, mirrors broader class distinctions and reinforces social stratification. This comprehensive review lays the groundwork for further analysis in subsequent chapters, particularly in understanding how the specific sociolinguistic context of South African Indian English in Potchefstroom and Mohadin fits into these broader frameworks of language variation and change. As discussed in Section 3.3, these features are analyzed in section 3.3 below in the methodology chapter.

CHAPTER 3 METHODOLOGY

3.1 Introduction

The methodology chapter of this dissertation outlines the comprehensive approach taken to explore the linguistic variables of retroflexion and the GOOSE vowel within the Indian speech-community of Potchefstroom, South Africa. This chapter provides a detailed account of the research design, including the historical and sociolinguistic context, the specific variables under investigation, and the methods employed for data collection and analysis. By presenting a clear and systematic methodology, this chapter aims to ensure the transparency, replicability, and validity of the research findings.

The next section of this chapter, section 3.2, delves into the broader historical and sociolinguistic context of the speech community under consideration, beginning with a very brief overview of the history of English in South Africa. This is followed by an examination of the Indian community's history in South Africa, tracing their journey from the arrival of indentured laborers in the late 19th century to their current sociolinguistic status. This section concludes with a detailed look at the Indian community in Potchefstroom, providing essential background for understanding the local context in which the linguistic study is situated. Following the contextual background, the chapter introduces the linguistic variables under investigation in section 3.3. The retroflex consonants, which are a distinctive feature of Indian languages, are examined for their phonetic characteristics and usage within the English of the Indian community in Potchefstroom. Similarly, the GOOSE vowel, the canonically high back rounded vowel /uː/, known for its sociolinguistic variation, is analyzed for its phonetic properties and contextual usage. The subsequent sections, sections 3.4 and 3.5, outline the data collection and analysis procedures. The data collection section describes the participant selection process, ensuring a reasonably representative sample of the Indian community in Potchefstroom, and details the instruments and procedures used to gather data systematically and ethically. The data analysis section then discusses the quantitative methods employed to interpret the collected data, including statistical analysis, supported by the use of relevant software tools.

3.2 The speech community

3.2.1 The broader history of English in South Africa

South Africa experienced its first colonization by the British in 1795 when they established a military presence at the Cape Colony to control the crucial Cape sea route, rather than to create a permanent settler colony (Lass, 2002:108). The significant arrival of English speakers occurred in 1820, when around 5000 British settlers, primarily from the lower middle and working classes, settled in the Eastern Cape (Lass, 2002:108). Despite being a minority among colonists—the Dutch had been present since 1652, when the Dutch East India Company set up an outpost—the British influence grew. In 1822, the Cape Colony governor, Lord Charles Somerset, proclaimed English as the official language of the colony, superseding

Dutch. The spread of English in the colony was facilitated by the recruitment of British schoolmasters and Scottish clergy to fill roles in the education and church systems (Lass 2002:108). In the 1840s and 1850s, another group of English speakers settled in the Natal area, establishing a new British colony in the southern part of Africa (see the map of South Africa in Figure 3.1). These settlers were primarily "standard speakers," including retired military personnel and aristocrats.

According to Lass (2002:109), the third wave of English settlers, arriving between 1875 and 1904 mainly in the Johannesburg area, introduced a variety of English dialects. However, these later waves did not significantly influence South African English (SAE), as "the seeds of development were already sown in 1820" (Lass, 2002:109). In 1910, the Union of South Africa was formed, designating English and Dutch as the official state languages, with Afrikaans effectively replacing Dutch in 1925. The rise of Afrikaner Nationalism, which marked the Apartheid era from 1948 to 1994, elevated the status of the Afrikaans language (Mesthrie, 2002:18). The apartheid government implemented the *Bantu Education Act* in 1953, a controversial language policy that aimed to make Afrikaans the medium of instruction in black schools. However, this policy inadvertently reinstated the prominence of English. According to Mesthrie (2002:24), after 1994, English and Afrikaans, along with nine other Southern Bantu languages, were granted equal official status. The diverse cultures in South Africa, coupled with segregation during the apartheid era, led to the development of distinct varieties of South African English, namely White, Black, Coloured, and Indian South African English, each remaining a distinct ethnolect. Lass (2002:110) describes White South African English as consisting of three sub-varieties, primarily spoken by White South Africans, referred to as "The Great Trichotomy" (a term originally used to categorize Australian English varieties and later applied to South African English) (Lass, 2002).

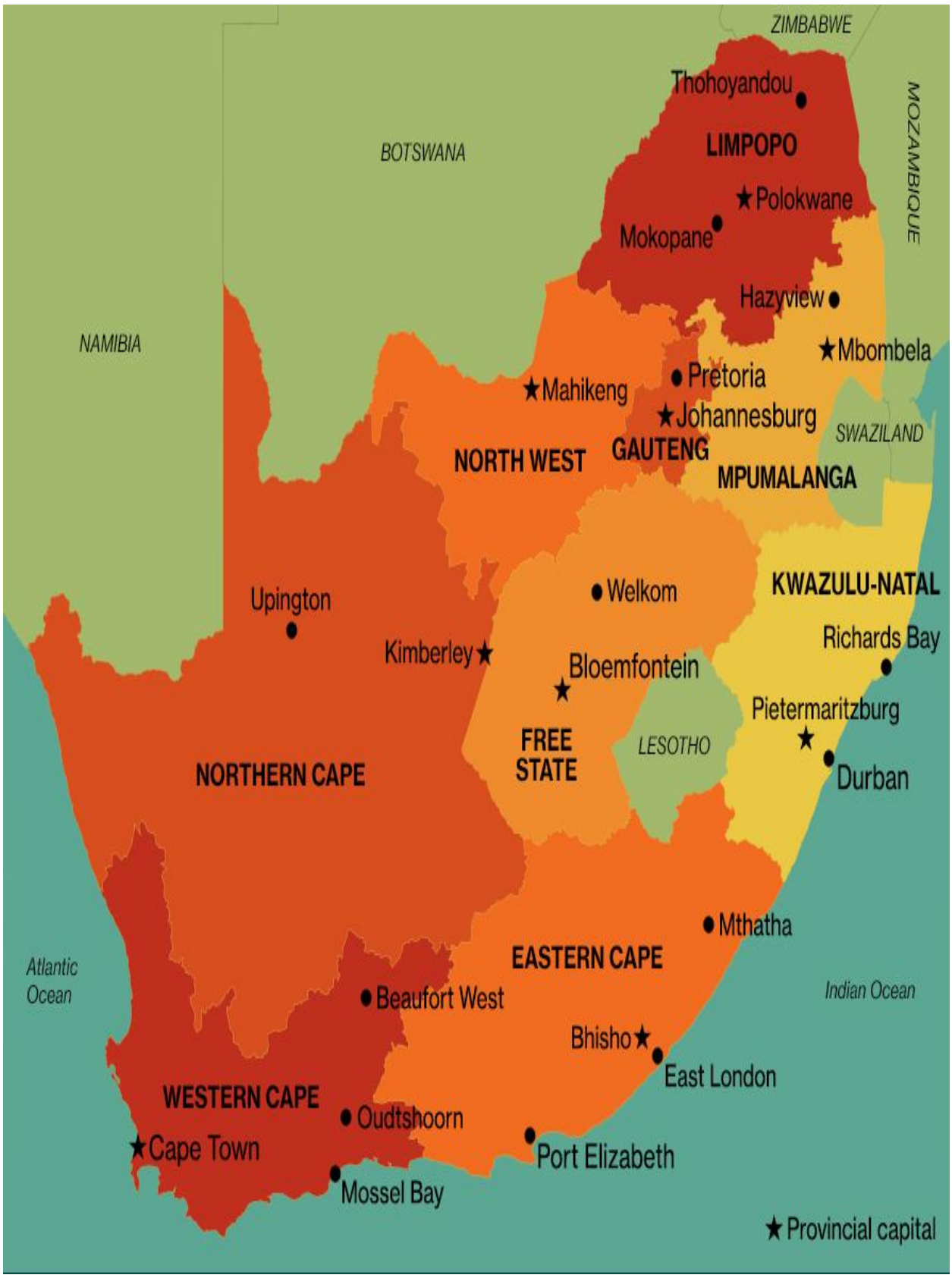

Figure 3.1 Map showing South Africa's nine provinces, highlighting major cities and towns in each region. Source: Adapted from South Africa Gateway, Wikimedia Commons.

Within this framework, and with respect to accent, the "Cultivated" variety closely resembles England's standard Received Pronunciation and is linked with the upper class; the "General" variety indicates middle-class status and is the most commonly spoken sociolect; and the "Broad" variety is associated with the working class, low socioeconomic status, limited education and connections with Afrikaans speakers. These three sub-varieties of White South African English are also referred to as "Conservative SAE," "Respectable SAE," and "Extreme SAE." Broad SAE closely resembles the second-language variety spoken by White L1-Afrikaans-speakers, known as Afrikaans English. This particular variety has been stigmatized by middle- and upper-class SAE speakers, primarily those of Anglo-Saxon descent, and is considered a vernacular form of SAE (Mesthrie, 2002:130). According to De Klerk and Gough (2002: 356-378), Black South African English (BSAE) is spoken by individuals whose first language is an indigenous African language. BSAE is regarded as a "new" English because it has developed through the education system and among second-language speakers in regions where English is not the dominant language. At least two sociolinguistic varieties on a post-creole continuum have been definitively studied in relation to the Black South African English spoken by Black South Africans: a prestigious "acrolect" and a more mainstream "mesolect." The "basilect" variety is even less similar to native English, while the "mesolect" is somewhat closer (Mesthrie, 2002: 356-378).

Another variety of South African English is Cape Flats English, primarily associated with inner-city Cape Coloured speakers (Kortmann & Schneider 2004: 320). Additionally, South African Indian English (SAIE) is a sub-variety of English that developed among the descendants of Indian immigrants to South Africa (Kortmann & Schneider 2004: 320). These distinct varieties of South African English reflect the country's complex sociolinguistic landscape, shaped by historical migration patterns, colonization, and the apartheid era's policies of segregation. Each variety not only signifies a unique linguistic heritage but also embodies the social identities and cultural narratives of its speakers. For instance, White South African English, with its sub-varieties of Conservative, Respectable, and Extreme SAE, mirrors the socio-economic stratification within the White community (Lass, 2002: 110). Similarly, Black South African English, emerging from the education system, highlights the adaptive nature of language amidst a multilingual backdrop (De Klerk & Gough, 2002: 356-378).

The evolution of these varieties is ongoing, influenced by factors such as globalization, urbanization, and increasing intercultural interactions. Modern South African English continues to develop as younger generations blend traditional forms with contemporary linguistic trends, further enriching the linguistic tapestry of the nation. The role of language remains central to its cultural and social transformation. The recognition and celebration of linguistic diversity are crucial for promoting social cohesion and addressing historical inequalities (Mesthrie, 2002: 24). Research into these evolving patterns offers valuable insights into how language serves as both a tool for communication and a marker of identity within South Africa's dynamic social fabric (Mesthrie, 2002: 130).

3.2.2 The history of the Indian community in South Africa

In the 19th century, the Natal government sought cheap labor from India, resulting in the transportation of over 150,000 Indian people to Natal between 1860 and 1911 (Mesthrie, 2002:160). These Indians arrived as indentured laborers to work on the sugarcane plantations in the Natal Colony (now KwaZulu-Natal – see Figure 3.1). Later, passenger Indians arrived as traders, artisans, teachers, shop assistants, and more, with some relocating to the Cape Colony and other regions of South Africa.

The *Immigration Restriction Act (Natal)* of 1897, along with amendments in 1900, 1903, and 1906, imposed strict educational, health, age, and financial requirements on Indians, excluding further indentured workers, who sought entry into the country or access to the Transvaal and Cape Colony. This legislation effectively halted the immigration of passenger Indians into the colony (Landis, 1961: 28).). Under apartheid legislation, which began in 1948, and the Group Areas Act of 1950, racial segregation was enforced by creating distinct residential areas for different races (Maharaj, 2014). South African Indians living in Natal were displaced from their existing communities and relocated to Indian-only townships (Yengde, 2021). When apartheid ended in 1994, the regions that had become significantly populated by Indians included Durban, Cape Town, Johannesburg, Pretoria, and Pietermaritzburg, and these remain heavily populated by Indians today (Gopalan, 2017).

This historical context of apartheid and the associated population movements have significantly influenced the structural properties of all varieties of English spoken in South Africa. According to the 2011 census, English is the mother tongue of approximately 4.9 million people in South Africa. Of these, around 1.89 million are white, 1.24 million are coloured, 1.1 million are Indian, and 0.69 million are 'African' (Mesthrie, 2002: 104). South Africans of Indian origin form a diverse community characterized by varied origins, religious beliefs, and heritage languages. While the majority are predominantly Hindu, Muslims and Christians have also been part of the Indian community in South Africa since as early as 1860 (Mesthrie, 2002: 165). Schneider's Dynamic Model of Postcolonial Englishes (see section 2.2) categorizes the different social groups involved in the linguistic development of postcolonial Englishes into three distinct strands:

1. **ADS-strand (Adstrate)**: This refers to communities where English is introduced as a result of colonial contact, often with limited initial access or control over the language. These communities eventually adopt English as a language for communication, not because they initiated its spread but because they were the addressees in colonial discourse.
2. **IDG-strand (Indigenizers)**: Communities where English was adopted and adapted to local languages, cultures, and practices, leading to significant indigenization. In these settings, English takes on a distinctly local flavor as it becomes a part of the native linguistic repertoire.
3. **STL-strand (Settlers)**: This strand refers to English-speaking settler communities who bring the language with them and maintain it as part of their colonial identity, often aligning their usage with the norms of the colonial home country, albeit with regional variations over time.

In the South African context, Schneider's model classifies the Indian community within the ADS-strand. This category refers to groups that were neither part of the indigenous population (IDG) nor the original settler colonists (STL), but rather migrants who maintained distinct ethnic and cultural identities while interacting with the colonial language. The Indian community in South Africa, introduced to English through British colonialism, fits this description as they adopted English primarily for administrative and economic purposes. Over time, they developed a unique variety, South African Indian English (SAIE), which retains elements of their native languages, reflecting their distinct place within the ADS-strand (Schneider, 2007: 59-67).

Although most South African Indians now speak English as their first language, a minority, particularly the elders, still speak some Indian languages. These languages include Hindi, Tamil, Telugu, Urdu, Punjabi, and Gujarati (Mesthrie, 2002: 165). South African Indian English (SAIE) shares certain similarities with Indian English, a group of English varieties spoken in India and among the Indian diaspora worldwide. This resemblance may be due to the original influence of speakers with common mother tongues or the fact that early English teachers were brought to South Africa from India, or both (Mesthrie, 2002: 165). The native Indian languages have been gradually fading over the years. The majority of young Indians can either barely speak or do not speak these languages at all. Instead, English has become the predominant home language for most of South Africa's Indian population (Mesthrie, 1993: 13). It can be argued that apartheid slowed the shift from Indian languages to English due to enforced segregation. However, the post-apartheid era has brought increased social and geographic fluidity, leading to more integrated communities. People now have greater freedom to choose their places of residence, friends, jobs, and the education and future professions of their children (Mesthrie, 2010: 6). Most studies on South African Indian English (SAIE) have been conducted by Rajend Mesthrie and have focused on the major cities and metropolises of South Africa, such as Cape Town, Durban, Johannesburg, as well as some rural communities along the coast of KwaZulu-Natal. There has been little to no research on the more (or semi-) rural communities scattered across the central and eastern parts of South Africa, despite their widespread presence (Mesthrie, 2010: 6).

The lack of research on these (semi-) rural communities presents a significant gap in the understanding of South African Indian English (SAIE), as it exists in various contexts. (Semi-) rural communities often maintain distinct cultural and linguistic practices that could offer valuable insights into the evolution of SAIE (Mesthrie, 2012). Exploring these areas could, for one, reveal how isolation from urban centers has influenced the preservation of Indian languages and the adaptation of English (Mesthrie, 2010: 6).

3.2.3 The Indian community of Potchefstroom

The North West Province, JB Marks district[8], Indian community residing in Mohadin or in the main (ex-white) town, Potchefstroom, has no written records or history outside of the simple population statistics provided in the national census. Based on the latest census data from the 2022[9] estimates, here are the updated population statistics for Potchefstroom and Mohadin in Table 3.1:

Table 3.1 Population Statistics for Potchefstroom and Mohadin (2022/2023) (Source: Statistics South Africa, 2022)

Population Group	Potchefstroom People	Potchefstroom Percentage	Mohadin People	Mohadin Percentage
White	30,387	69.9%	2	0.1%
Black African	11,042	25.4%	775	48.4%
Coloured	1,216	2.8%	70	4.4%
Indian or Asian	565	1.3%	738	46.1%
Other	217	0.5%	14	0.9%

These numbers are derived from the latest available census data and estimates, reflecting the demographic distribution of the various ethno-racial groups in Potchefstroom and Mohadin. Any further information about the Potchefstroom Indian community had to be derived from participant insights and broader research on Indian populations in South Africa. Historically, Indians in Potchefstroom resided in Mohadin, a township located just west of the (historically white) main town, which was designated as their area of residence under Apartheid until its end in 1994. Since then, the community has geographically divided, with some members remaining in Mohadin while many of those with greater economic means having moved into the main town.

According to the participants interviewed for this study, most of the Indians still residing in Mohadin are descendants of the original families who moved there after the onset of Apartheid. In contrast, the population in the main town comprises of residents and individuals who have relocated from Mohadin, thereby becoming local to the main town. The community, whether in Mohadin or the main town, is predominantly Muslim, with only a few Hindu families.

This, along with the fact that the Indian population constitutes the majority of Potchefstroom's Muslim population, has led to the community members making little to no distinction between their religious and

[8] Previously known as the Tlokwe District.

[9] Although the 2022 South African census encountered significant difficulties, including data collection issues and concerns about accuracy and reliability, it remains the most recent demographic data available.

ethnic identities. The Potchefstroom Indian community is divisible into three sub-communities based on their geographic location along a continuum of social status, which itself is determined by their proximity to either Mohadin or Van der Hoff Park (Figure 3.2).

Figure 3.2 Geographic Distribution of the Potchefstroom Indian community (Source: SA-Venues.com, 2023)

This map illustrates the residential distribution of the Potchefstroom Indian community, highlighting key areas such as Mohadin and Van der Hoff Park, along with other significant neighborhoods in Potchefstroom. Mohadin, situated on the western edge of Potchefstroom, is considered the area with the lowest social and economic status. In contrast, Van der Hoff Park, located on the north-eastern edge of Potchefstroom, is regarded as the area with the highest social and economic standing. This distinction is

partly due to its distance from Mohadin and partly because Van der Hoff Park is recognized as *the* affluent neighborhood in town. The remaining parts of the main town, located between these two neighborhoods, reflect varying levels of social and economic status based on their proximity to Mohadin and Van der Hoff Park.

The centrality of religion within the community also serves as a significant social factor distinguishing the different groups. This factor follows the same trend as social and economic status along the geographic continuum. Residents of Mohadin are considered the most conservative and devout. This conservatism extends to social customs and daily interactions, reinforcing a communal lifestyle deeply rooted in religious observance (Chetty, 2013). In contrast, those residing in the main town are seen as more liberal, though not necessarily less devout. This blend of devoutness and modernity creates a dynamic environment where religious traditions coexist with contemporary lifestyles (Gopal, Khan, & Singh, 2014). Those living in Van der Hoff Park are regarded as both very liberal and the least devout, often prioritizing professional and economic pursuits. This neighborhood's higher socioeconomic status allows for greater interaction with diverse communities, potentially leading to a more secular outlook (Schulein, 2005). Despite these differences, the community celebrates a rich array of festivals throughout the year, such as Diwali, Onam, and Eid, among others. These events provide opportunities for communal gatherings, reinforcing cultural identity and solidarity among the Indian community in Potchefstroom. The celebrations include traditional rituals, festive meals, and cultural performances, showcasing the community's vibrant cultural mosaic and fostering a sense of unity and continuity amidst diversity (Kaarsholm, 2006).

3.3 The linguistic variables

This section focuses on the two primary linguistic variables under investigation in this study: retroflexion and the GOOSE vowel. These variables were selected due to their sociophonetic significance in South African Indian English (SAIE) and their relevance to broader studies of language variation. The following subsections will explore these features in detail, discussing their phonetic properties, social distribution, and role in the linguistic landscape of Potchefstroom's Indian community.

3.3.1 Retroflexion

A retroflex sound is a consonant produced by curling the tip of the tongue back toward the hard palate (Ladefoged, 2010: 12). Many English speakers do not use retroflex sounds, and the few studies available have primarily focused on aspects of retroflex production and perception in Indo-Aryan languages. According to Ladefoged (2012: 166), the symbols used by the International Phonetic Alphabet (IPA) for retroflex sounds include [ʈ, ɖ, ɳ]. These symbols represent specific retroflex sounds, with [ʈ] denoting a voiceless retroflex plosive, [ɖ] a voiced retroflex plosive, and [ɳ] a retroflex nasal.

Table 3.2 presents examples of retroflex consonants in different languages, including their IPA transcriptions, descriptions, orthographies, and meanings.

Table 3.2 Retroflex Consonants in Different Languages with IPA Transcriptions and Meanings (Source: Ladefoged & Maddieson, 1996, p .23)

IPA	Description	Language	Orthography	IPA Transcription	Meaning
ɳ	Voiced retroflex nasal	Punjabi	ਗਾਣਾ / ٹاؤں	[ˈgaːɳaˑ]	Song
ʈ	Voiceless retroflex plosive	Swedish	Parti	[pʰaˈʈiː]	Party
ʈ	Voiceless retroflex plosive	Hindi/Urdu	टांग / ٹانگ	[ʈaːŋgˑ]	Leg
ɖ	Voiced retroflex plosive	Somali	Bandhig	[banːɖig]	Presentation
ɖ	Voiced retroflex plosive	Hindi/Urdu	डब्बा / ڈبا	[ɖəbba]	Box

Retroflex stops, nasals, and fricatives are generally absent in most varieties of English. The notable exception is Indian English, where retroflex stops and nasals are present, and retroflex fricatives, while not uncommon, can vary in how much the tongue tip is curled backward. In Hindi and other Northern Indian languages, retroflex sounds are produced with the tongue tip positioned just behind the most prominent part of the alveolar ridge. Conversely, in Malayalam and other Southern Indian languages, the tongue tip is curled further back so that the underside of the tongue tip touches the roof of the mouth (Ladefoged, 2012: 166). Figure 3.3 below illustrates the places of articulation found in English, with a detailed view of the coronal region on the right.

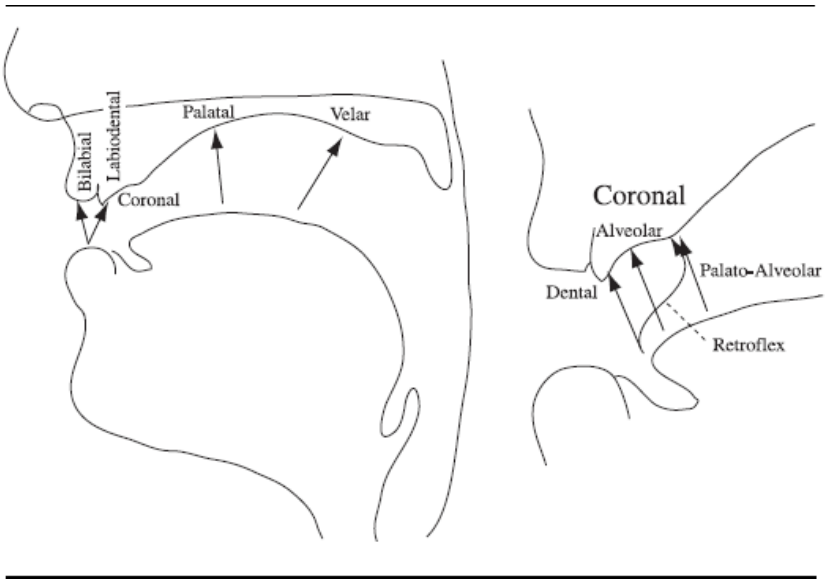

Figure 3.3 Section of the vocal tract showing places of articulation and the coronal region. Source: Ladefoged, P. (2001). A Course in Phonetics (4th ed., p. 11)

Indian English speakers commonly produce retroflex stops [ʈ] and [ɖ] in place of the alveolar [t] and [d] used in most native varieties of English. However, it is important to note that many Indian languages, such as Hindi and Tamil, primarily use dental stops [t̪] and [d̪], rather than alveolar ones, meaning that the

influence on Indian English pronunciation varies by linguistic background (Bansal, 1976; Mesthrie & Bhatt, 2008). In some cases, speakers may exhibit a continuum of variation between dental and retroflex realizations depending on regional influence and individual phonetic adaptation. This substitution contributes to the distinct sound of Indian English (Hamann, 2003). However, the precise acoustic characteristics that distinguish retroflexes from other coronals have often not been clearly identified, and more quantitative data is needed to enhance our understanding of these differences. Most importantly, since retroflexes are articulated further back in the oral tract with the tongue tip, this typically results in a faster release and more intense bursts. Thus, in a study by Hussain *et al.* (2017), although burst spectral measures and formant transitions do not consistently differentiate retroflexes from dentals in certain vowel contexts, stop release duration and total stop duration effectively distinguished Punjabi retroflex and dental stops across all word contexts and vocalic environments. F2 on the other hand can either be raised or lowered before a retroflex, depending on the vowel context. Retroflex articulations may also influence the trajectory of the third formant. F3 can be lowered in the transition from back vowels, raised in other vowel contexts, or remain stable in retroflex stops produced after /i/ and /e/ (Dave, 1977).

Cross-linguistic research has shown that while the specific acoustic manifestations of retroflexion may vary, the general patterns of lowered F3 and distinct burst spectral characteristics are generally consistent (Hamann, 2003; Hamilton, 1996). These features, and the unique burst spectral properties, make retroflex sounds a fascinating subject of study in phonetics and phonology. A cross-linguistic study by Lisker and Abramson (1964) noted, however, that voice onset time (VOT) is a significant acoustic cue widely used to differentiate among coronals produced at various places of articulation. In their comparison of coronal stops produced by single speakers of two Indo-Aryan languages, Hindi and Marathi, Lisker and Abramson (1964) discovered that the mean VOTs for initial voiceless unaspirated retroflex and dental stops in both languages were approximately 11 ms. However, variations were observed in non-initial contexts: Hindi voiceless unaspirated retroflex stops had a mean VOT of 8 ms compared to 14 ms for dental stops, while Marathi retroflex stops had a mean VOT of 3 ms compared to 15 ms for dental stops. This trend suggests that raising the tongue tip towards the hard palate in retroflex articulation increases the length of the front cavity. Consequently, the sublingual cavity (space underneath the tongue) also enlarges (Hamann, 2003). The acoustic consequences of these articulatory differences can be measured, as in Figure 3.4, where VOT duration is being measured for the relevant retroflex sound.

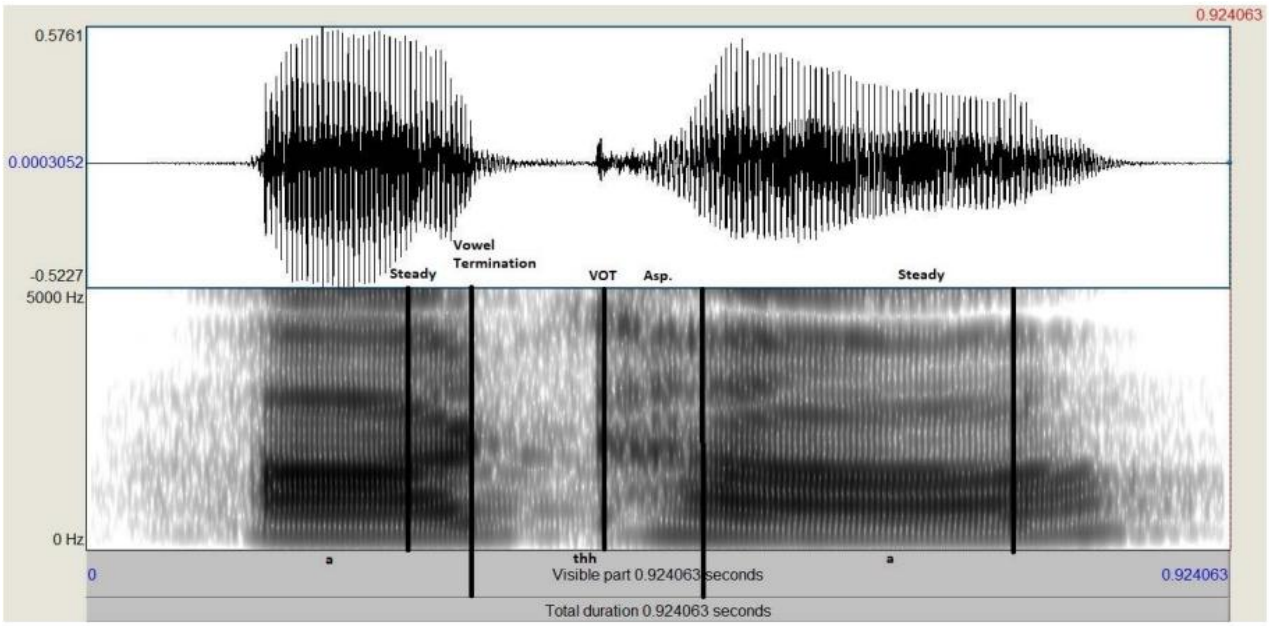

Figure 3.4 The waveforms and measuring points of retroflexion characteristics (word aʈʰa) pronounced by a male speaker (Source: Adapted from Comparative Acoustic–Phonetic Analysis of Retroflex Consonants of Some Indian Languages, p. 2)

Chawla and Meigh's (2020) study explored the acoustic properties of retroflex consonants, primarily in Hindi but also in other languages with these sounds. They compared retroflex sounds in Hindi with those in other Indo-Aryan and Dravidian languages, providing insights into how these sounds function across different linguistic systems. The study also highlighted variation in retroflex articulation depending on factors like vowel context, stress, and syllabic position. Key acoustic parameters measured included Voice Onset Time, formant transitions, and stop burst characteristics, further supporting the use of VOT as a main cue for retroflexion. The general conclusion from the existing literature on the acoustic cues of retroflexion is that retroflexed sounds should have a shorter VOT than their non-retroflexed equivalents. Given that VOT has been established as a key distinguishing feature of retroflexion, its inclusion as a primary variable in this study allows for a comparative analysis with previous research on Indian phonetic variation.

3.3.2 The GOOSE vowel

Another well-known variable in English phonetics is the GOOSE vowel, commonly referred to as the 'long u' and transcribed as [u:] in IPA (Wells, 1982). Phonetically, [u:] is characterized as a relatively long close back vowel. The traditional vowel chart depicted in Figure 3.5 represents the articulatory vowel space, a graphical representation of vowel sounds based on the position of the tongue in the mouth during articulation. The chart is organized to show how vowels are produced in terms of tongue height (how close the tongue is to the roof of the mouth) and tongue backness (how far forward or backward the tongue is in the mouth). In certain contexts, especially when not followed by a consonant within the same syllable, the GOOSE vowel may exhibit a slight glide, forming a diphthong that begins with a sound like [ʊ] and moves towards [u:] (Wells, 1982). The vowel often centralizes slightly, meaning it is produced closer to the center of the mouth rather than the extreme back position.

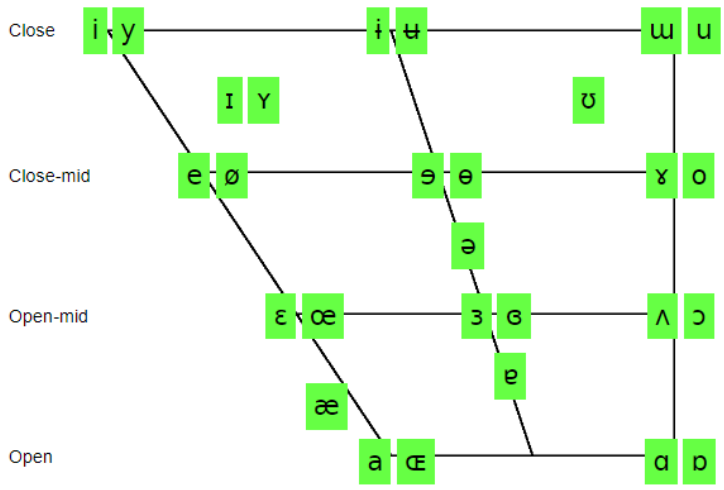

Figure 3.5 Traditional Vowel Chart Showing Central Range for High Vowels and Correlation with Front-Central and Back-Central Categories (Source: International Phonetic Association, 1999, p. 12)

When the GOOSE vowel is preceded by the palatal semivowel /j/ (known as yod), the resulting sequence is referred to as 'long U' in traditional phonetic terms. This occurs in words like "music" or "cute." However, when the GOOSE vowel appears without this yod, it doesn't have a specific traditional name, though it might be informally referred to as 'long oo' (Wells, 1982: 147). The term 'long u' is thus used in various ways. It can refer both to the sequence /ju:/ (as in "music") and to the vowel sound [u:] itself (as in "goose"), depending on the context. Therefore, while 'long u' is a broader term, the GOOSE vowel specifically refers to the sound [u:], whether or not it's preceded by a yod. Studies of the fronting of the GOOSE vowel have become increasingly common in recent years. The fronting of this vowel is prevalent in many varieties of English and has been studied internationally, being particularly notable in North American English as observed by Labov, Ash, and Boberg (2006: 154).

Numerous studies in southern England have focused on GOOSE-Fronting as an ongoing change, with apparent time studies indicating this fronting has been occurring for at least the past five decades. Significant studies in this area include those by Przedlacka (2001), Hawkins and Midgley (2005), Fabricius (2007), Harrington *et al*. (2011), and Harrington *et al*. (2008). Schneider and Kortmann (2004:1117) confirm that fronting is also notably present in Scotland, Canada, the U.S.A., South Africa, Australia, and New Zealand, particularly after the coronals /t, d, s, n/. It is noteworthy that fronting was once rare in the varieties of South African English (SAE) spoken by Blacks, Coloureds, and Indians. This conclusion is based on the fact that it was never mentioned in the descriptions of these varieties by Hundleby (1964), Wood (1987), and Bughwan (1979). This distinction highlights the sociolinguistic complexity within South African English (SAE). The central-to-front quality of the GOOSE vowel among White speakers not only signals social status but also ethnic identity. It is often perceived by Black speakers as a characteristic feature of White South African English, reinforcing ethnic boundaries within the linguistic landscape (Mesthrie, 2010: 4).

In vernacular varieties spoken by Indian and Coloured communities, the GOOSE vowel remains backed, sometimes even more so than in Conservative White SAE. This preference persists even in more formal or standard speech registers, suggesting a strong cultural and linguistic resilience. The notable exceptions are media personalities, who might adopt more fronted vowel qualities to align with a broader, possibly more 'neutral' or 'standard' SAE for wider audience acceptance. Wood (1987:136-137) discovered that the backing and rounding of /u:/ were prevalent in Coloured varieties of English. Lass (1995:99) made a clear distinction with White speakers, stating:

> The central-to-front quality is an ethnic as well as a social marker; it is (on anecdotal evidence at least) perceived by black speakers as peculiarly 'White'. Vernacular Indian and Coloured varieties have a back vowel, often even more backed than Conservative; and there is a strong tendency for Indian and Coloured speakers to avoid the more fronted values even in very standard registers (the only exceptions being media personalities).

From this, Mesthrie (2010: 7) concluded that higher social class and younger speakers tend to have more fronted GOOSE vowels. In a more recent article, Lass (2004: 377) puts it more bluntly:

> This central-to-front quality is distinctly 'white'; more specifically, it is the typical local (as opposed to British-oriented) pronunciation for White standard speakers. Coloured and Indian speakers usually have a back vowel /u:/ in this category [...] and Coloured or Black speakers who adopt this pronunciation are often criticized by the political left as linguistic turncoats or ethnic/class traitors.

These observations are particularly relevant to the present study, as they provide a sociolinguistic backdrop for analyzing the GOOSE vowel in South African Indian English (SAIE) speakers in Potchefstroom and Mohadin. Given that language variation often correlates with identity and social mobility. According to Mesthrie (2010: 7), Lanham (1978: 153–154) suggests that the most advanced variant of the GOOSE vowel is a fully central [ʉː], which is more likely influenced by a preceding [j]. Lanham (1978: 154) confirmed that fronted GOOSE likely originated in Natal and had already begun spreading, at the time of his publication, to the middle classes of all regional communities. This spread seems to be particularly noticeable, in the post-apartheid period, among youth who have formed new social networks in non-racial schools, where Whites are still present in significant numbers (Mesthrie, 2010: 7). Mesthrie (2010) conducted preliminary research on the linguistic effects of various non-white population groups transitioning into the South African middle class, noting a tendency to adopt the white variety of speech. In his research, younger Indian participants exhibited moderate fronting of the GOOSE vowel, with women doing so more than men. Mesthrie's (2010) study was based in the large metropolis of Cape Town, where English is the dominant language. However, whether a similar trend will be observed in a smaller, rural town like Potchefstroom, which is predominantly Afrikaans-speaking, remains an open question and highlights a gap in the existing literature.

3.4 Data collection

The study involved a total of 32 participants, evenly distributed between the township of Mohadin and the previously whites-only main town of Potchefstroom. The participants were divided into four distinct groups based on age and gender. Each location (Mohadin and the main town) had four young females under 25 years of age, four young males under 25 years of age, four mature females over 45 years of age, and four mature males over 45 years of age, ensuring a balanced representation of gender and age within the study (Table 3.3).

Table 3.3 Breakdown of the participants by age group, gender, and location

Age Group	Mohadin	Main Town	Total
Young female (under 25)	4	4	8
Young male (under 25)	4	4	8
Mature female (over 45)	4	4	8
Mature male (over 45)	4	4	8
Total	16	16	32

The split in age between young participants under 25 and mature participants over 45 was chosen for two primary reasons. Firstly, individuals over 45 years old would have grown up during apartheid, experiencing almost complete isolation from non-Indian communities. In contrast, those under 25 years old might have developed prestige standards due to their exposure to other speech communities. This distinction allows the study to examine the potential influence of historical social isolation versus contemporary social integration on linguistic patterns.

The study employed a Zoom H4n Pro portable recorder to capture high-quality audio during participant interviews. This device featured advanced capabilities that facilitated clear and comprehensive recording, including four-track recording, powerful stereo microphones suitable for high sound pressure levels, and support for high-resolution audio formats. Furthermore, the recorder incorporated a Mid-Side decoder for external microphone setups, as well as pre-record and auto-record functions to ensure no important speech samples were missed. The remote control also enabled the easy operation of the recording device without interrupting the interview process. These technical specifications and functionalities of the Zoom H4n Pro were instrumental in generating a reliable dataset for the subsequent acoustic analysis of the participants' speech, particularly the phonetic realization of retroflexion and the GOOSE vowel across different social contexts.

The interviews followed the standard Labovian format, well-known in sociolinguistics (Tagliamonte, 2012:27). They were divided into four main sections. The first section was designed to elicit more careful speech, while the second and third sections aimed to elicit more casual speech. In the first section,

participants read aloud a disclaimer and legal ethical form adapted from Da Silva (2008) as provided in the Appendix, Section 1. This served a dual purpose: it provided environments for potential retroflexion and acted as a verbal contract confirming the participant's consent (Du Plessis & Bekker, 2014). The second and third sections of the interview differed mainly in their content focus. Section 2 in the Appendix captured the participant's biographic information and included attitude questions about which countries the participant most admires, both as the 'world's coolest country' and as a favored travel destination (Appendix, Section 2). Section 3 focused on eliciting more naturalistic speech by asking participants about their experiences with load shedding, including how they cope with power outages and what activities they engage in when the lights go off (Appendix, Section 3).

At the end of the interview, participants read out a word list, which was a minor adaptation of Wells' (1982) lexical sets, similar to the approach Mesthrie (2010) used in his previously-mentioned study. This constituted the fourth and final section. The word list specifically included words with the GOOSE vowel, some of which contained /t/ and /d/ sounds (Appendix, Section 4). To accurately characterize the fronting of the GOOSE vowel, it was useful to consider the environments that either favor or disfavor fronting (see the next section for more on this).

3.5 Data analysis

RStudio [10]was found to be a convenient, reliable, and advanced platform for data analysis. Although it is quite technical, it is highly recommended for statistical analysis once navigated proficiently. This aligns with previous research highlighting RStudio's efficiency in data manipulation, visualization, and statistical modelling (Grolemund & Wickham, 2017; Xie, Allaire & Grolemund, 2020). Researchers have noted that while RStudio has a steep learning curve, it offers a powerful and flexible environment for handling large datasets and performing complex analyses, making it a preferred choice for quantitative research (Peng, 2019). RStudio was utilized to determine the relevant influence of several independent (social and structural) variables on the three dependent variables (Galecki & Burzykowski, 2013). The dependent variables were the sounds /t/, /d/, and the GOOSE vowel, while the independent variables included self-declared biological sex, age cohort, place of residence, and stress vs unstressed syllables. Syllable stress was determined using acoustic and phonological criteria, following established stress identification methods in phonetics (e.g., duration, intensity, and pitch). Stressed syllables typically exhibited greater duration, higher intensity, and pitch prominence, whereas unstressed syllables were shorter and had reduced vowel quality (Ladefoged & Johnson, 2014) [11]; and in the case of the GOOSE vowel, allophonic context.

[10] https://posit.co/download/rstudio-desktop/

[11] The study chose not to include 'style' as an independent variable, given the well-established connection between style and social class (the relevant proxy for social class in this study being place of

These allophonic contexts were coded categorically and incorporated as a fixed effect in the statistical model. This allowed for an analysis of how GOOSE-fronting varied depending on its phonetic environment while controlling other sociolinguistic variables such as age, gender, and place of residence. The statistical analysis was conducted using mixed-effects regression models in RStudio (lme4 package), where allophonic context was included as a predictor variable to determine its significance in vowel variation. The basic statistical approach was the use of ctree analysis (coupled with basic t-tests); a statistical approach that is becoming more and more common in modern sociolinguistics (Tagliamonte & Baayen 2012). Ctree analysis (Conditional Inference Trees): Ctree analysis is a non-parametric machine learning technique that identifies the most statistically significant factors influencing variation by recursively partitioning data into subgroups based on predictor variables (Hothorn, Hornik, & Zeileis, 2006). It is particularly useful for handling complex interactions between linguistic and social factors without making strict assumptions about the distribution of the data. Welch's t-test: A parametric statistical test used to compare mean differences between two independent groups (e.g., gender, age groups, place of residence). Unlike the standard Student's t-test, Welch's t-test does not assume equal variances between groups, making it more robust for linguistic datasets where variance homogeneity cannot always be ensured (Delacre, Lakens, & Leys, 2017).

The data in this study includes both parametric and non-parametric elements, requiring a combination of techniques: Ctree analysis was chosen because it is well-suited for non-parametric data, allowing for an exploratory, data-driven approach to identifying linguistic variation patterns without assuming normal distribution. Welch's t-test was selected for parametric comparisons where mean differences between groups were of interest, ensuring robust statistical inference even when group variances differed. By combining these methods, the analysis captures both structured group differences (through t-tests) and complex interactions (through ctree analysis), providing a comprehensive and statistically sound approach to examining sociophonetic variation in retroflexion and GOOSE vowel fronting.

To facilitate a more nuanced analysis of these linguistic variables, the dataset was first segmented into subsets for the sounds /t/ and /d/ using RStudio. This initial sub-setting allowed for focused statistical tests and visualizations specific to each phonetic variable. The dataset was filtered to include only the relevant lexical items, enabling a precise exploration of how various social and linguistic factors influence the articulation of these sounds. Lexical selection was based on the following criteria; Only words containing /t/, /d/, and the GOOSE vowel were included, as these were the primary linguistic variables under investigation and items were chosen to include variation in word-initial positions, allowing for a comprehensive analysis of phonetic conditioning on articulation. As well as words commonly used by

residence). This decision was made to avoid an overly complex analysis. As will be seen in the next chapter, the exclusion of this variable did not prevent the study from producing reliable findings.

South African Indian English (SAIE) speakers in both formal and informal settings were prioritized to reflect naturalistic speech patterns.

Following the creation of these initial subsets, further segmentation was necessary to investigate the role of group, as will be seen in Chapter 4. This step was critical for examining the differential impact of the social variables on Voice Onset Time (VOT). Separate conditional inference trees (ctrees) were constructed as well to reveal distinct patterns of variation that were not evident in the overall dataset. Ctree analysis (classification trees) helps in identifying how various social or linguistic factors influence a dependent variable by recursively splitting the dataset based on the most significant predictors (Hothorn, Hornik, & Zeileis, 2006). It visually illustrates which variables have the greatest impact on the outcome. T-tests, by contrast, are used to test hypotheses by comparing means between two groups, allowing researchers to determine whether observed differences are statistically significant or merely due to random chance (Delacre, Lakens, & Leys, 2017).

For retroflexion, a total of 614 lexical items were recorded and analyzed using PRAAT (Boersma & Weenink, 2021). PRAAT is a widely used software for phonetic analysis, developed for speech signal processing, visualization, and measurement of acoustic features. The target words were first segmented and stored in separate files. The samples were then analyzed acoustically, measuring VOT for /t/ and /d/ (Chawla & Meigh, 2020).

This acoustic analysis involved identifying the point where the burst of energy occurs, indicating the release of the plosive closure (this is often marked by a sudden spike in amplitude); and then locating the point where the periodic waveform (indicating voicing) begins. In the spectrogram, this is typically seen as the appearance of vertical striations corresponding to vocal fold vibrations, as illustrated in Figure 3.4 above. In the case of GOOSE, the focus was on the second formant (F2) of the vowel (the standard acoustic correlation of the degree of fronting) and there were 620 lexical items. PRAAT produced raw hertz frequencies which were recorded in tables formulated in EXCEL. To consider the differences between the male and female participants due to variation in vocal-tract size, normalization of the frequencies was undertaken using the Watt-Fabricius method (Watt and Fabricius 2003). This method is commonly used in sociophonetics to account for anatomical differences in vocal tract length between speakers, particularly between males and females. It scales vowel formant frequencies relative to a speaker's central vowel space, reducing the impact of biological variation and allowing for more accurate cross-speaker comparisons. In addition, Figure 3.6 illustrates the scale proposed by Mesthrie (2010) for categorizing the degree of fronting and backing of vowels using the Watt-Fabricius normalization method.

This scale provides a detailed framework for understanding the positioning of vowel sounds based on their normalized second formant (F2) frequencies. The scale is divided into specific categories:

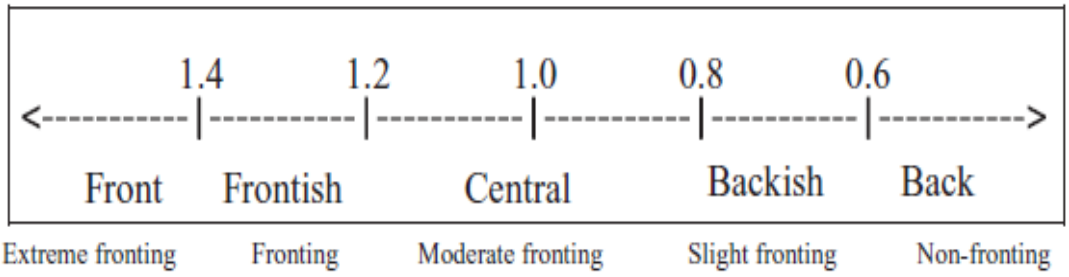

Figure 3.6 A proposed scale by Mesthrie of fronting for high vowels by Watts-Fabricius ratios

- **Front (Extreme fronting)**: This category encompasses normalized F2 values ranging from 2.0 to 1.4, indicating the most fronted vowel positions.
- **Frontish (Fronting)**: Values from 1.4 to 1.2 fall into this category, representing vowels that are fronted but not to the extreme degree.
- **Central (Moderate fronting)**: The central point of the scale is 1.0, representing vowels that are moderately fronted and considered central in their positioning.
- **Backish (Slight fronting)**: Values from 0.8 to 0.6 are categorized here, indicating vowels that are slightly fronted but leaning towards the back.
- **Back (Non-fronting)**: This category includes values from 0.6 to 0.2, representing the most backed vowel positions.

For normalization, the Watt-Fabricius normalization option on the NORM website [12](Kendall and Thomas, 2009) was employed, with a delimited text file created through EXCEL. This file contained tokens of the FLEECE vowel and a dummy high-back vowel (Fi, Fj), where both Fi and Fj are the same as the F1 value for FLEECE, the latter thus acting as a 'dummy' GOOSE vowel. Additionally, tokens of the TRAP, BATH, and STRUT vowels were included to determine the lowest vowels for each speaker. These values were then inputted into NORM to produce normalized average values for the GOOSE vowel for each speaker based on all the tokens provided. These averages are given in the categories found in Figure 3.6 above, which I will refer to as 'W-F ratios,' following Mesthrie (2010).

When analyzing the fronting of the GOOSE vowel, it is crucial to consider the structural factors that constrain this process. Building on Mesthrie's (2010) work, we explored various environments that were expected to either favor or disfavor fronting. The different environments are presented below:

- **/r/ and /l/ before a GOOSE vowel.**[13]

[12] http://lingtools.uoregon.edu/norm/norm1.php

[13] The inclusion of this allophonic environment was actually a fortuitous error; Mesthrie (2010) excluded such cases given the difficulties involved in acoustic analysis. The inclusion of this allophonic environment turned out to

- **/l/ after a GOOSE vowel:** This is a retracting environment in English varieties and affects South African English (SAE) vowels.
- **Preceding consonant /j/:** This is a fronting environment, and words with this environment are termed 'J-words,' treated as a subset of the GOOSE lexical set.
- **Preceding coronal consonants**. (generally, a fronting environment)
- **Preceding non-coronal consonants**.

3.6 Conclusion

This methodology chapter has systematically outlined the research design, data collection, and analysis processes employed in this study to investigate the linguistic variables of retroflexion and the GOOSE vowel within the English of the Indian community of Potchefstroom, South Africa. By situating the study within a comprehensive historical and sociolinguistic context, the chapter provides a foundational understanding of the broader social and linguistic environment that shapes language use in this community. The research methodology, which combines participant interviews with acoustic analysis, was carefully structured to ensure the validity and reliability of the findings. The application of advanced tools and statistical techniques, such as ctrees in RStudio and PRAAT, underscores the rigor of the analytical framework used to explore these linguistic phenomena (Blanco, Dain, & Lavayssière, 2017) (Lai & Bird, 2009). Moreover, the methodological approach was designed to capture both social and linguistic nuances, offering insights into how factors like age, gender, and geographic location influence speech patterns in this unique sociolinguistic setting. The conclusion of this chapter sets the stage for the subsequent presentation and discussion of findings, where the insights gained from this methodology will be thoroughly explored and interpreted in relation to the research questions posed at the outset of this study.

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be fortuitous since it ended up being the one sub-category showing the effects of social-class on GOOSE-Fronting (see the next chapter).

CHAPTER 4 DATA ANALYSIS

4.1 Introduction

In the previous chapter, we discussed the methodologies employed for data collection and analysis. This chapter focuses on the presentation and interpretation of the results derived from these methodologies. This section represents the culmination of extensive fieldwork, rigorous data analysis, and a thorough investigation into the Indian speech community of Potchefstroom and Mohadin. We will provide a comprehensive overview of the acoustic results related to Voice Onset Time (VOT), examining the variables of gender, age, social class, and stress, and the distinctions between voiced and voiceless /d/ and /t/ sounds. Additionally, the analysis will cover the GOOSE vowel, exploring its acoustic properties in relation to a similar set of social and structural independent variables. Through this detailed analysis, we aim to shed light on the linguistic characteristics and patterns within this speech community, offering insights that contribute to the broader field of sociolinguistics.

4.2 Voice Onset Time (VOT)

Voice Onset Time (VOT) is a key acoustic parameter that measures the time lag between the release of a stop consonant and the onset of voicing (Lisker & Abramson, 1964). It serves as a crucial phonetic feature in distinguishing voiceless and voiced plosives, making it highly relevant to the study of retroflexion in South African Indian English (SAIE). Differences in VOT can indicate variation in articulation across speaker groups, influenced by age, gender, place of residence, and phonetic environment. In this study, VOT was analyzed using conditional inference tree (ctree) analysis to explore the interaction between linguistic and social variables. This approach allows for the identification of statistically significant factors affecting VOT patterns in SAIE. The following section presents the overall pattern of interactions obtained from the ctree analysis, highlighting key trends and sociophonetic influences.

4.2.1 Overall pattern of interactions (ctree analysis)

Figure 4.1 is a Conditional Inference Tree showing the influence of independent variables (Gender, Age, Social Class, Stress, and Voicing (/t/ vs. /d/)) on the dependent variable (Voice Onset Time in milliseconds). Each node is numbered, with the root node (1) 'TorD' being the most significant factor ($p < 0.001$). The tree illustrates the statistical significance of each independent variable's impact, with p-values indicating levels of significance. A p-value of less than 0.01 is considered highly statistically significant; and a p-value of less than 0.05 is considered statistically significant (Kestenbaum, 2018). The primary, highly significant split in the data is based on voicing, distinguishing voiced /d/ from voiceless /t/. From the conditional inference tree in Figure 4.1, we can infer that voicing is the most significant factor affecting VOT, as voiced /d/ typically has a shorter VOT than voiceless /t/. This is expected, as in English, voiced plosives generally have a shorter VOT compared to their voiceless counterparts (Ladefoged & Johnson, 2011: 152). Starting

with the data for /d/ on the left side of the tree, stress (whether the syllable containing /d/ is stressed or unstressed) is the most important factor. Unstressed syllables ("no") are further split by gender (node 3). The female data is then divided by social class: those in Mohadin (node 5) have an average VOT of 19 ms, while those in Town (node 6) have an average VOT of 24 ms. The male data similarly shows a social class split males in Mohadin (node 8) have an average VOT of 35 ms, whereas males in Town (node 9) have an average VOT of 21 ms. Nodes 5, 6, 8, and 9 are leaf nodes, indicating the average VOT measurements for each subgroup.

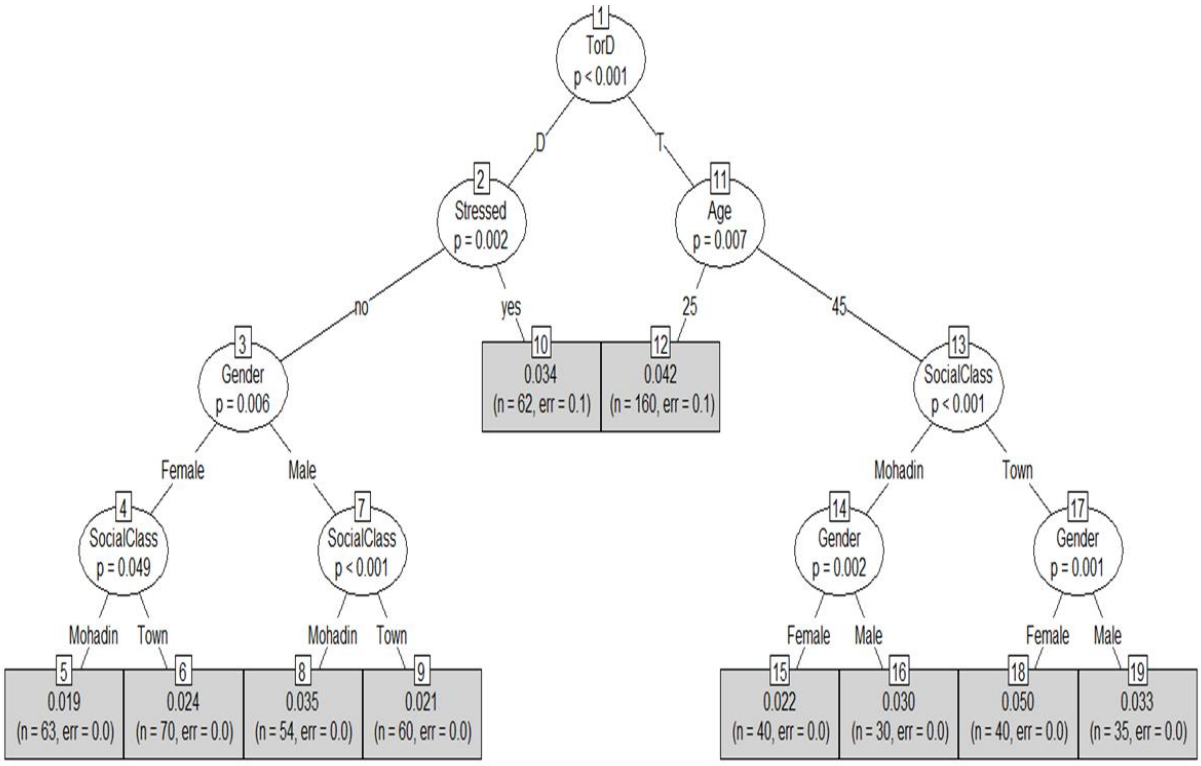

Figure 4.1 Conditional Inference tree for all the independent variables

For example, females in Mohadin have an average VOT of 19 ms for /d/ in unstressed syllables, whereas those in Town have a slightly higher average of 24 ms. Males in Mohadin have an average VOT of 35 ms, compared to 21 ms for males in Town. For syllables with primary stress ("yes" branch), the average VOT is 34 ms, with n=62 indicating 62 measurements for /d/ in syllables with primary stress. Examining the data for /t/ on the right side of the tree, age (node 11) emerges as the most significant factor, dividing the data into two groups: under 25 (n=160, indicating 160 /t/ measurements from individuals under 25) and over 45. For the over-45 group, social class is the next significant factor (node 13), which further branches into Mohadin and Town. Gender is an additional factor for both social classes: in Mohadin, the data splits into female (node 15) and male (node 16) with average VOTs of 22 ms and 30 ms, respectively. In the Town data, the split is also by gender, with females having an average VOT of 50 ms and males 33 ms.

4.2.2 The role of voicing

Voicing clearly plays a crucial role in predicting VOT, particularly in distinguishing between voiced and voiceless consonants /d/ and /t/. These consonants typically exhibit different VOT values, with /d/ having a shorter VOT. This is because the onset of voicing (i.e., the beginning of the following vowel) occurs earlier for /d/ compared to /t/, where voicing starts later after the consonant is released. This distinction is confirmed by the truncated conditional inference tree in Figure 4.2, which captures the difference between /d/ and /t/ in terms of the effect of voicing on VOT. As shown in both Figure 4.1 and 4.2, voicing is the most significant factor ($p < 0.001$), with the average VOT for /d/ being 26 ms (node 2) and for /t/ being 38 ms (node 3), demonstrating the clear impact of phonological voicing on VOT.

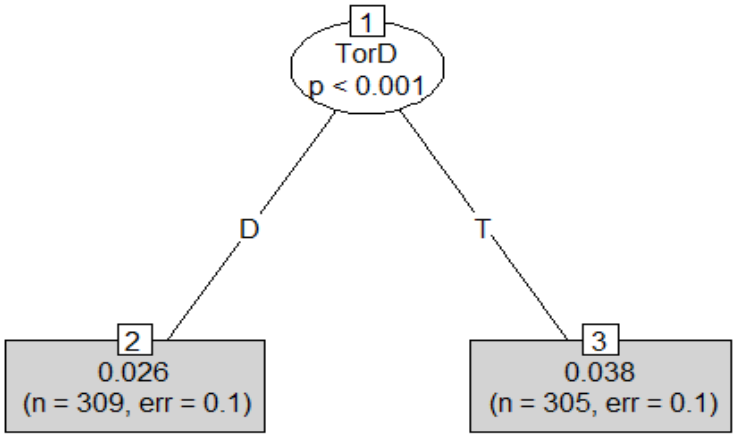

Figure 4.2 Conditional Inference Tree for VOT by Voicing (/d/ vs. /t/)

To further confirm that there is indeed a significant difference, Welch's Two Sample t-test (Welch, 1947) was conducted, and the results are shown in Table 4.1.

Table 4.1 Welch's Two Sample t-test for VOT~TorD

```
        Welch Two Sample t-test

data:  mastervotspreadsheet$VOT by mastervotspreadsheet$`T/D`
t = -6.73, df = 604.91, p-value = 3.943e-11
alternative hypothesis: true difference in means between group D and group T is not equal to 0
95 percent confidence interval:
 -0.014893665 -0.008164937
sample estimates:
mean in group D mean in group T
     0.02635922      0.03788852
```

The t-test provides a robust comparison between the VOT of voiced /d/ and voiceless /t/. The highly significant t-value of -6.73 and an extremely low p-value of 3.943e-11 strongly suggest that there is a significant difference in VOT between these two consonants. The negative t-value indicates that the VOT for /d/ is significantly shorter than for /t/, which aligns with the phonetic expectations. The mean VOT for

the voiced /d/ group is 26 ms, while the mean VOT for the voiceless /t/ group is 38 ms. Furthermore, the alternative hypothesis suggests that the true difference in means between /d/ and /t/ is not equal to 0. The extremely low p-value supports this hypothesis, indicating, once again, a significant difference.

As confirmed by both the conditional inference tree and Welch's Two Sample t-test (Welch, 1947), voiced /d/ exhibits significantly shorter VOT than voiceless /t/. The t-test results (t = -6.73, p = 3.943e-11) indicate a highly significant difference. This robust evidence establishes that phonological voicing significantly affects VOT, providing confidence in the accuracy of our measurement and analysis processes. As mentioned before in section 3.3.1, this difference was to be expected given the general trend in English for voiceless plosives to show longer VOT. Having established the statistically significant effect of voicing on VOT, we now turn to the analysis of other independent variables: gender, age, social class, and stress. Each variable's influence on VOT was examined based on p-values obtained from statistical tests. Additionally, boxplots were used to visually assess patterns of variation and confirm whether differences between groups were statistically significant.

4.3 Results for /d/

In this section, we will focus on the analysis of the /d/ data to investigate the effects of stress, gender, and social class on Voice Onset Time (VOT). By examining these specific independent variables, we aim to gain deeper insights into how they influence the production of the voiced /d/ consonants. To facilitate this analysis, the dataset was first segmented to include only instances of the /d/ sound. The identification of /d/ tokens was conducted using a combination of acoustic analysis in PRAAT (Boersma & Weenink, 2021) and manual verification. Automated segmentation was performed by extracting stop consonants based on waveform patterns and spectrographic cues. To ensure accuracy, each instance was manually reviewed to confirm correct phonemic categorization, particularly in cases where /d/ might be affected by coarticulation or speech rate variation. Following this initial sub-setting, further divisions were made based on gender and social class. Separate subsets for male and female speakers were created, allowing us to examine the impact of social class within each gender group independently. This approach enables a more nuanced exploration of how VOT varies not only between genders but also within social strata for each gender. For each variable—stress, gender, and social class—we employed three complementary analytical methods: conditional inference trees (ctrees), Welch's Two Sample t-tests and boxplots.

1. Conditional Inference Trees (ctrees) were constructed for each variable to provide the initial confirmation of the variable's predictive role.

2. Welch's Two Sample t-tests (Welch, 1947) were conducted to statistically confirm the significance of observed differences in VOT values. By comparing mean VOT values between groups we can determine whether the observed differences are statistically significant or due to random variation.

3. Boxplots visually illustrate the distribution of VOT values for each group. This helps to identify any noticeable patterns or differences in VOT based on the independent variables.

4. The role of the independent variables will be discussed below according to the ctree output beginning with stress below.

4.3.1 The role stress

The analysis of the /d/ sound revealed a significant relationship between stress and Voice Onset Time (VOT). Figure 4.3 illustrates the conditional inference tree (ctree) model for VOT in the /d/ dataset. The tree shows a primary split based on the Stressed variable, with a p-value of less than 0.001, indicating that stress is a strong predictor of VOT variation. This finding suggests that stress influences the articulation of the /d/ sound in a notable way, affecting how long the vocal cords remain inactive before the onset of voicing.

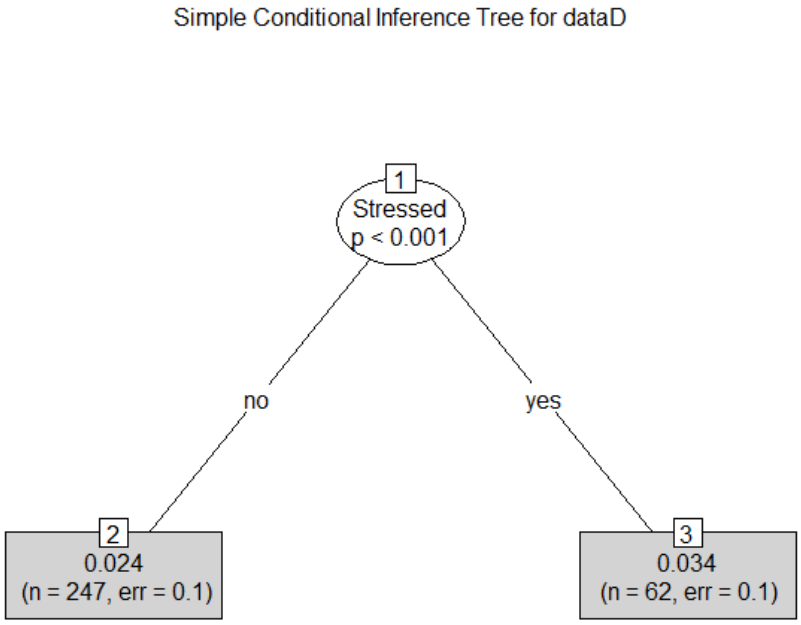

Figure 4.3 Conditional Inference Tree for VOT in Stressed and Unstressed Syllables.

For unstressed syllables, represented in Node 2 of the tree, the mean VOT is 24 ms with 247 observations in this category. This relatively shorter VOT indicates that, in the absence of stress, the /d/ sound is produced more quickly and with less emphasis. This pattern suggests that speakers may use a more casual or less marked articulation of /d/ in unstressed contexts, which aligns with general phonetic expectations where less articulatory effort is needed for unstressed syllables. In contrast, for stressed syllables, represented in Node 3, the mean VOT increases significantly to 34 ms, with 62 observations. This longer VOT reflects the increased articulatory effort that speakers employ when producing stressed syllables. The extended VOT in stressed contexts suggests that speakers are likely to produce a more deliberate and possibly more non-retroflexed version of the /d/ sound when the syllable is emphasized.

This finding supports the hypothesis that stress enhances the clarity and precision of articulation, thereby affecting the phonetic realization of the /d/ sound. The results highlight a crucial aspect of phonetic variation in South African Indian English (SAIE). The statistically significant difference in VOT between stressed and unstressed syllables suggests that stress not only affects the temporal properties of the /d/ sound but may also play a role in the retention or loss of retroflexion. Specifically, in stressed contexts, where articulation is more pronounced, speakers might lose retroflexion more robustly compared to unstressed contexts, where the articulation may be more lenient and prone to retroflexion.

The Welch Two Sample t-test in Table 4.2 provides statistical evidence for this difference. The t-test yields a t-value of -2.4208 and a p-value of 0.01814, indicating a statistically significant difference in mean VOT between stressed and unstressed syllables. The mean VOT for stressed syllables is 34 ms , while for unstressed syllables, it is 24 ms.

Table 4.2 Welch's Two Sample t-Test Results for VOT in Stressed vs. Unstressed /d/ Syllables

```
        Welch Two Sample t-test

data:  VOT by Stressed
t = -2.4208, df = 68.529, p-value = 0.01814
alternative hypothesis: true difference in means between group no and group yes is not equal to 0
95 percent confidence interval:
 -0.018283586 -0.001761994
sample estimates:
 mean in group no mean in group yes
       0.02434818        0.03437097
```

The p-value of 0.01814 from the t-test confirms that the difference in VOT observed in the ctree is statistically significant and not due to random variation. This p-value is below the standard significance threshold of 0.05, allowing us to reject the null hypothesis and conclude that stress has a statistically significant effect on VOT. Both the ctree and t-test analyses show that stressed syllables are articulated with a longer VOT (and thus with less retroflexion) compared to unstressed syllables. The similarity in statistical significance in both analyses reinforce the reliability of the findings. The alignment of results between the ctree and the t-test suggests a robust relationship between stress and VOT. This consistency across different analytical methods strengthens the conclusion that stress is a key factor influencing the articulation of the /d/ sound.

The boxplot shown in Figure 4.4 complements the results obtained from the ctree and t-test analyses by highlighting the distribution, central tendency, and variability of VOT with the yellow dot indicating the mean VOT for each category.

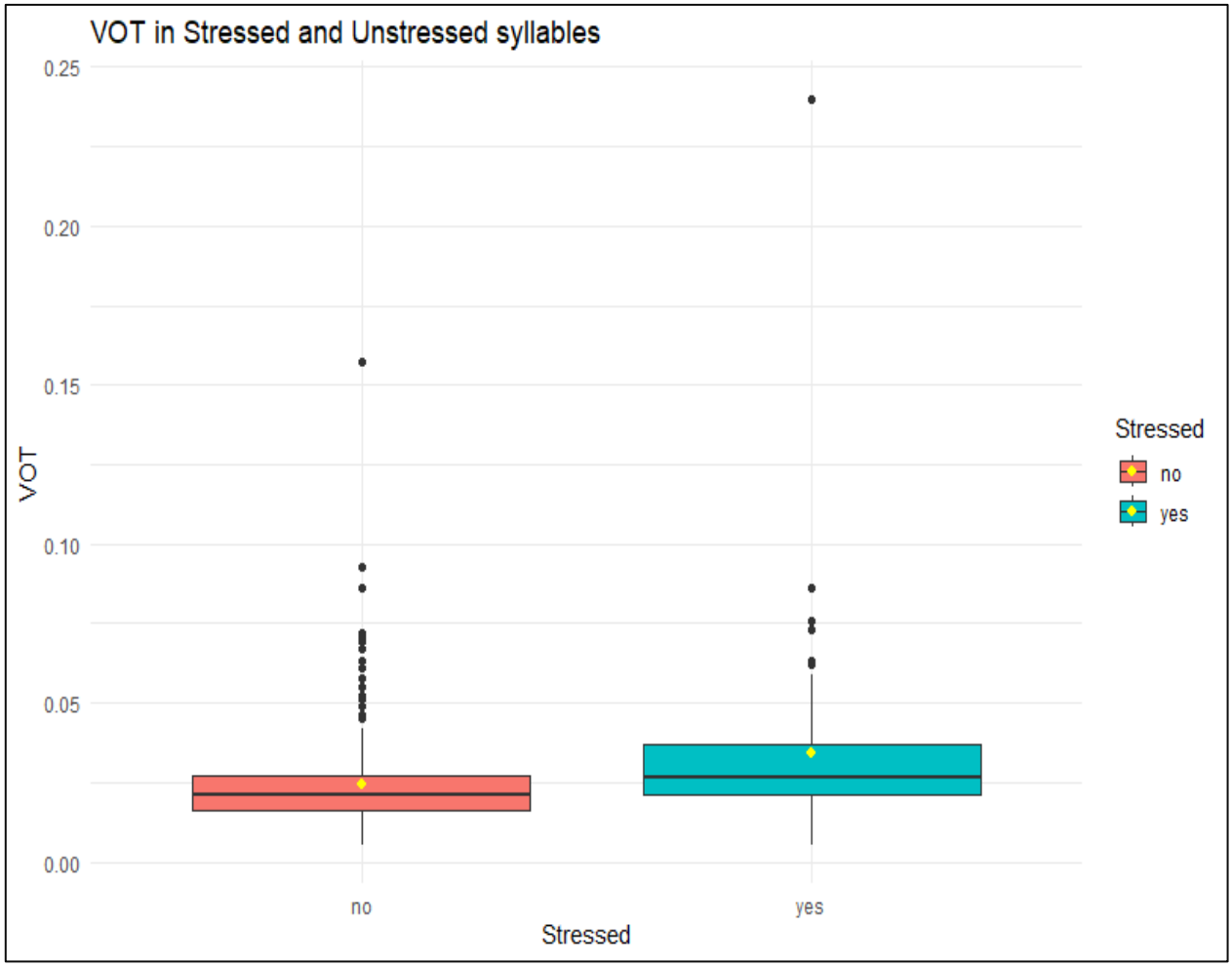

Figure 4.4 Voice Onset Time (VOT) for the /d/ Consonant in Stressed vs. Unstressed Syllable

For unstressed syllables (no), the boxplot shows a relatively narrow interquartile range (the box itself) with a few outliers above the box. This compact distribution suggests that the majority of VOT values for unstressed syllables are close to the mean of 24 ms, with minimal variation among speakers. The smaller spread indicates that speakers are generally consistent in producing shorter VOTs for unstressed syllables, reflecting a less deliberate (or more retroflexed) articulation. In contrast, the boxplot for stressed syllables (yes) shows a wider interquartile range, which means that there is greater variability in VOT values around the mean of 34 ms . This wider spread indicates that there is more variation in how different speakers produce the /d/ sound in stressed contexts. The presence of more extreme values and a greater range of VOTs suggests that speakers might use different strategies to articulate stressed /d/, possibly due to varying levels of emphasis or individual speaking styles. The "whiskers" of the boxplot, which extend from the box to the smallest and largest values within 1.5 times the interquartile range (IQR), are longer for stressed syllables. This shows that the data is more spread out, with a wider range of VOT values. The number of outliers (points beyond the whiskers) is also higher for stressed syllables, indicating more extreme deviations from the mean. This is another sign of increased variability among speakers when producing the /d/ sound under stress.

The statistically significant difference in mean VOT between stressed and unstressed syllables demonstrates the strong effect of stress on the production of the /d/ sound. When a syllable is stressed, the /d/ sound is articulated with a longer VOT, indicating a more deliberate and clearer pronunciation (and with less evidence of retroflexion). This pattern aligns with established linguistic principles, where stressed syllables are articulated with greater precision and duration (Awan & Stine, 2011). In the context of South African Indian English (SAIE), these findings suggest that stress may play a role in losing certain 'traditional' phonetic features, such as retroflexion, in stressed syllables. Conversely, in unstressed syllables, where the /d/ sound is produced more quickly, there may be a greater tendency for these features to be maintained (Noor et al., 2021). This is particularly relevant in multilingual settings where different languages and dialects interact, potentially influencing the speech patterns of SAIE speakers.

4.3.2 The role of gender

In the analysis of unstressed syllables for the /d/ sound, gender emerges as a significant factor influencing Voice Onset Time (VOT). The conditional inference tree in Figure 4.5 illustrates that gender plays a crucial role in shaping the articulation of the /d/ consonant. This tree, focused on the unstressed /d/ data, highlights a clear split between male and female speakers, indicating distinct differences in VOT values between the two groups. The primary split in the tree is based on gender, with a highly statistically significant p-value of 0.002. This result suggests that the temporal characteristics of the /d/ sound vary considerably between male and female speakers, even when the syllable is not stressed. By isolating the data to only include unstressed syllables, the analysis minimizes the confounding effects of stress, allowing for a more focused examination of gender-specific patterns of VOT.

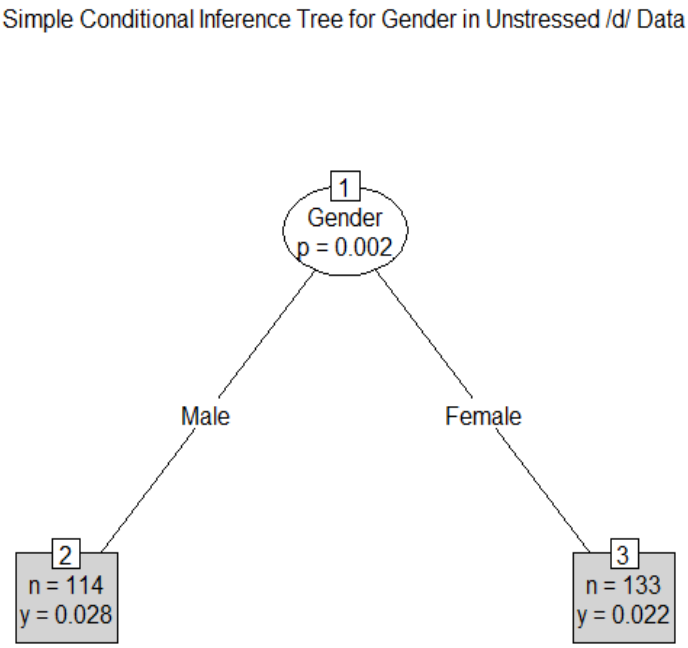

Figure 4.5 Conditional Inference Tree for Gender and VOT in Unstressed /d/ Data

For male speakers (Node 2), the mean VOT is 28 ms, based on 114 observations. This longer mean VOT suggests that male speakers tend to articulate the /d/ sound with a more pronounced delay in unstressed syllables (i.e., with less retroflexion). This could indicate the adoption of non- traditional speech patterns or a more deliberate articulation style, reflecting broader social or linguistic norms within the community. In contrast, female speakers (Node 3) exhibit a shorter mean VOT of 22 ms, based on 133 observations. The shorter VOT for female speakers suggests a quicker, more retroflexed articulation of the /d/ sound in unstressed syllables. This pattern may reflect a tendency among female speakers to adopt a more traditional pronunciation.

The distinct difference in mean VOT values between male and female speakers indicates that gender has a significant impact on the articulation of the /d/ consonant in unstressed syllables. This variation is in fact contrary to broader sociolinguistic trends, where female speakers often lead in adopting new linguistic forms or conform to standardized speech patterns, while male speakers may retain more traditional or marked forms of pronunciation. The observed differences suggest that male and female speakers may be responding to different social pressures or linguistic norms, influencing their pronunciation in distinct ways. For instance, the shorter VOT observed among female speakers could reflect a preservation of traditional speech patterns, potentially as a marker of ethnic or cultural identity. Conversely, the longer VOT among male speakers may indicate a shift towards less marked, more standardized pronunciations, possibly driven by a desire to conform to broader social norms or expectations.

The Welch Two Sample t-test in Table 4.3 provides statistical evidence for this difference. The t-test yields a t-value of -3.0479 and a p-value of 0.002649, indicating a statistically significant difference in mean VOT

between male and female speakers. The mean VOT for female speakers is 21.5 ms, while for male speakers it is 27.7 ms.

Table 4.3 Welch's Two Sample t-Test Results for VOT by Gender in Unstressed /d/ Syllables

```
        Welch Two Sample t-test

data:  VOT by Gender
t = -3.0479, df = 181.16, p-value = 0.002649
alternative hypothesis: true difference in means between group Female and group Male is not equal to 0
95 percent confidence interval:
 -0.010125802 -0.002167431
sample estimates:
mean in group Female   mean in group Male
          0.02151128           0.02765789
```

The p-value of 0.00264 from the t-test confirms that the difference in VOT observed in the ctree is statistically significant and not due to random variation. This p-value is well below the standard significance threshold of 0.05, allowing us to reject the null hypothesis and conclude that gender has a significant effect on VOT. Both the ctree and t-test analyses show that male speakers are more likely to articulate the /d/ sound with a longer VOT compared to female speakers (i.e., with less retroflexion). The similarity in mean VOT values and the statistical significance in both analyses reinforce the reliability of the findings. The alignment of results between the ctree and the t-test suggests a robust relationship between gender and VOT. This consistency across different analytical methods strengthens the conclusion that gender is a key factor influencing the articulation of the /d/ sound in unstressed syllables.

The boxplot shown in Figure 4.6 complements the results obtained from the ctree and t-test analyses by highlighting the distribution, central tendency, and variability of VOT, with the yellow dot indicating the mean VOT for each gender group. For female speakers, the boxplot shows a relatively narrow interquartile range (the box itself), suggesting that the majority of VOT values are close to the mean of 0.022 milliseconds, with minimal variation among speakers. This compact distribution indicates that female speakers generally produce shorter VOTs (more retroflexion) for the /d/ sound in unstressed syllables, reflecting a more uniform and less marked articulation. In contrast, the boxplot for male speakers shows a wider interquartile range, which means that there is greater variability in VOT values around the mean of 0.028 milliseconds. This wider spread indicates that there is more variation in how different male speakers produce the /d/ sound in unstressed contexts. The presence of more extreme values and a greater range of VOTs suggests that male speakers might use different strategies to articulate the /d/ sound, possibly due to varying levels of emphasis or individual speaking styles.

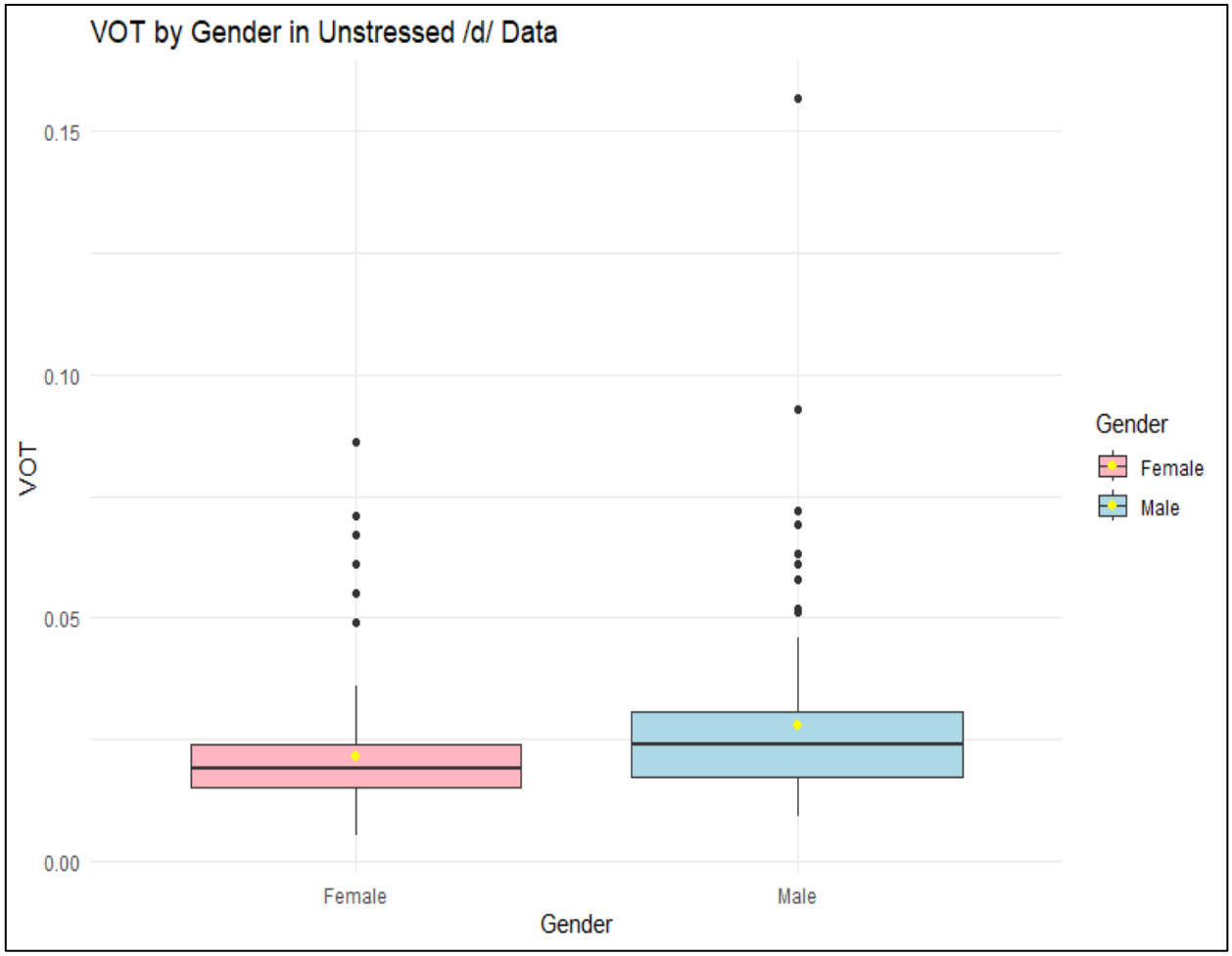

Figure 4.6 Boxplot of VOT by Gender in Unstressed /d/ Syllables

The "whiskers" of the boxplot, which extend from the box to the smallest and largest values within 1.5 times the interquartile range (IQR), are longer for male speakers. This shows that the data is more spread out, with a wider range of VOT values. The number of outliers (points beyond the whiskers) is also higher for male speakers, indicating more extreme deviations from the mean. This is another sign of increased variability among male speakers when producing the /d/ sound in unstressed syllables. The substantial difference in mean VOT between male and female speakers demonstrates the strong effect of gender on the production of the /d/ sound. Male speakers articulate the /d/ sound with a longer VOT, indicating a more deliberate and less traditional (less-retroflexed) pronunciation. This pattern is not in alignment with established sociolinguistic principles, where men generally maintain more distinct or marked speech patterns, while women may adopt more neutral or standardized forms. In the context of SAIE, these findings suggest that gender plays a role in maintaining certain phonetic features, such as retroflexion, more prominently among female speakers. Conversely, male speakers, who produce the /d/ sound less quickly, may be more prone to influence from non-retroflexed variants.

4.3.3 The role of social class

The analysis of social class on the Voice Onset Time (VOT) for the /d/ sound in unstressed syllables involved a detailed exploration of how social class interacts with gender to influence phonetic variation. This section focuses on how VOT varies across different social class categories within the South African Indian English (SAIE) speaking community in Potchefstroom. To systematically examine the impact of social class, the dataset was first divided into distinct subsets based on gender and social class categories. This segmentation allowed us to explore the interaction between these variables in a more nuanced manner. Separate analyses were conducted for male and female speakers, allowing for a detailed examination of how social class influences VOT within each gender group. The social class categories considered were based on the geographic locations of the speakers: Mohadin and Town. These categories represent different social and linguistic environments, with Mohadin traditionally being a more insular Indian community, while Town represents the more integrated, previously whites-only area.

Truncated ctrees were thus constructed for each gender subset to identify significant splits based on social class. This helped in visualizing the impact of social class within each gender group. T-tests were then conducted to statistically compare mean VOT values between different social class groups within each gender category. And lastly boxplots were used to visualize the distribution and variability of VOT values across social classes for both female and male speakers. This visualization provides an intuitive understanding of the differences and overlaps between the social class categories. The analyses revealed that social class has a nuanced impact on VOT, which is modulated by gender. For both female and male speakers, significant differences in VOT were observed between the Mohadin and Town social class categories, suggesting that the social environment plays a crucial role in shaping phonetic behavior.

4.3.3.1 Female results

The analysis of the /d/ sound in unstressed syllables for female speakers revealed a significant relationship between social class and Voice Onset Time (VOT). Figure 4.7 illustrates the conditional inference tree (ctree) model for VOT based on social class among female speakers. The tree shows a primary split between the Town and Mohadin social class categories, with a p-value of 0.025, indicating that social class is a significant predictor of VOT variation for female speakers. This finding suggests that the social environment in which these speakers reside plays a crucial role in shaping their phonetic behavior.

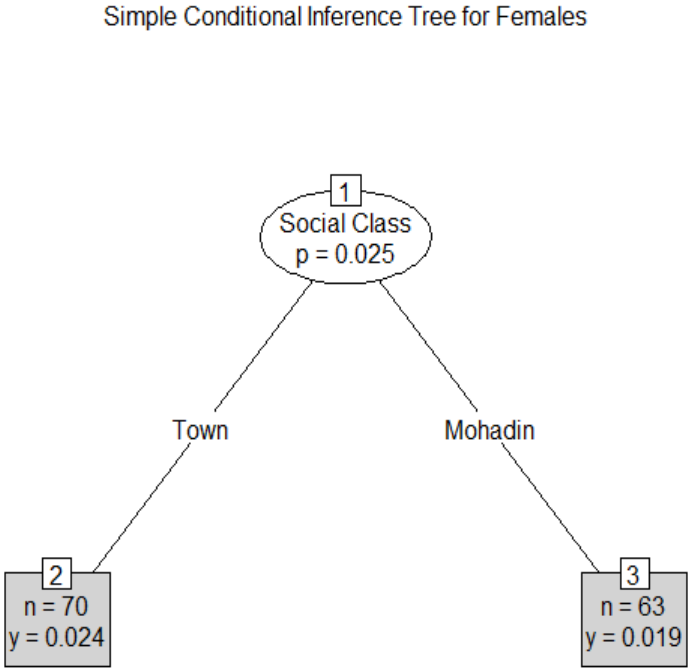

Figure 4.7 Conditional Inference Tree for Social Class and VOT in Female Speakers

For female speakers from the Town category, represented in Node 2 of the tree, the mean VOT is 0.024 (24 milliseconds) with 70 observations. This relatively longer VOT indicates that female speakers residing in Town articulate the /d/ sound with more delay and possibly more emphasis in unstressed syllables compared to their counterparts from Mohadin. This pattern suggests that female speakers in Town might adopt a more deliberate or formal speech style, possibly reflecting the influence of a more diverse linguistic environment and greater social mobility. In contrast, for female speakers from Mohadin, represented in Node 3, the mean VOT is shorter, at 0.019 (19 milliseconds), with 63 observations. The shorter VOT for female speakers from Mohadin indicates a quicker and more retroflexed articulation of the /d/ sound in unstressed syllables. This may reflect a more traditional or community-specific speech pattern, aligning with the social and cultural norms prevalent in the more insular Mohadin community.

The statistically significant difference in VOT between the Town and Mohadin groups among female speakers highlights the influence of social class on phonetic variation. Female speakers in Town, who may be more integrated into broader societal structures, tend to have a longer VOT, suggesting a shift towards a more formal or prestige variant of speech. Conversely, female speakers in Mohadin maintain a shorter VOT, which could be indicative of a retention of traditional (retroflexed) speech patterns and less exposure to linguistic influences that encourage the adoption of marked or extended VOTs.

To statistically confirm the observed differences, a Welch Two Sample t-test was conducted, comparing the mean VOT values between these two groups. The results of the Welch Two Sample t-test are presented in Table 4.3.3. The test yielded the following key findings:

Table 4.4 Welch's Two Sample t-Test Results for VOT by Social Class in Female Speakers

```
        Welch Two Sample t-test

data:  VOT by Social Class
t = -2.2548, df = 118.65, p-value = 0.02598
alternative hypothesis: true difference in means between group Mohadin and group Town is not equal to 0
95 percent confidence interval:
 -0.0083951566 -0.0005445259
sample estimates:
mean in group Mohadin    mean in group Town
           0.01915873            0.02362857
```

The t-statistic is -2.2548, indicating that there is a difference in mean VOT between female speakers from the Mohadin and Town groups. The negative value suggests that the mean VOT for female speakers from Mohadin is lower than that for those from Town. The p-value is 0.02598. This value is below the standard significance threshold of 0.05, indicating that the difference in mean VOT between the two social class groups is statistically significant. In other words, it is highly unlikely that the observed difference in VOT is due to random chance. Female speakers from the Mohadin group exhibit a shorter mean VOT (19 ms) compared to those from Town (24 ms), suggesting a more retroflexed articulation of the /d/ sound in unstressed syllables.

The results of the t-test support the findings from the ctree analysis, confirming that social class significantly influences VOT among female speakers in unstressed syllables. The mean VOT for female speakers from Mohadin is shorter than that for those from Town, indicating a more retroflexed articulation of the /d/ sound in Mohadin. This may reflect a retention of more traditional speech patterns within the Mohadin community, where there may be less external influence from other linguistic groups or prestige norms. Conversely, the longer mean VOT observed among female speakers from Town suggests a shift towards a more formal (less retroflexed) standardized speech pattern. This may be influenced by greater social mobility and increased interaction with diverse linguistic environments, prompting speakers to adopt a more distinct or "prestige" variant of the /d/ sound, even in unstressed contexts.

The boxplot in Figure 4.8 visually represents the distribution of Voice Onset Time (VOT) among female speakers based on social class categories—Mohadin and Town—in unstressed /d/ syllables. This visualization complements the statistical analyses conducted earlier, providing a clear depiction of how VOT values differ between these social class groups. The yellow dot in each boxplot represents the mean VOT for each social class category. For female speakers in Mohadin, the mean VOT is approximately 0.019 (19 milliseconds), while for those in Town, it is around 0.024 (24 milliseconds). This reflects a consistent pattern observed in the ctree and t-test results, where female speakers in Town have a longer mean VOT (i.e., less retroflexion) compared to their Mohadin counterparts.

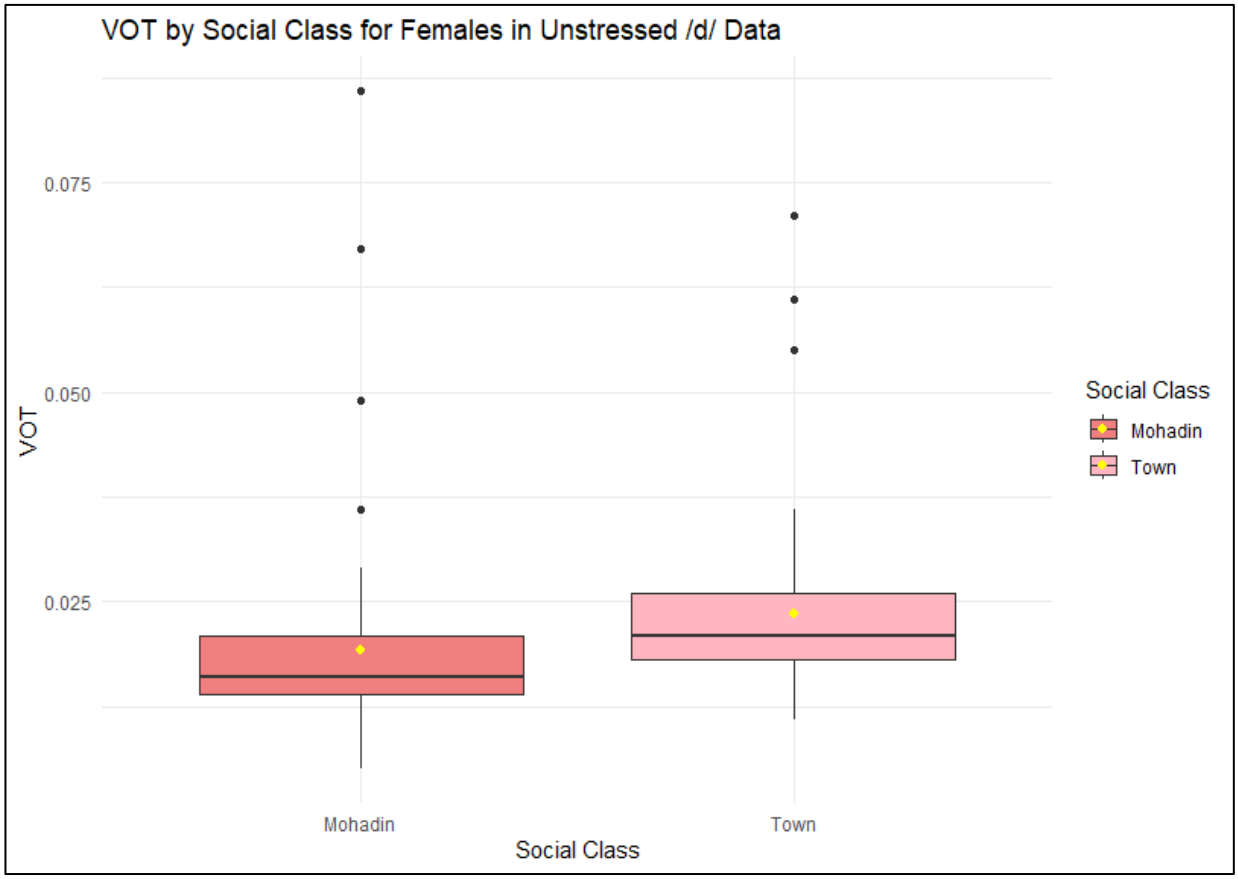

Figure 4.8 Boxplot of VOT by Social Class in Female Speakers

The interquartile range (the width of the box) is relatively similar for both groups, indicating a comparable spread of VOT values around the median for each social class category. The compact IQR for Mohadin suggests that most female speakers from this group produce the /d/ sound with minimal variation in VOT, possibly reflecting a stable community-specific norm. The whiskers extend from the box to the smallest and largest values within 1.5 times the interquartile range (IQR). The whiskers for Town are slightly longer, indicating a broader range of VOT values compared to Mohadin. This suggests that female speakers in Town exhibit more variability in their articulation of the /d/ sound, potentially due to diverse linguistic influences or a greater degree of social mobility. There are more outliers in the Mohadin category, suggesting that while the majority of speakers adhere to a consistent pattern, there are a few individuals who produce the /d/ sound with much longer VOTs (i.e., with less or no retroflexion). This could be indicative of variability within the community or individual linguistic styles that deviate from the norm. The boxplot shows a clear distinction between the two social class groups, with Town speakers having a higher overall mean and median VOT than Mohadin speakers. This visual distinction reinforces the statistical findings that social class significantly impacts VOT for female speakers in unstressed syllables.

The results from the conditional inference tree (ctree), Welch's Two Sample t-test, and boxplot analyses all align, confirming that social class significantly influences the Voice Onset Time (VOT) for female speakers in unstressed /d/ syllables. Each method consistently shows that female speakers from Town exhibit longer

mean VOTs (i.e., less retroflexion) compared to those from Mohadin. The ctree analysis highlighted social class as a primary factor, with a clear split between Town and Mohadin groups. This was further supported by the t-test results, which indicated a statistically significant difference in mean VOT between the two groups. The boxplot provided a visual confirmation, showing distinct mean VOT values and variability for each social class category. Overall, these complementary findings reinforce the conclusion that social class plays a crucial role in shaping VOT (and retroflexion) among female speakers in the SAIE community. The consistency across different analytical methods strengthens the reliability of the results and underscores the impact of social environment on phonetic variation.

4.3.3.2 Male results

The ctree analysis in Figure 4.9 shows that social class is a significant predictor of VOT for unstressed /d/ for male speakers, with a p-value of less than 0.001. The primary split in the tree occurs between the Mohadin and Town groups. Mohadin Speakers (Node 2): the mean VOT for male speakers from Mohadin is 35 ms, with 54 observations. This longer VOT suggests that male speakers from Mohadin articulate the /d/ sound with more delay and emphasis, reflecting the use of non-traditional (non-retroflex) speech patterns. Town Speakers (Node 3): the mean VOT for male speakers from Town is significantly shorter at 21 ms, with 60 observations. This indicates a quicker and less marked articulation of the /d/ sound, possibly reflecting a retention of traditional retroflexed speech patterns.

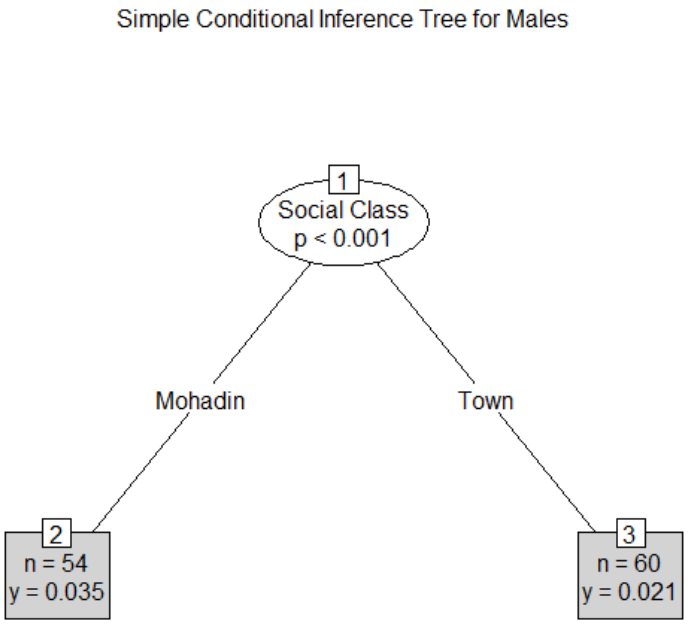

Figure 4.9 Conditional Inference Tree for Social Class and VOT in Male Speakers

The t-test results in Table 4.5 provide statistical evidence supporting the findings from the ctree analysis. The t-statistic is 3.8379, indicating a statistically significant difference in mean VOT between Mohadin and Town male speakers. The positive value reveals that the mean VOT for Mohadin speakers is higher than that for Town speakers as seen in the mean estimates; Mohadin's mean VOT is 35 ms and Town's VOT is

21 ms. The p-value is 0.0002962, well below the significance threshold of 0.05, confirming that the observed difference in mean VOT is statistically significant and not due to random variation. The t-test confirms that male speakers from Mohadin articulate the /d/ sound with less retroflexion than those from Town, reinforcing the trend observed in the ctree analysis.

Table 4.5 Welch's Two Sample t-Test Results for VOT by Social Class in Male Speakers

```
        Welch Two Sample t-test

data:  VOT by Social Class
t = 3.8379, df = 61.287, p-value = 0.0002962
alternative hypothesis: true difference in means between group Mohadin and group Town is not equal to 0
95 percent confidence interval:
 0.006345279 0.020147314
sample estimates:
mean in group Mohadin    mean in group Town
           0.03462963           0.02138333
```

The boxplot in Figure 4.10 visually represents the distribution of VOT values among male speakers based on social class. The boxplot for Mohadin speakers shows a broader interquartile range (IQR), indicating greater variability in VOT values. The mean VOT, represented by the yellow dot, is visibly higher than that of Town speakers. The presence of outliers reveals that while the majority of speakers exhibit a consistent pattern, there are individuals who produce the /d/ sound with much longer VOTs (i.e., with less retroflexion), reflecting personal linguistic styles. The boxplot for Town speakers shows a narrower IQR, indicating less variability in VOT values around the mean. This compact distribution suggests that male speakers in Town produce the /d/ sound with more uniformity, aligning with more traditional speech patterns. The shorter mean VOT in the Town group reinforces the finding that male speakers in this social class adopt a more traditional articulation style.

Figure 4.10 Boxplot of VOT by Social Class in Male Speakers of SAIE.

The results from the ctree, t-test, and boxplot analyses all align, confirming that social class significantly influences VOT for male speakers in unstressed /d/ syllables. The consistent findings across different analytical methods strengthens the conclusion that male speakers from Mohadin retain less traditional speech patterns, characterized by longer VOTs, compared to those from Town. This pattern suggests, somewhat counter-intuitively, that male speakers in Mohadin, while they may be more integrated into the community's cultural norms, are more influenced by external linguistic changes. In contrast, male speakers in Town, who are likely more exposed to diverse linguistic environments and social mobility, exhibit shorter VOTs (and thus more retroflexion), reflecting a shift away from more standardized speech patterns. The observed differences in VOT between Mohadin and Town male speakers highlight the role of social class in shaping linguistic behavior within the SAIE community. These findings provide valuable insights into how language variation and change occur in multilingual settings, influenced by social and environmental factors that mediate linguistic adaptation and retention. The boxplot in Figure 4.11 illustrates the distribution of Voice Onset Time (VOT) across different social class and gender groups for unstressed /d/ syllables. This visualization provides a comprehensive view of how VOT varies not only by social class but also by gender, highlighting the interaction between these two variables in shaping phonetic behavior.

Figure 4.11 Boxplot Showing VOT by Social Class and Gender in Unstressed /d/ Syllables

The mean VOT for female speakers from Mohadin is shorter compared to the other groups, as indicated by the yellow dot – and thus showing the most retroflexion for this group. The compact interquartile range (IQR) and a few outliers suggest a consistent production of shorter VOTs among most speakers, with minimal variation. Whereas female speakers from Town exhibit a longer mean VOT than their Mohadin counterparts. The wider IQR and presence of outliers indicate greater variability in VOT production, indicating that Town speakers may adopt different strategies in articulating the /d/ sound.

The mean VOT for male speakers from Mohadin is noticeably longer (and thus less-retroflexed) compared to other groups, reflecting a more standard articulation of the /d/ sound. The broader IQR and presence of outliers indicate significant variability, revealing that while most speakers adhere to a common pattern, there are individual deviations. Male speakers from Town, however, have a shorter mean VOT (more retroflexion) compared to Mohadin males, but not as much as the Mohadin females. The narrow IQR suggests a uniform production of shorter VOTs, possibly reflecting the retention of traditional (retroflexed) speech patterns. The comparison between male and female speakers reveals that, within Mohadin, male speakers generally have longer VOTs (less retroflexion) than female speakers, suggesting a strong rejection of traditional (retroflexed) speech patterns. In the Town group, the difference between male and female speakers is less pronounced, with both genders exhibiting relatively shorter VOTs. This indicates a

convergence around the traditional norm, potentially influenced however by some degree of increased inter-ethnolinguistic mobility and exposure to diverse linguistic norms.

4.4 Conclusion for the /d/ section

Overall, this section provides a comprehensive analysis of how stress, gender, and social class influence the Voice Onset Time (VOT) (and thus retroflexion) of /d/ in the South African Indian English (SAIE)-speaking community. The statistically significant effects of these variables on VOT highlight the dynamic nature of language use in the SAIE community, where phonetic variation is shaped by a complex interplay of individual, community, and societal factors. The observed patterns of VOT variation suggest that language change in the SAIE community is not uniform but is mediated by social variables such as gender and social class. Male speakers, particularly those in more traditional settings like Mohadin, appear to be the least resistant to phonetic change. In contrast, female speakers, especially those in Mohadin, exhibit signs of retaining traditional (retroflexed) speech patterns. This, in fact, reflects the opposite of broader sociolinguistic trends where women often lead linguistic change, particularly in contexts of social mobility and increased inter-ethnolinguistic contact (Labov, 1990) (Shin, 2013). By employing a combination of conditional inference trees (ctrees), Welch's Two Sample t-tests, and boxplots, this section has demonstrated the complex ways in which stress, gender, and social class shape phonetic variation and contribute to language change and maintenance in a multilingual context. The alignment of findings across different analytical methods reinforces the robustness of the results and provides a solid foundation for understanding the factors driving phonetic variation and change in this unique linguistic environment.

4.5 Results for /t/

this section focuses on the analysis of the /t/ data to investigate the effects of age, social class, and gender on Voice Onset Time (VOT). By examining these specific independent variables, we aim to gain deeper insights into how they influence the production of the voiceless /t/ consonant. To facilitate this analysis, as was done in the previous analysis, the dataset was first segmented to include only instances of the /t/ sound. Following this initial sub-setting, further divisions were made based on age, social class and gender. Separate subsets for Mohadin and Town were created, allowing us to examine the impact of gender within each social class independently. This approach enabled a more nuanced exploration of how VOT varies not only between social classes but also within each gender. For each variable—age, social class, and gender—we employed three complementary analytical methods: (truncated) conditional inference trees (ctrees), Welch's Two Sample t-tests and boxplots.

1. Conditional Inference Trees (ctrees) were constructed as a preliminary method for analyzing the relevant predictor.

2. Welch's Two Sample t-tests were conducted to statistically confirm the significance of observed differences in VOT values. By comparing mean VOT values between groups we were able to determine whether the observed differences are statistically significant or due to random variation.
3. Boxplots were used to visually illustrate the distribution of VOT values for each group. This helped identify any noticeable patterns or differences in VOT based on the independent variables.

4.5.1 The role of age

Figure 4.12 illustrates the results of the conditional inference tree analysis for VOT in relation to age in the /t/ data. The analysis reveals that age is a significant predictor of VOT, with a p-value of 0.002. The data is divided into two age groups. Node 2: speakers aged 25 years or younger exhibit a mean VOT of 42 ms, with 160 observations. This indicates that younger speakers tend to produce /t/ sounds with a relatively longer VOT. Node 3: in contrast, speakers over 45 have a mean VOT of 34 ms, with 145 observations. This shorter VOT suggests a tendency toward more retroflexion of the /t/ sound among older speakers. Thus, younger speakers tend to have a longer VOT for /t/ sounds compared to older speakers. As mentioned in section 2.3 and our hypothesis in chapter 1, it was anticipated that the younger generation would, overall, display less retroflexion and thus that the younger generation's VOT would be longer than that of the elder generation. Conversely, it was thus anticipated that the older generation would retroflex more and that since, as was previously indicated, a shorter VOT signals retroflexion, that this generation's VOT would be less.

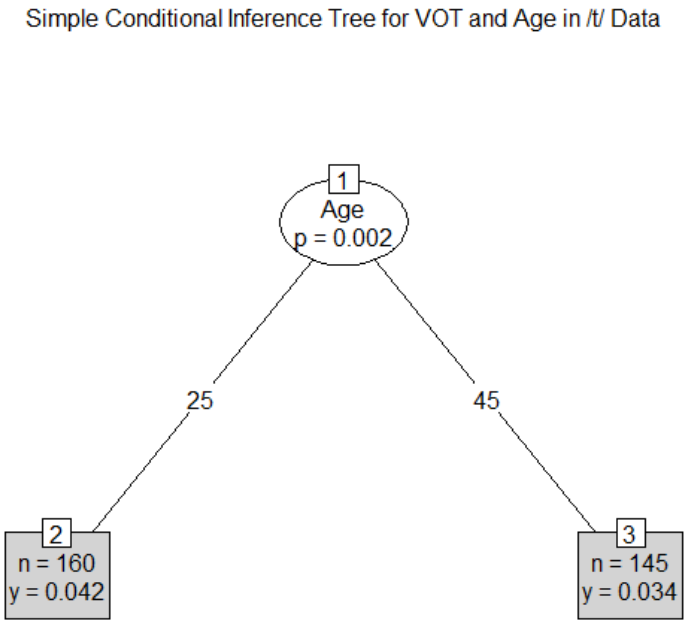

Figure 4.12 Conditional Inference Tree for Age and VOT in /t/ Data

The Welch Two Sample t-test in Table 4.6 provides statistical evidence for this difference. The t-test yields a t-value of 3.0903 which indicates a relatively large difference between the means of the two age groups

and a p-value of 0.002186 confirms that the difference in VOT observed in the ctree is statistically significant and not due to random variation. This p-value is below the standard significance threshold of 0.05, allowing us to conclude that age has a statistically significant effect on VOT in the /t/ data. The mean VOT for speakers aged 25 years or younger is 41.55 ms, while for those over 45 years, it is 33.85 ms. This means that, on average, the VOT is higher in speakers aged 25 years or younger compared to those over 45 years thus, indicating that younger speakers engage in less retroflexion that older speakers.

Table 4.6 Welch's Two Sample t-Test Results for VOT by Age

```
        Welch Two Sample t-test

data:  VOT by Age
t = 3.0903, df = 301.95, p-value = 0.002186
alternative hypothesis: true difference in means between group 25 and group 45 is not equal to 0
95 percent confidence interval:
 0.002797441 0.012606007
sample estimates:
mean in group 25 mean in group 45
      0.04155000       0.03384828
```

The boxplot in Figure 4.13 illustrates the distribution of VOT for the two age groups in the /t/ dataset, with the yellow dot indicating the mean VOT for each group. This visual representation supports the findings from both the ctree and Welch's Two Sample t-test, highlighting distinct patterns in VOT between the two age groups.

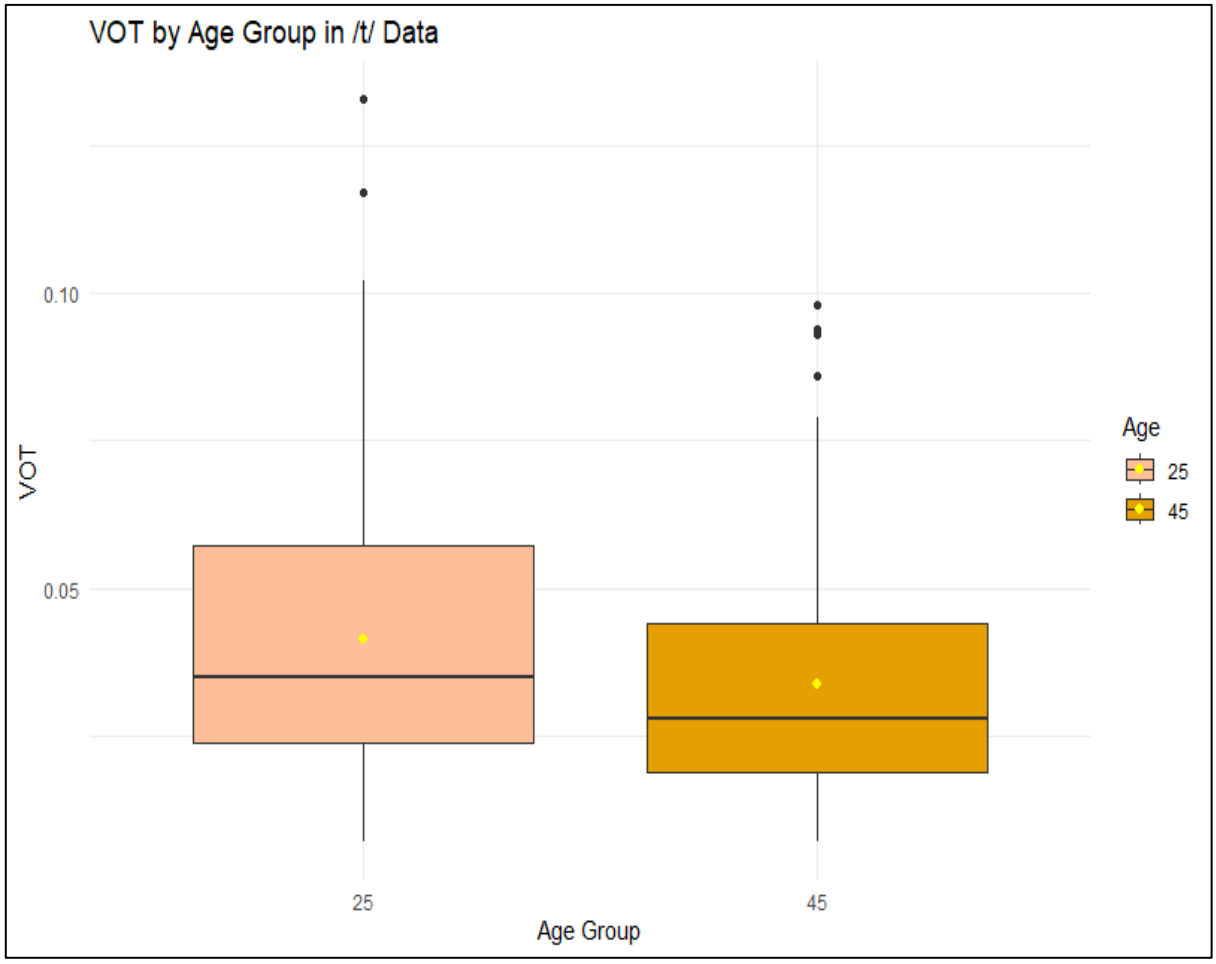

Figure 4.13 Boxplot Showing VOT by Age Group

For speakers aged 25 years or younger, the boxplot shows a mean VOT of 0.042 (42 milliseconds). The relatively wide interquartile range (IQR) and the presence of some outliers above the box indicate a greater degree of variability in VOT among younger speakers. This suggests that younger individuals employ a wider range of articulatory strategies when producing the /t/ sound, possibly due to influences such as social variability, style-shifting, or a broader range of speech registers. In contrast, the mean VOT for speakers older than 45 years is 34 ms (34 milliseconds), reflecting a more concise (comparatively retroflexed) articulation of the /t/ sound. The narrower IQR indicate a more consistent VOT among older speakers. This pattern may be indicative of a more stable and uniform speech style within this age group, with less variation in the production of the /t/ sound.

Overall, the alignment of results across different analytical methods—ctree, Welch's Two Sample t-test, and boxplot—strengthens the conclusion that age significantly impacts the production of the /t/ sound in SAIE, with younger speakers demonstrating a distinctive phonetic behavior compared to their older counterparts. The results indicate that generational differences play a crucial role in shaping phonetic variation within the SAIE community. Younger individuals may be adopting different phonetic norms, perhaps influenced by social changes, increased inter-ethnolinguistic contact, or shifts in language identity.

These findings align with broader sociolinguistic patterns, where younger speakers often lead linguistic change.

4.5.2 The role of social class

The analysis of social class in relation to Voice Onset Time (VOT) for the /t/ sound among speakers aged 45 and above reveals significant differences between the Mohadin and Town groups using location as a proxy for social class. The conditional inference tree in Figure 4.14 demonstrates that social class is a major factor influencing VOT in this demographic. The split in the ctree occurs, based on social class, with a p-value of less than 0.001, indicating a highly significant distinction in VOT between the two social classes.

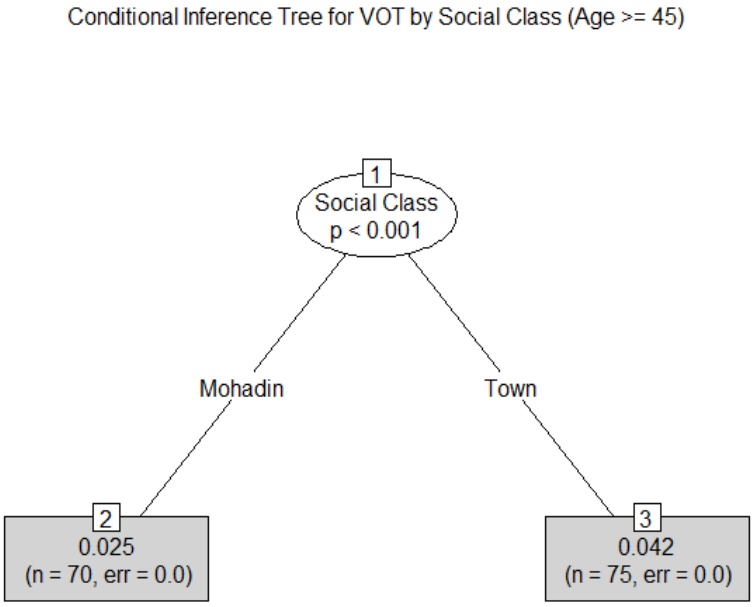

Figure 4.14 Conditional Inference Tree for Social Class and VOT

The ctree model shows that speakers from Mohadin have a mean VOT of 25 ms with 70 observations, while those from Town exhibit a higher mean VOT of 42 ms with 75 observations. This shows that speakers from the Town group articulate the /t/ sound with a longer VOT, reflecting a less retroflexed articulation compared to those from Mohadin. This difference in VOT indicates varying levels of adherence to retroflexion, where speakers from Mohadin, a more traditional setting, retain more retroflexed forms, while those from Town adopt less retroflexed or non-retroflexed variants.

The Welch's Two Sample t-test, in Table 4.7, provides further statistical confirmation of the significant difference in VOT between the two social class groups. The t-test yields a t-value of -5.4882 and a p-value of 2.562e-07, which is well below the standard significance threshold of 0.05. This confirms that the observed difference in mean VOT between Mohadin and Town speakers is not due to random variation but is a statistically significant effect of social class on VOT. This all supports the hypothesis that social class

impacts the phonetic realization of the /t/ sound, with Town speakers demonstrating a longer VOT (and thus less retroflexion).

Table 4.7 Welch's Two Sample t-Test Results for VOT by Social Class

```
        Welch Two Sample t-test

data:  VOT by Social Class
t = -5.4882, df = 111.83, p-value = 2.562e-07
alternative hypothesis: true difference in means between group Mohadin and group Town is not equal to 0
95 percent confidence interval:
 -0.02230537 -0.01047178
sample estimates:
mean in group Mohadin    mean in group Town
           0.02537143            0.04176000
```

The boxplot, Figure 4.15, visually represents the distribution of VOT values for the Mohadin and Town groups in the over 45 sub-group. It clearly shows that Town speakers have a broader spread of VOT values, with a higher mean indicated by the yellow dot. This wider interquartile range suggests greater variability in the articulation of the /t/ sound among Town speakers, reflecting the influence of different social and linguistic norms. In contrast, the Mohadin group displays a more compact distribution around a lower mean VOT, indicating more uniform speech patterns likely adhering to traditional retroflexed pronunciations.

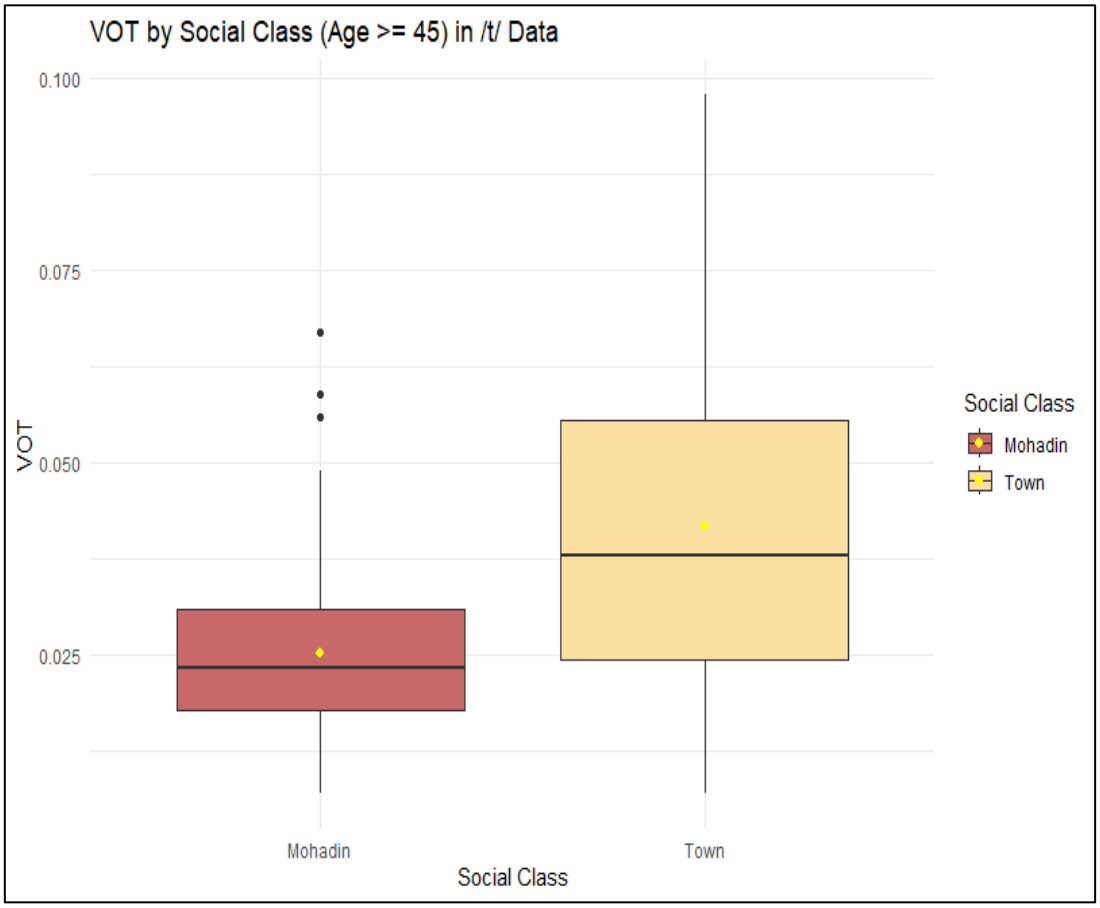

Figure 4.15 Boxplot Showing VOT by Social Class

The combined results of the ctree, t-test, and boxplot analyses demonstrate that social class significantly influences the VOT of the /t/ sound among speakers aged 45 and above. The longer VOT in the Town group suggests a shift away from traditional retroflexed pronunciations, possibly due to increased exposure to and adoption of more standard or prestige linguistic variants. This aligns with the broader sociolinguistic trend where social mobility and interaction with other linguistic communities influence language variation and change. In contrast, the shorter and more uniform VOT in the Mohadin group indicates a stronger retention of traditional speech patterns, highlighting the role of social class in maintaining linguistic features such as retroflexion in the SAIE community.

4.5.3 The role of gender

The analysis of the /t/ sound in speakers aged 45 and above reveals a nuanced interaction between social class and gender. The truncated conditional inference tree (Figure 4.16) highlights that both social class and gender significantly influence Voice Onset Time (VOT), but their effects manifest differently in the Mohadin and Town communities. Social class serves as the primary factor driving the initial split in VOT, while gender further differentiates the VOT values within each social class. This layered interaction indicates that, although social class sets the broad patterns of phonetic variation, gender adds a secondary, yet crucial, level of influence. The distinct phonetic patterns observed in each community reflect how gender roles and social mobility shape language use, with gender acting as a key variable in how /t/ is articulated across varying social contexts. Therefore, the results for Mohadin and Town will be presented separately to illustrate these unique gender-based patterns within each sub-community (social-class).

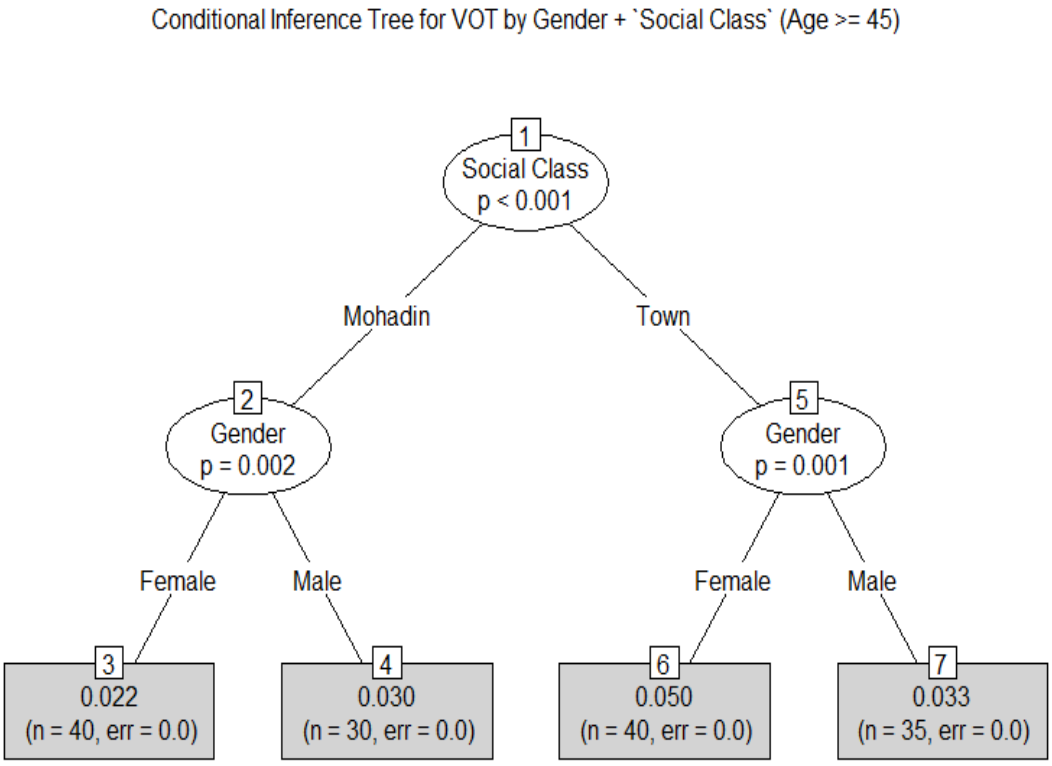

Figure 4.16 Conditional inference tree showing the interaction between social class and gender on Voice Onset Time (VOT) for the /t/ sound in speakers aged 45 and above

4.5.3.1 Mohadin results

The conditional inference tree (Figure 4.17) shows a significant split based on gender (p = 0.002) among the Mohadin group. Female speakers have a mean VOT of 22 ms and 40 observations, while male speakers have a higher mean VOT of 30 ms and 30 observations. This indicates that males in Mohadin articulate the /t/ sound with a longer VOT compared to females, suggesting a deliberate move away from retroflexion.

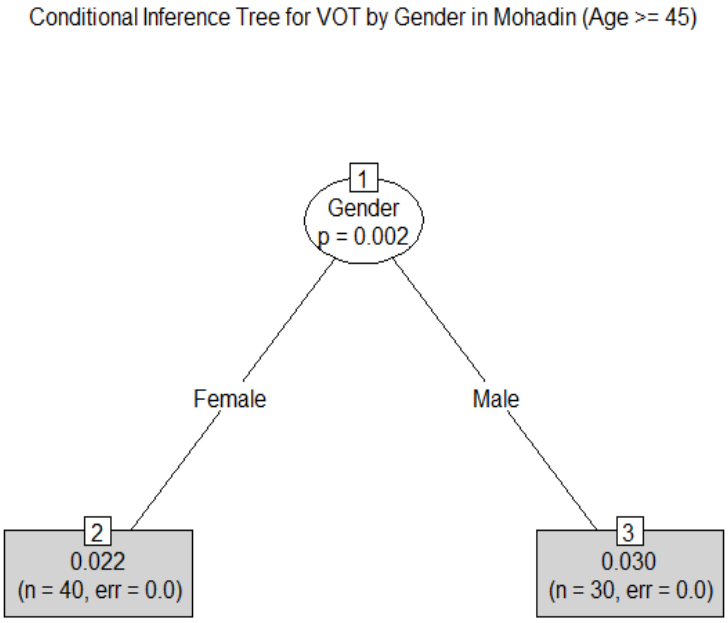

Figure 4.17 Conditional Inference Tree for Gender and VOT in /t/ Data.

These findings are corroborated by the results of Welch's Two Sample t-test (Table 4.8). The t-test yields a t-value of -3.0623, indicating a statistically significant difference in mean VOT between male and female speakers, with a p-value of 0.0036. This low p-value suggests that the observed variation in VOT is highly unlikely to be due to random chance. The mean VOT for male speakers is 30 milliseconds, while for female speakers, it is 22 milliseconds, aligning with the results from the ctree analysis. This confirms that over-45 male speakers in Mohadin produce the /t/ sound with less retroflexion than their female counterparts.

Table 4.8 Welch's Two Sample t-Test Results for VOT by Gender in Mohadin speakers

```
        Welch Two Sample t-test

data:  VOT by Gender
t = -3.0623, df = 47.681, p-value = 0.003605
alternative hypothesis: true difference in means between group Female and group Male is not equal to 0
95 percent confidence interval:
 -0.014192392 -0.002940942
sample estimates:
mean in group Female   mean in group Male
          0.02170000           0.03026667
```

The boxplot in Figure 4.18 further supports these findings by visually demonstrating the distribution of VOT values for both genders. The yellow dots, indicating the mean VOT for each group, show a clear distinction between males and females. Male speakers exhibit a broader range of VOT values, which could signify greater variability in their speech patterns. In contrast, female speakers display a narrower range of VOT values, suggesting a trend towards shorter VOTs and a greater focus on the use of retroflexion.

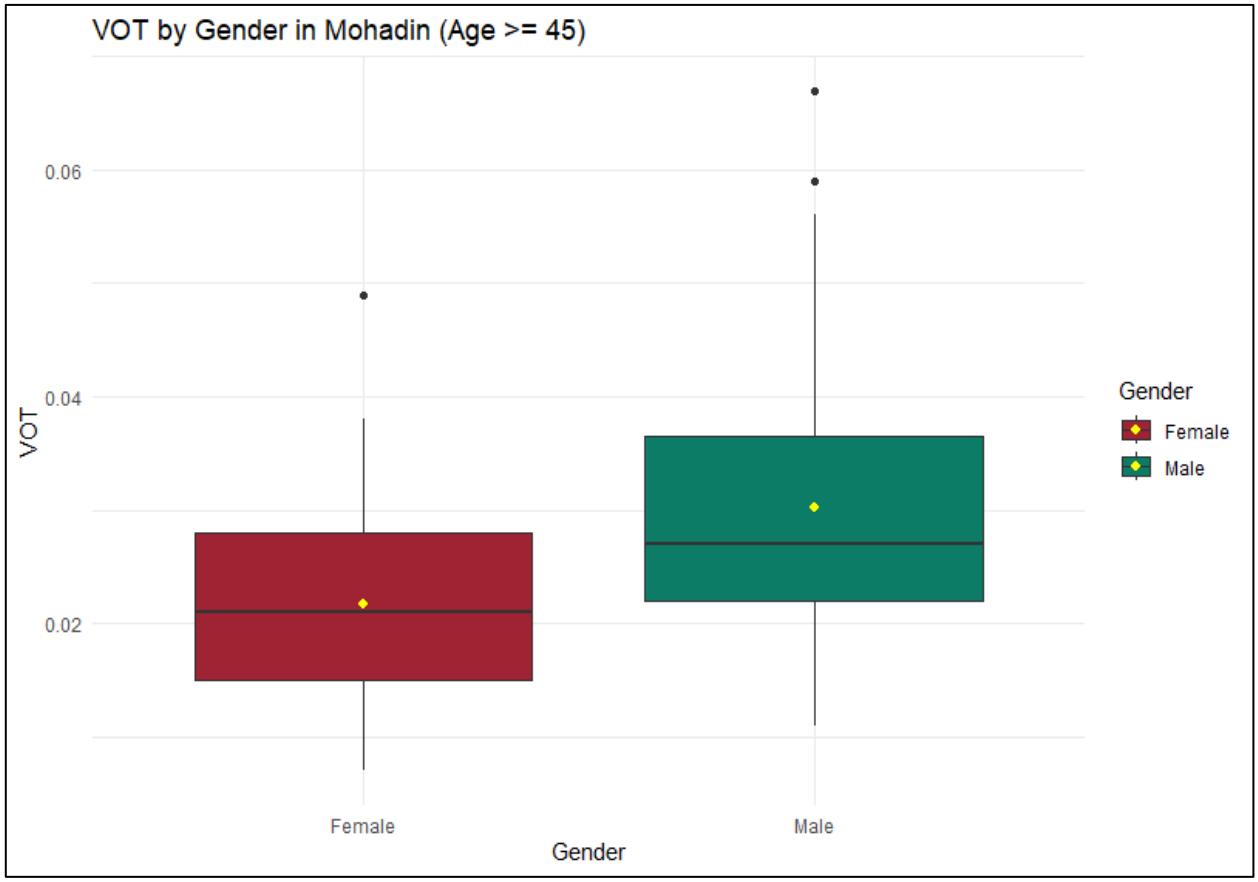

Figure 4.18 Boxplot Showing VOT by Gender in Mohadin speakers

The boxplot also highlights a few outliers for both groups. While the female group has a couple of outliers closer to the main distribution, indicating less extreme variation in their articulation patterns, the male group shows a few extreme values that suggest some male speakers produce the /t/ sound with a much longer VOT. This could be indicative of a strong resistance to retroflexion among certain individuals.

Overall, the results from the conditional inference tree (ctree), Welch's Two Sample t-test, and boxplot analyses align consistently. These findings confirm that in the Mohadin community, male speakers are less likely to retain retroflexion and thus more likely to produce a longer VOT for the /t/ sound, reflecting a move away from traditional speech patterns. Conversely, female speakers demonstrate a trend towards shorter VOTs, which indicate a retention of traditional (retroflexed) articulation patterns.

4.5.3.2 Town

The conditional inference tree (Figure 4.19) highlights a significant split based on gender ($p = 0.001$) among speakers in Town. Female speakers exhibit a mean VOT of 50 ms, with 40 observations, while male speakers show a shorter mean VOT of 33 ms, with 35 observations. This indicates that over-45 female speakers in Town articulate the /t/ sound with a considerably longer VOT compared to male speakers, suggesting a more standard articulation. This pattern may reflect a greater adoption of formal speech norms or increased linguistic variability among females in this social context.

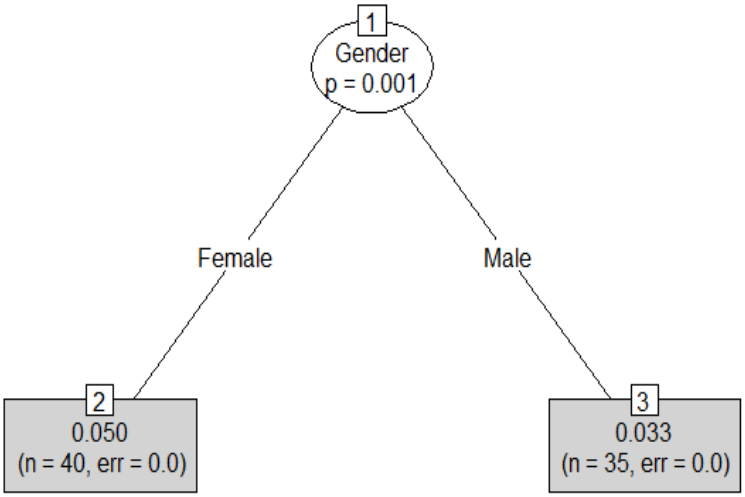

Figure 4.19 Conditional Inference Tree for Gender and VOT in /t/ Data (among over 45s in Town)

The results are further supported by Welch's Two Sample t-test (Table 4.9). The t-test yields a t-value of 3.5174, demonstrating a statistically significant difference in mean VOT between male and female speakers, with a p-value of 0.0007. This very low p-value indicates that the observed variation in VOT between the two genders is highly unlikely to be due to random chance. The mean VOT for female speakers is 50 ms, while for male speakers, it is 33 ms, which aligns with the findings of the ctree analysis. This confirms that over-45 female speakers in Town tend to produce the /t/ sound with a more extended VOT (and thus far less retroflexion).

Table 4.9 Welch's Two Sample t-Test Results for VOT by Gender in Town speakers

```
        Welch Two Sample t-test

data:  VOT by Gender
t = 3.5174, df = 70.621, p-value = 0.0007664
alternative hypothesis: true difference in means between group Female and group Male is not equal to 0
95 percent confidence interval:
 0.007368291 0.026660280
sample estimates:
mean in group Female   mean in group Male
          0.04970000           0.03268571
```

The boxplot in Figure 4.20 visually supports these findings by illustrating the distribution of VOT values for both genders.

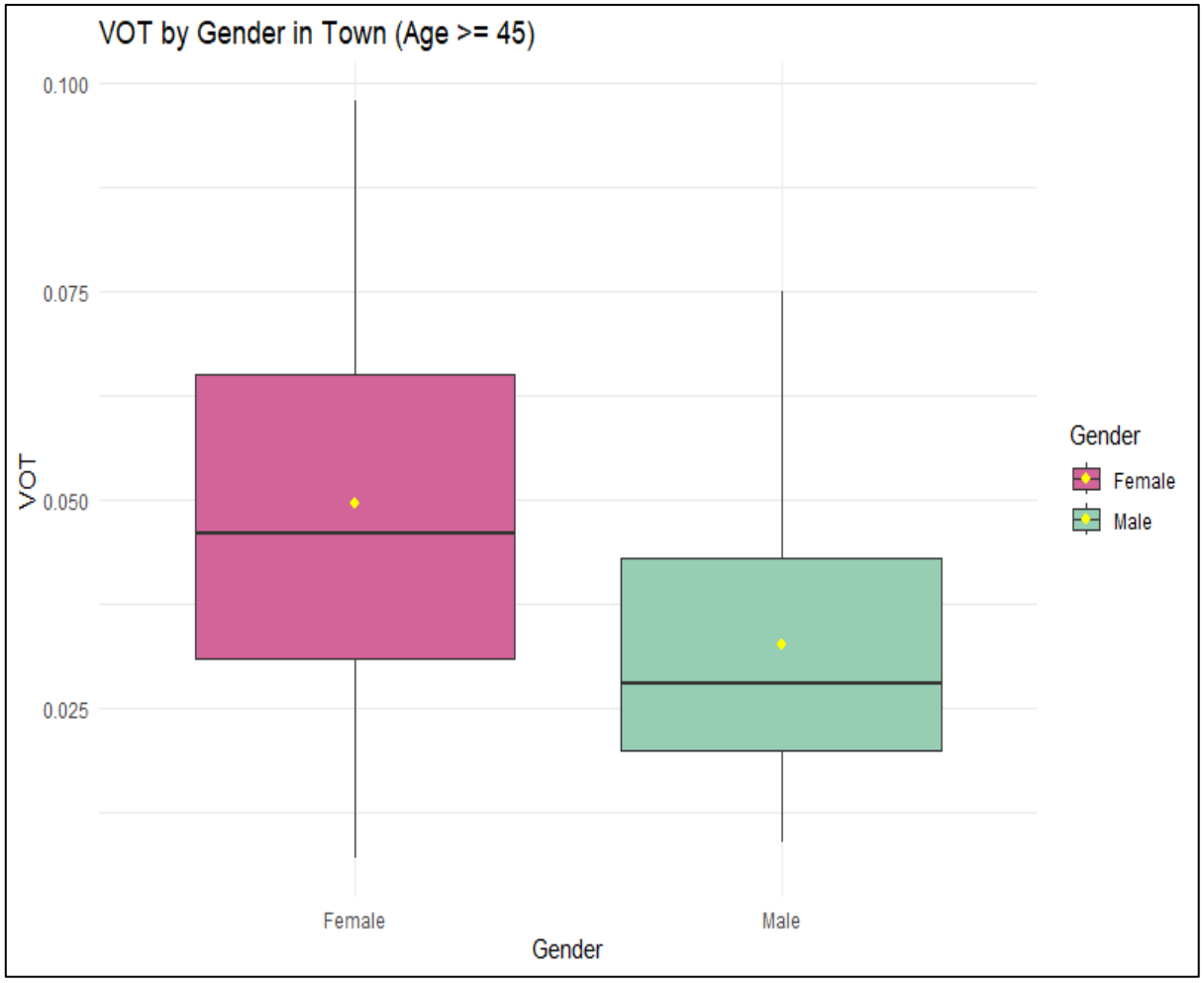

Figure 4.20 Boxplot Showing VOT by Gender in Town speakers

The yellow dots, representing the mean VOT for each group, show a clear distinction between males and females. Female speakers display a broader range of VOT values, which may indicate greater variability in their speech patterns or an increased tendency towards hyper-articulation, possibly as a result of a more formal or prestige-driven speech style. Male speakers, in contrast, show a more compact range of VOT values, suggesting a more uniform and less marked articulation pattern. The relatively even distribution of VOT values for both genders, without visible outliers, suggests that the majority of speakers in both groups adhere to consistent patterns of articulation. The results from the conditional inference tree (ctree), Welch's Two Sample t-test, and boxplot analyses all align, confirming that in the Town community, female speakers exhibit a significantly longer VOT (and thus far less retroflexion) for the /t/ sound compared to male speakers. This pattern may reflect a shift towards more marked or formal speech patterns among females, possibly influenced by greater social mobility or exposure to diverse linguistic environments. Conversely, male speakers in Town maintain shorter VOTs, indicating a less marked articulation pattern and possibly a retention of more traditional speech norms. These findings highlight the nuanced role of gender in shaping phonetic variation within the Town community.

The boxplot in Figure 4.21 provides a comprehensive view of the interaction between gender and social class in shaping the Voice Onset Time (VOT) of the /t/ sound among speakers aged 45 and above across both Mohadin and Town communities. This visualization allows for a direct comparison of VOT values, highlighting distinct patterns based on gender and social class. The mean VOT for female speakers in Mohadin is approximately 25 milliseconds, with a relatively compact interquartile range (IQR). This consistency suggests a stable community norm for articulation, potentially reflecting traditional speech patterns with more emphasis on retroflexion. The few outliers present indicate slight deviations in VOT among some speakers but not to an extreme degree. In contrast, female speakers in Town exhibit a significantly higher mean VOT of around 50 milliseconds. This marked difference suggests that female speakers in Town use a more formal or deliberate speech style (with far less retroflexion), possibly influenced by greater social mobility and exposure to diverse linguistic environments. The broader IQR and the presence of outliers suggest a more variable speech pattern, reflecting a wider range of articulation strategies.

Figure 4.21 Boxplot of Voice Onset Time (VOT) by Gender and Social Class for Speakers Aged 45 and Above in Mohadin and Town Communities.

The significant disparity between the mean VOTs of female speakers in Mohadin and Town indicates that social class heavily influences how females articulate the /t/ sound (at least in the older group). Female speakers in Town, with their higher and more variable VOTs, appear to be more influenced by factors

associated with prestige and formal speech norms. Conversely, the shorter and more consistent VOTs among older Mohadin females suggest a retention of traditional speech patterns, with less exposure to or adoption of non-community-specific linguistic influences.

Male speakers in Mohadin exhibit a mean VOT of 30 milliseconds, with a wider IQR compared to their female counterparts. This variability indicates that while the male speakers generally adhere to community-specific norms, there is a broader range of articulation styles. The presence of extreme outliers suggests that some male speakers place a strong emphasis on avoiding retroflexion. Male speakers in Town, however, have a slightly higher mean VOT of approximately 33 milliseconds, which is, however, shorter and more compact compared to their female counterparts in Town but slightly higher than their Mohadin equivalents. The relatively narrow IQR indicates that these speakers maintain a more uniform speech pattern. The lack of extreme outliers in this group suggests a more cohesive speech norm with less deviation from the community standard. While both Mohadin and Town male speakers show shorter VOTs (and thus more retroflexion) compared to Town female speakers, the slightly higher mean VOT of both male groups in comparison with the Mohadin female group shows that the latter group (as was the case with /d/) shows the most retroflexion. Town males, with their slightly higher and more consistent VOTs, may be more influenced by external linguistic norms or a desire to align more closely with perceived standard or prestige forms. The results thus indicate that while older Town speakers, particularly females, are more likely to adopt speech patterns associated with broader societal norms, older Mohadin speakers, especially females, retain a stronger attachment to traditional speech styles. This suggests a complex interaction between social class, gender, (as well as age) and linguistic behavior, with different groups within the SAIE community responding to social pressures and linguistic environments in varied ways.

4.6 Conclusion for the /t/ section

The analysis of the /t/ sound in the SAIE community has revealed how age, social class, and gender collectively influence Voice Onset Time (VOT) patterns. The findings from the conditional inference trees (ctree), Welch's Two Sample t-tests, and boxplots consistently demonstrate that these variables significantly impact the production of the /t/ phoneme is realized, shaping distinct phonetic behaviors among speakers. Age emerged as a primary factor influencing VOT, with younger speakers (aged 25 and below) exhibiting longer VOTs (and thus less retroflexion) compared to older speakers (aged 45 and above). This generational difference aligns with the hypothesis that younger speakers are less likely to use retroflexion, leading to longer VOTs, while older speakers, who may retain more traditional speech patterns, show shorter VOTs indicative of retroflexion. Social class further refines these patterns, particularly among speakers aged 45 and above. The ctree analysis highlighted a stark division between Mohadin and Town speakers, with Town speakers displaying significantly longer VOTs, indicative of less retroflexion, however, there is a difference from Mohadin in that in Town, longer VOT appears to be associated with a more standard articulation, particularly among over-45 female speakers. This suggests

that the linguistic norms governing VOT differ between Mohadin and Town. While in Mohadin, a shorter VOT indicates the retention of traditional retroflexion, in Town, a longer VOT may instead reflect increased exposure to standard English norms or greater linguistic variability among female speakers in formal settings. The interaction between social class and gender also revealed interesting subtleties in the data, with females again playing an important role both in the retention of traditional (Mohadin females) and the assimilation to non-traditional (Town females) norms. This highlights a complex interaction between gender, place of residence, and shifting linguistic norms across different communities.

4.7 GOOSE vowel

The results presented in this section focus on formant values (F1, F2) as indicators of vowel fronting or backing. Conditional inference tree (ctree) analysis was used to determine the most significant predictors of variation, while Welch's t-tests were conducted to compare mean differences between social groups. The findings below highlight key trends in GOOSE-fronting, its social distribution, and potential phonetic conditioning factors.

4.7.1 Overall patterns of interactions (ctree analysis)

Figure 4.22 presents a conditional inference tree that examines the relationship between independent variables (allophone, gender, age, and social class) and the dependent variable, which in this case is the (normalized) F2 of the GOOSE vowel (i.e., how front or back the vowel is in acoustic vowel space). The tree identifies the specific conditions and criteria that influence the pronunciation of the GOOSE vowel.

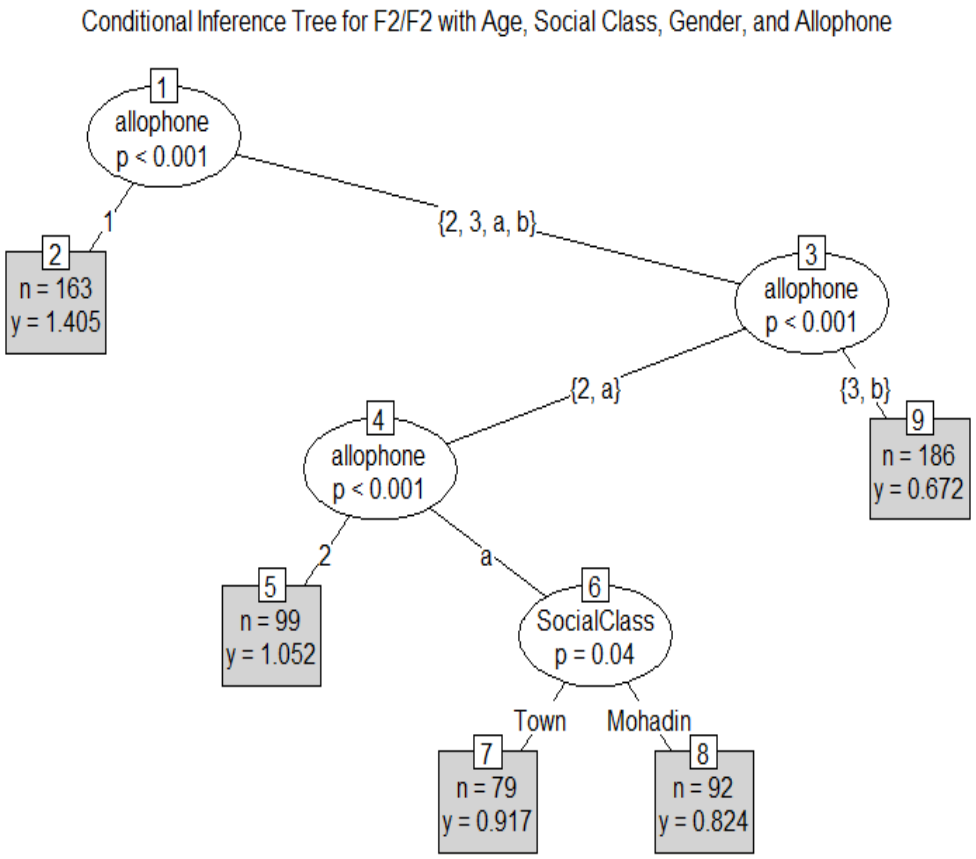

Figure 4.22 Conditional Inference Tree for F2/F2 with the independent variables

The most significant predictor of F2-value in the data is the "allophone" (i.e., the phonetic context in which the GOOSE vowel is found, according to Mesthrie, 2010). The consistently low p-values (below 0.001) indicate a strong statistical relationship between the allophone variable and the F2-value of the GOOSE vowel. The most prominent split in GOOSE vowel fronting occurs at Node 1, distinguishing the preceding consonant /j/ (category 1) from other GOOSE allophones (categories 2, 3, a, and b). This distinction aligns with expectations based on previous studies, including Mesthrie's (2010) work, which identified the /j/ environment as a significant factor in the fronting of GOOSE vowels. The split at Node 1, with a p-value of less than 0.001, indicates a substantial difference in normalized F2 values associated with this specific allophone, highlighting the distinctive phonetic behavior of 'J-words' in the South African Indian English (SAIE) context.

It is worth noting that, unlike this study, Mesthrie (2010) excluded the category where /r/ and /l/ precede a GOOSE vowel (category a) due to known acoustic complexities and their effect on F2 readings. Despite this, the inclusion of category ‘a’ in the present analysis has proven valuable, as it reveals significant effects of social class on GOOSE fronting, which might otherwise have been overlooked. Thus, another significant split occurs at Node 6, where social class differentiates Town and Mohadin speakers. The ctree analysis

indicates that social class significantly influences GOOSE fronting, with Town speakers displaying higher normalized F2 values than Mohadin speakers.

This finding aligns with sociophonetic literature, suggesting that Town speakers may be more inclined to adopt fronted variants of the vowel. The absence of splits based on gender and age suggests that these variables did not significantly contribute to the observed variation in GOOSE-Fronting within this dataset. These results support the initial hypotheses concerning the influence of phonetic environments and social class on GOOSE-Fronting. The distinct patterns observed in the ctree analysis provide strong evidence that social context and specific phonetic environments play a crucial role in shaping the pronunciation of the GOOSE vowel in the SAIE community.

4.7.2 The role of the different allophones of GOOSE

As discussed earlier, the primary determinant of (normalized) F2-value in the dataset is "allophone." The analyzed allophones include: (a) /r/ and /l/ before a GOOSE vowel, (b) dark-/l/ after a GOOSE vowel, (1) preceding consonant /j/, (2) preceding coronals (e.g., "see"), and (3) preceding non-coronals (e.g., "boot"). Among these, the most significant is the GOOSE vowel preceded by the consonant /j/ (Allophone {1}), which has a y-value of 1.405. This significantly higher y-value indicates that this allophone is considerably more fronted compared to others, highlighting its distinctive phonetic behavior in the dataset. The ctree further categorizes the allophones into two main groups: GOOSE vowels preceded by coronals or /r/ and /l/ (Allophone {2, a}), and GOOSE vowels preceded by non-coronals or followed by dark /l/ (Allophone {3, b}). The second group, Allophone {3, b}, is where one would expect very back (low F2) values, as reflected in the ctree analysis, with the lowest y-value of 0.672. This observation is consistent with section 3.3.2 and literature on GOOSE-Fronting (Mesthrie, 2010), which highlights that non-fronting environments, such as those involving non-coronal contexts and dark /l/, typically result in retracted vowel qualities. The coarticulatory influence of these segments constrains fronting, leading to lower F2 values that are characteristic of a back-vowel quality. For Allophone {2, a}, which includes GOOSE vowels preceded by coronals or /r/ and /l/, a further split is observed into 2 (coronals) and ‘a’ (/r/ or /l/), with the later ‘a’ then being split in terms of social class, distinguishing between Town and Mohadin. This indicates that within this ‘a’ subset, social class has a significant effect on the fronting of GOOSE vowels. Overall, the significant role of allophone in predicting F2-value, particularly in the context of the fronting effect observed with the preceding /j/, is strongly supported by the data. This finding reinforces the well-established understanding that the /j/ environment is a prime fronting condition in words such as *knew*, *use*, and *dew*.

4.7.3 The role of social class

For this analysis, a subset of the data was created specifically for allophone 'a' (i.e., /r/ and /l/ before a GOOSE vowel) to focus on the effects of social class on the (normalized) F2 value. This subset allows for a more detailed examination of how social class influences the fronting of this particular GOOSE allophone.

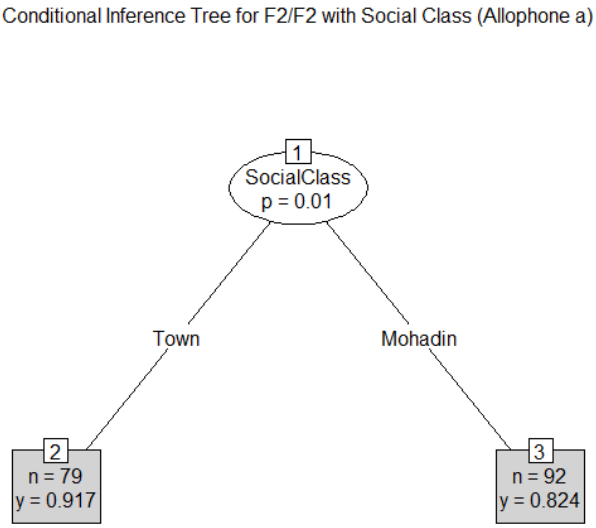

Figure 4.23 Conditional Inference Tree for F2/F2 with Social Class (Allophone a)

The ctree identified social class as significant, but its influence might vary across different allophones. The conditional inference tree (Figure 4.23) demonstrates that social class is a significant predictor of F2/F2 (i.e., normalized) values for allophone 'a', with a p-value of 0.01. Speakers from Town exhibit a higher mean F2/F2 value (0.917), indicating a more fronted articulation compared to those from Mohadin, whose mean F2/F2 value is 0.824. This distinction aligns with expectations that Town speakers, exposed to broader linguistic influences, would display more fronted pronunciations.

Welch's Two Sample t-test was conducted to statistically validate the differences in mean F2 values between Mohadin and Town speakers. The results, presented in Table 4.10, show a t-value of -2.6026, indicating a notable difference in mean F2/F2 values between the two social class groups. The p-value of 0.01011 is below the conventional significance threshold of 0.05, confirming that the observed difference in mean F2/F2 values is statistically significant and unlikely to be due to random variation.

Table 4.10 Welch Two Sample t-test Results for F2/F2 by Social Class (Allophone 'a')

```
        Welch Two Sample t-test

data:  F2/F2 by SocialClass
t = -2.6026, df = 162.4, p-value = 0.01011
alternative hypothesis: true difference in means between group Mohadin and group Town is not equal to 0
95 percent confidence interval:
 -0.16332419 -0.02240503
sample estimates:
mean in group Mohadin    mean in group Town
            0.8238696             0.9167342
```

The boxplot in Figure 4.24 visually demonstrates that Town speakers have a higher mean F2/F2 value and exhibit a broader range of fronting compared to the more retracted and uniform F2 values observed among Mohadin speakers. The presence of outliers in the Mohadin group suggests some variability in articulation possibly due to individual speaker differences or varying degrees of exposure to external linguistic influences. In contrast, Town speakers show a more consistent pattern of fronting, which aligns with social pressures towards standardization and prestige speech variants.

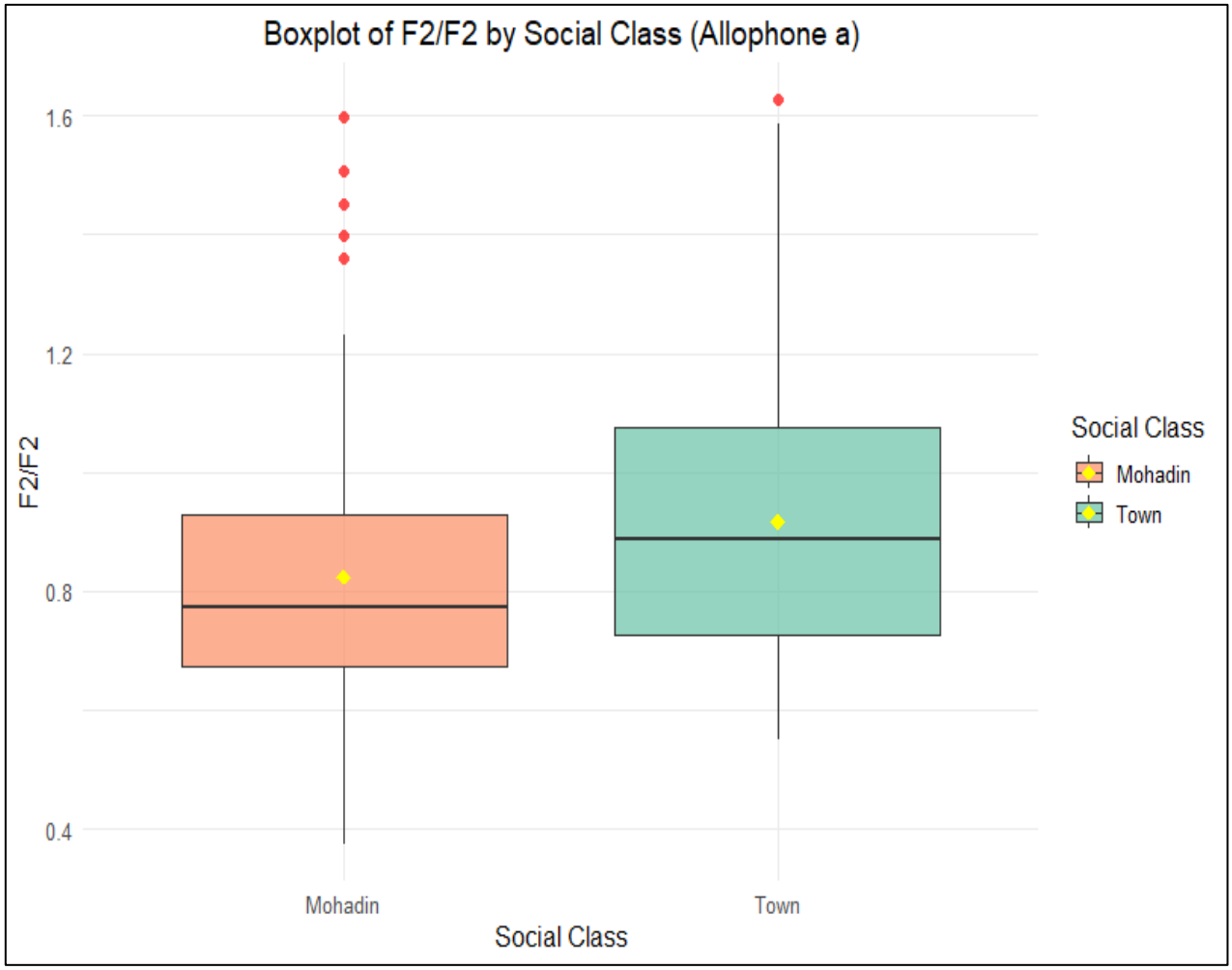

Figure 4.24 Boxplot of F2/F2 by Social Class (Allophone a)

The combined results from the conditional inference tree, Welch's Two Sample t-test, and boxplot analyses underscore the significant impact of social class on the articulation of GOOSE allophone 'a.' The higher F2/F2 values among Town speakers indicate a greater degree of fronting, likely reflecting accommodation to more standardized or prestige variants. Conversely, the lower and more consistent F2/F2 values among Mohadin speakers suggest a retention of traditional or community-specific phonetic features. These findings emphasize the nuanced role of social class in shaping the pronunciation of the GOOSE vowel within the SAIE community, with Town speakers exhibiting a tendency towards more fronted articulation compared to their Mohadin counterparts, but within a very specific linguistic context.

4.7.4 Further Analysis of GOOSE-Fronting

Table 4.11 provides an overview of the normalized F1 and F2 mean values and their respective standard deviations (SD) for speakers from the Mohadin and Town social classes. As discussed in Chapter 3.5, the normalized F2 values indicate the degree of vowel frontness, with higher F2 values corresponding to more fronted vowels (see Figure 3.6 in this regard).

Table 4.11 Summary table of the mean normalized F1 and F2 values (with standard deviations) for GOOSE across Mohadin and Town social classes

SocialClass	N	F1/F1 Mean (SD)	F2/F2 Mean (SD)
Mohadin	300	0.832 (0.122)	0.912 (0.385)
Town	319	0.859 (0.163)	1.044 (0.417)

The Town group exhibits a higher (normalized)F2 mean value compared to the Mohadin group, indicating a greater degree of fronting among Town speakers. Specifically, the mean (normalized) F2 value for Mohadin is 0.912, with a standard deviation of 0.385, whereas for Town, the mean value is higher at 1.044, with a larger standard deviation of 0.417. These findings align with the results from the ctree analysis, where social class was identified as a significant predictor of F2 values in allophone 'a'. The higher F2 values among Town speakers suggest a greater tendency towards fronted articulation, which could be attributed to increased exposure to standard or prestige linguistic variants as mentioned in section 2.2. Conversely, Mohadin speakers appear to retain more traditional or community-specific pronunciation patterns, as evidenced by their lower F2 values. The relatively large standard deviations for F2, particularly in the Town group, indicate a higher degree of variability in vowel fronting among Town speakers. This variation could be influenced by multiple factors, such as differing degrees of linguistic accommodation or varying levels of adherence to prestige norms within the community.

To complement the statistical analysis, Figure 4.25 provides a visual representation of the vowel formant data. This sociophonetic plot illustrates the mean positions of the normalized F1 and F2 formants for each vowel, categorized by social class, with ellipses representing one standard deviation around these means. The plot clearly shows the positional differences in vowel articulation between the Mohadin (red) and Town (blue) speakers. The x-axis (normalized F2) represents the frontness or backness of the vowel sound. Lower values indicate a more back vowel, while higher values indicate a more front vowel.

The y-axis (normalized F1) represents the height of the vowel sound. Lower values indicate a higher vowel, while higher values indicate a lower vowel. Particularly, the GOOSE vowel for Town speakers (blue asterisk) is positioned further to the left, indicating greater fronting. The spread of the ellipse indicates some variability, but the central tendency is clearly towards a fronted position. With respect to the Mohadin speakers (red asterisk), the graph shows the red asterisk more to the right, representing a more back GOOSE vowel and thus indicating less GOOSE-Fronting for this social class. The ellipse's spread shows that while there's variability, the mean position remains more back compared to the Town class.

This visual evidence corroborates the statistical findings from Table 4.11 above as well as the ctree and t-test conducted earlier, highlighting the sociolinguistic variation in vowel pronunciation. The data emphasizes that the Town class has a significantly more fronted GOOSE vowel than the Mohadin class, as

indicated by the higher F2 values and the positioning on the graph. The focus on F2 as the key predictor aligns with the visual representation, making it evident that social class influences the fronting of the GOOSE vowel. The Town speakers' tendency to front the GOOSE vowel more than the Mohadin speakers highlights notable sociophonetic variation within the community and this confirms the hypothesis that L1-SAIE speakers who have moved into the main (previously white-only) town of Potchefstroom are fronting their GOOSE vowel more in comparison to those still living in the Indian community of Mohadin.

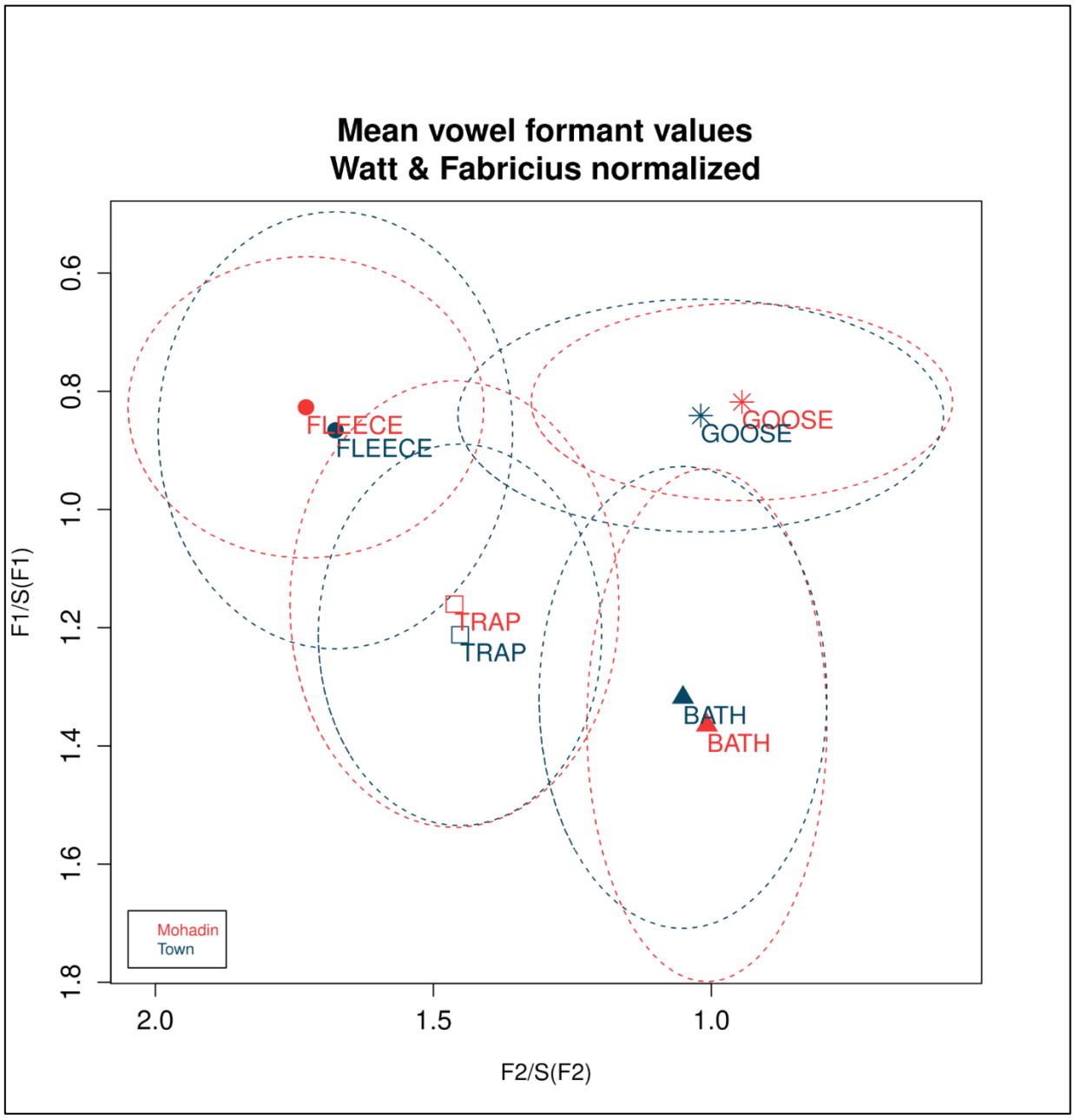

Figure 4.25 Vowel Space Plot for Mohadin and Town Speakers

4.7.5 The role of age

In this section, we investigate the effect of age on the (normalized) F2 values of the GOOSE vowel to determine whether age plays a significant role in influencing vowel fronting. Although the ctree analysis did not identify age as a significant predictor, further statistical testing and visual representation were carried out to assess any subtle differences between age groups.

Table 4.12 Welch Two Sample t-test for normalized F2 by Age

```
        Welch Two Sample t-test

data:  F2/F2 by Age
t = 1.8548, df = 611.17, p-value = 0.0641
alternative hypothesis: true difference in means between group 25 and group 45 is not equal to 0
95 percent confidence interval:
 -0.003543469  0.124118244
sample estimates:
mean in group 25 mean in group 45
       1.0088307        0.9485433
```

Welch's Two Sample t-test was conducted to compare the mean (normalized) F2 values between two age groups: younger speakers (aged 25 and below) and older speakers (aged 45 and above). The results of this test are summarized in Table 4.12. The mean F2 value for the younger age group is 1.0088, while for the older age group, it is slightly lower at 0.9485. The t-test yielded a t-value of 1.8548 with 611.17 degrees of freedom (df) and a p-value of 0.0641, which is above the conventional significance level of 0.05. The null hypothesis for this t-test posits that there is no significant difference in the mean (normalized) F2 values between the two age groups. Given the p-value, we fail to reject the null hypothesis, suggesting that the difference in vowel fronting between younger and older speakers is not statistically significant. Although there is a tendency for younger speakers to have slightly higher F2 values, indicating more fronted articulation, this difference is not strong enough to be considered significant in the context of the current analysis.

The mean (normalized) F2 value for female speakers was 0.9731, while for male speakers, it was slightly higher at 0.9866. The test yielded a t-value of -0.41173 and a degrees of freedom (df) metric of 616.28. The p-value of 0.6807 is considerably higher than the conventional alpha level of 0.05, indicating that the observed difference in means is not statistically significant. The null hypothesis for this t-test posits that there is no difference in the mean F2 values between male and female speakers. Given the p-value, we fail to reject this null hypothesis, suggesting that gender does not have a significant effect on the degree of fronting of the GOOSE vowel. This outcome is consistent with the findings from the ctree analysis, further confirming that gender is not a crucial variable in determining F2 variation of GOOSE in this speech community.

Figure 4.26 provides a boxplot of the (normalized) F2 values by gender, providing a visual comparison between female and male speakers. The boxes represent the interquartile range (IQR), and the horizontal line within each box denotes the median F2 value. The mean F2 values for each gender are highlighted by yellow points. The boxplot reveals a slight increase in the mean F2 values for male speakers compared to females. However, both groups exhibit a considerable overlap in their interquartile ranges, and the spread of F2 values is similar across genders. This visual representation aligns with the statistical test results, demonstrating that there is no substantial gender-based difference in the fronting of the GOOSE vowel. Additionally, the distribution of values within each group suggests that gender does not introduce significant variability in vowel fronting.

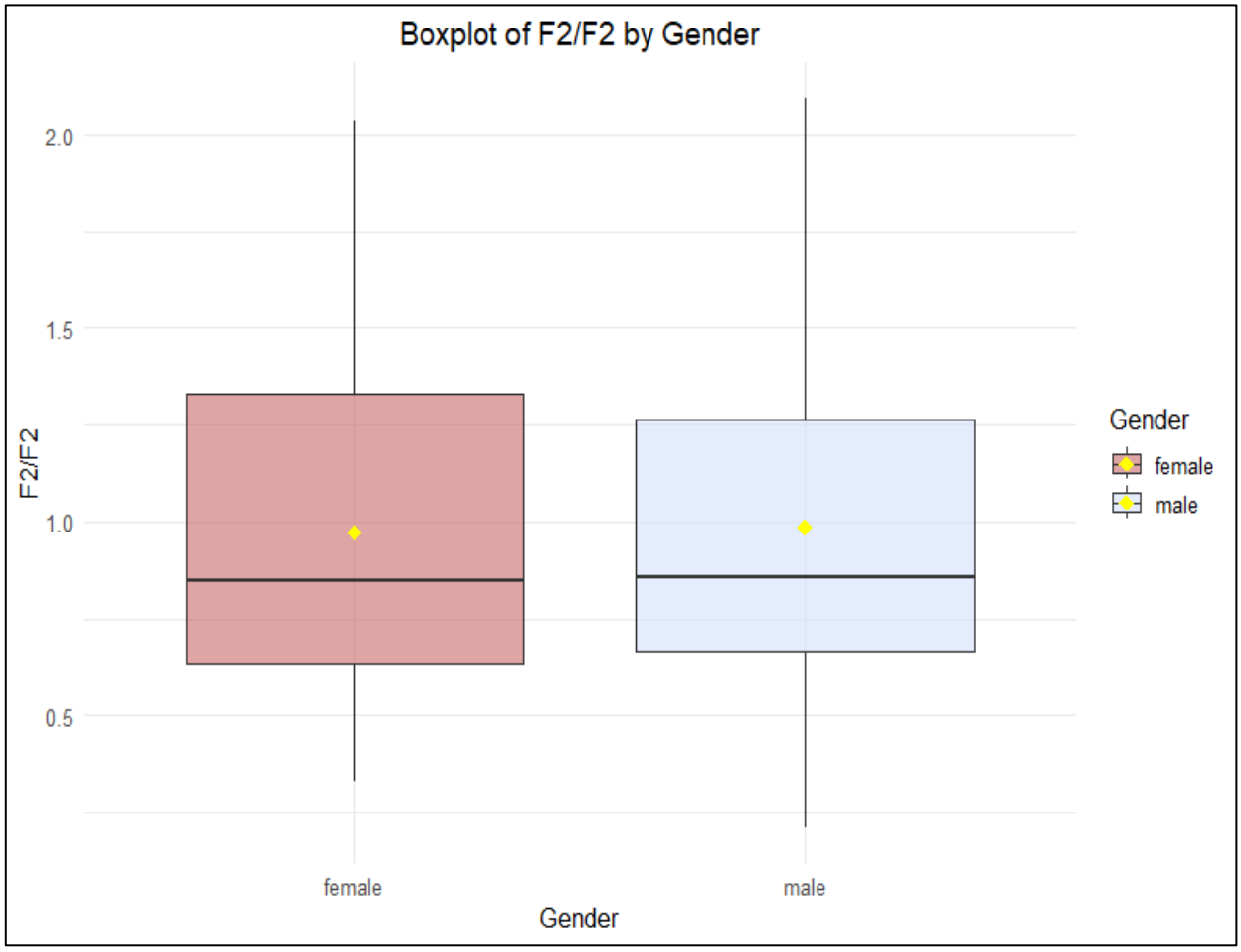

Figure 4.26 Boxplot of the F2/F2 values by gender

The combined results from Welch's Two Sample t-test and boxplot analysis indicate that gender does not significantly influence the fronting of the GOOSE vowel in the current dataset. Despite slight differences in mean (normalized) F2 values between male and female speakers, these variations are not statistically significant and do not suggest any systematic effect of gender on vowel fronting. Overall, the evidence presented in this section supports the conclusion that gender does not play a significant role in shaping GOOSE-Fronting in South African Indian English in the broader Potchefstroom area.

4.7.6 GOOSE-Fronting: the intersection of social class, gender and age

The boxplot in Figure 4.27 visually represents the interaction between social class, age, and gender on the (normalized) F2values of the GOOSE vowel. Each subplot displays the distribution of (normalized) F2 values for different combinations of age (25 and 45), gender (female and male), and social class (Mohadin and Town)

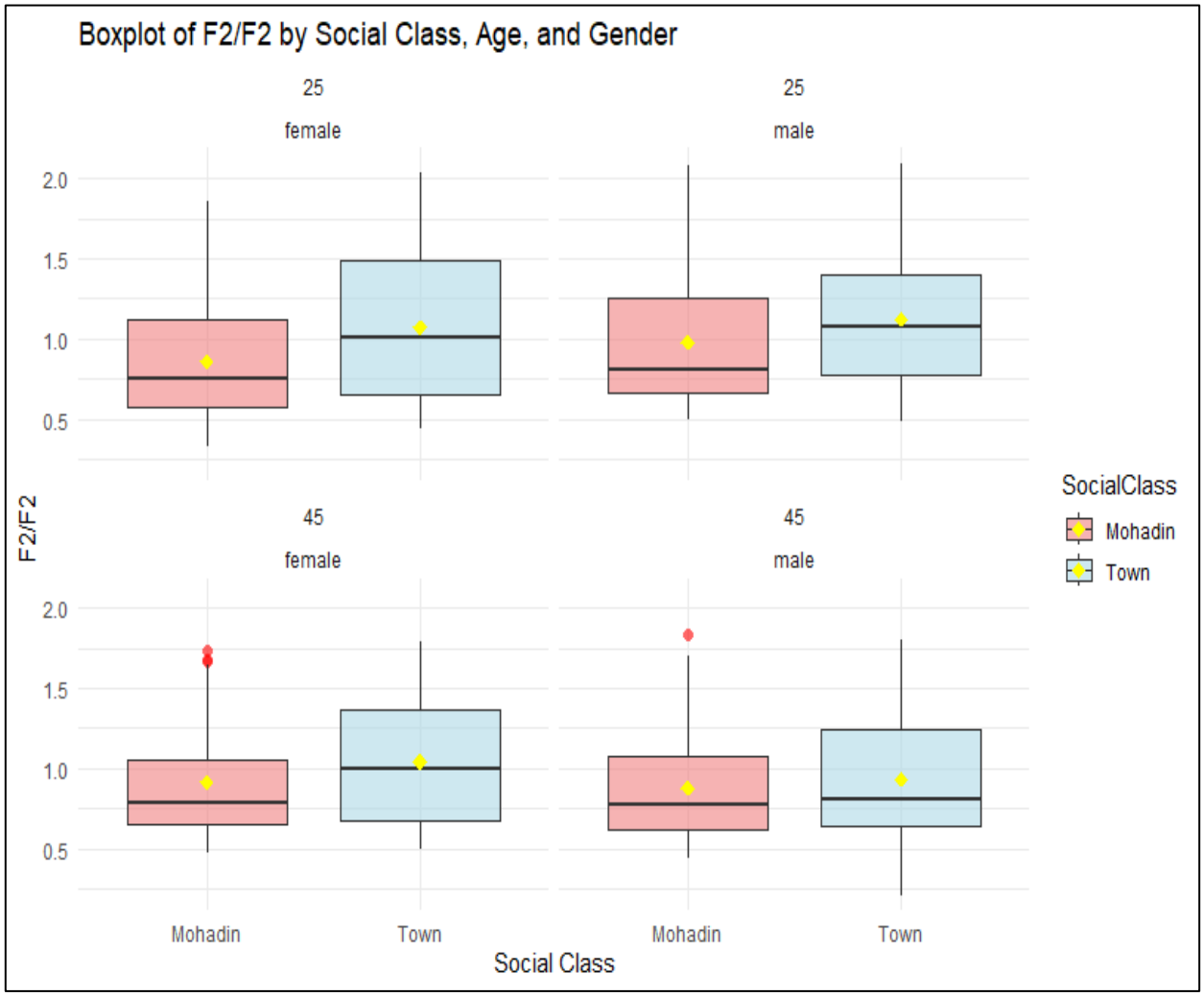

Figure 4.27 Social class, age, and gender on the F2/F2 of the GOOSE vowel

The mean (normalized) F2 value for young female speakers in Mohadin is relatively low, indicating less fronted vowel articulation. The compact interquartile range (IQR) suggests a consistent speech pattern with minimal deviations, reflecting a stable community norm that may adhere to traditional linguistic practices. In contrast, young females in Town display higher F2 values with a broader IQR, indicating more fronted vowel articulation and greater variability in their speech. This could reflect a shift towards standard or prestige forms, likely influenced by increased social mobility or interaction with diverse linguistic environments. Similar to their female counterparts, young males in Mohadin show a more retracted vowel

articulation, with a narrow IQR indicating a stable community norm. The lack of extreme outliers suggests minimal deviation from traditional speech patterns, reinforcing a strong adherence to community-specific phonetic norms. Young males in Town exhibit comparatively higher F2 values, similar to Town females. However, the variability is slightly lower than in the female group, suggesting a more consistent pattern of vowel fronting. This could indicate a general trend towards adopting more fronted vowel articulations within this social class and age group.

Older females in Mohadin have a comparatively low mean (normalized) F2 value, indicating more retracted vowel articulation, consistent with traditional speech patterns. The presence of outliers suggests that some speakers may have different articulatory habits, potentially due to varied exposure to external linguistic norms or individual speech variations. Older females in Town show higher F2 values with a broader IQR compared to their Mohadin counterparts. This suggests a shift towards more fronted articulation, potentially reflecting the adoption of prestige variants or increased exposure to diverse linguistic influences. Older males in Mohadin also exhibit lower mean F2 values than their Town 'compatriots', indicating retracted vowel articulation, similar to the female group. The relatively stable IQR and presence of outliers indicate that while there is a general adherence to traditional vowel articulation patterns, some speakers show flexibility or variation in their speech. Similar to older females, older males in Town have higher F2 values and a broader IQR compared to equivalent Mohadin speakers. This suggests a greater degree of vowel fronting and variability in speech patterns, possibly influenced by different levels of exposure to standard linguistic norms or varying degrees of accommodation to external speech forms.

Overall, the boxplots reveal a consistent pattern where Town speakers, regardless of age and gender, tend to exhibit more fronted GOOSE vowels compared to Mohadin speakers. This trend is visible in both younger and older age groups, suggesting that social class is a stronger determinant of vowel fronting than age or gender alone. The findings indicate that linguistic accommodation to prestige variants is more prevalent in the Town group, which may reflect social aspirations or greater exposure to standard language norms. These results highlight the importance of considering multiple sociolinguistic factors together to understand the complexities of language variation in the SAIE community (and other speech communities). While age and gender may not independently drive vowel fronting, their interaction with social class reveals meaningful patterns that contribute to our understanding of phonetic variation in this linguistic context.

4.8 Conclusion of the GOOSE section

Overall, the findings regarding GOOSE-Fronting and its relationship with the factors of age, gender, and social class in South African Indian English (SAIE) can be summarized as such; social class distinctions, as represented by geographical locations, Mohadin and Town, were found to significantly influence GOOSE-Fronting in SAIE, but mainly when /r/ and /l/ comes before a GOOSE vowel. Welch's two-sample t-test and boxplot analysis indicated that speakers from the different social class backgrounds (Mohadin

and Town) exhibited significant variation in fronting. In contrast, Welch's two-sample t-tests and boxplot analyses revealed that age, as represented by the age groups under 25 and over 45, is not a significant predictor of GOOSE-Fronting in SAIE. There was no statistically significant difference in mean (normalized) F2 values between the age groups, suggesting that age alone may not influence the pronunciation of the GOOSE vowel. Similar findings were observed for gender, as Welch's two-sample t-test and boxplot analysis did not show significant differences in mean (normalized) F2 values between female and male speakers. While there may be slight differences in fronting between genders, these differences were not statistically significant and may not be substantial enough to influence overall fronting patterns. These findings highlight the complexity of sociolinguistic variation and the importance of considering multiple factors, including social class, in understanding phonetic variation within the SAIE community.

CHAPTER 5 CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This final chapter integrates the key findings from the analysis of linguistic variation within the Indian community of Potchefstroom, South Africa, and discusses their broader implications. **Section 5.2** summarizes the study's core findings, particularly focusing on the sociolinguistic variables of retroflexion and the GOOSE vowel. It will also highlight the influence of social factors such as age, gender, class (geography), which were explored in the context of Potchefstroom and Mohadin. In **Section 5.3**, the research questions and hypotheses posed at the outset of the study will be revisited, with specific attention to how the data (dis)confirmed the hypotheses related to language change and variation within the community. This section will highlight the complex relationship between social mobility and linguistic behavior. **Section 5.4** will then shift the focus to the linguistic and social implications of the study, explaining how the findings extend beyond the immediate community and contribute to broader sociolinguistic theory. This includes the significance of social integration, language preservation, and the dynamics of identity construction through language in post-apartheid South Africa. Finally, **Section 5.5** will explore the broader implications of this study, identifying avenues for future research and recommending a continued focus on under-researched communities to better understand linguistic variation in diverse social and geographical contexts. The chapter will close with final remarks in **Section 5.6**, offering a reflective synthesis of the contributions of this study to the field of sociolinguistics, with a particular focus on South African Indian English and its socio-cultural context.

5.2 Summary of key findings

Building on the historical and sociolinguistic contexts briefly outlined in Chapter 1, the research highlighted the distinct linguistic practices of the Indian community in Potchefstroom, a population that had previously not been studied in depth. The analysis revealed that increased inter-ethnolinguistic mobility, especially in the post-apartheid period, has indeed had a measurable impact on the linguistic patterns of the Indian English speakers in this area. As hypothesized, speakers who have moved into the main town of Potchefstroom exhibit different linguistic patterns compared to those remaining in Mohadin, particularly in the loss of retroflexion and increased GOOSE-Fronting, compared to their counterparts in Mohadin. This indicates that greater social interaction with other ethnic groups influences language use, leading to the adoption of new linguistic features and/or the reduction of traditional ones. As outlined in Chapter 2, language variation and change are strongly influenced by social factors such as ethnicity, gender, age, and place. This study’s findings align with existing literature that suggests that these factors significantly shape the speech patterns of minority communities. For instance, younger participants and those living in Potchefstroom, particularly women, demonstrated more frequent fronting of the GOOSE vowel, aligning with broader trends in sociolinguistics where women are seen as leaders of linguistic change (Labov, 2001)

and further supporting the idea that social integration in predominantly white areas accelerates such linguistic change.

The significant findings related to retroflexion were especially compelling. Contrary to broader sociolinguistic trends, males in Mohadin were the least resistant to phonetic change and showed the least retroflexion, particularly in the production of /d/ (Heffernan, 2007). This observation challenges the common sociolinguistic pattern in which men tend to maintain traditional speech features, while women are more likely to adopt innovative linguistic forms (Eckert, 1989). This can be attributed to the cultural dynamics in Mohadin, where men are more likely to interact with external social groups due to work and social mobility. This increased exposure to non-retroflexed speech patterns in Standard South African English or mainstream English varieties may lead to linguistic accommodation, in which speakers shift their articulation to align with external norms rather than retaining traditional features. Meanwhile, women in Mohadin retained traditional retroflexion, possibly because of cultural norms restricting their social interactions. These patterns reflect the persistence of linguistic features that are tied to historical and social isolation. For /t/, age, social class, and gender all played significant roles. Older Mohadin women retained more traditional speech patterns, while younger women in Potchefstroom adopted more formal and prestigious forms, exhibiting longer VOTs. Social mobility and increased interaction with diverse linguistic environments in the town were likely contributing factors to this linguistic change.

The geographic division between Mohadin and Potchefstroom proved to be a crucial factor in explaining language variation. The conservative speech of Mohadin residents, particularly their use of retroflexion, contrasted with the more standard South African English (SAE) used by Potchefstroom's younger residents. This aligns with studies that have explored place as a proxy for social class, such as Labov's (1966) study of New York City and Trudgill's (1974) research in Norwich, discussed in Chapter 2 (section 2.6). In Potchefstroom, place serves as a stand-in for social mobility, with linguistic variation reflecting the social and economic divide between the two areas. Chapter 3 provided a clear methodology for examining these variables, and the quantitative and qualitative analyses conducted in Chapter 4 confirmed several hypotheses.

5.3 Research Questions and Hypotheses

This section revisits the research questions and hypotheses that guided this study. By referring back to the analyses and discussions in earlier chapters, the answers to these questions are supported by the findings and methodologies previously discussed.

1. **What are the effects of increased inter-ethnolinguistic mobility on language change and variation in SAIE in the broader Potchefstroom area?**

In Chapter 3, section 3.2.1, we discussed the broader context of language variation in South African English (SAE), particularly focusing on South African Indian English (SAIE) in Potchefstroom. Hypothesis 1 predicted that increased inter-ethnolinguistic mobility would result in measurable changes in language use, specifically in retroflexion and GOOSE-Fronting. The findings confirmed this: L1-SAIE speakers who have moved into the previously whites-only town of Potchefstroom are showing signs of losing retroflexion and increasingly fronting the GOOSE vowel, compared to those still living in Mohadin. This suggests a shift towards adopting linguistic features more commonly associated with the dominant English population, even if the local population is not mainly L1-English.

2. **Will a similar outcome to Mesthrie's (2010) study conducted in Cape Town, where English is dominant, occur in an Afrikaans-dominated small town like Potchefstroom?**

Hypothesis 2 posited that the Afrikaans-speaking environment in Potchefstroom would shape different linguistic outcomes compared to Mesthrie's findings in Cape Town. In Chapter 4, section 4.7, we saw that while GOOSE-Fronting was present, it was less prominent, perhaps due to the local linguistic dominance of Afrikaans. This was measured through the acoustic analysis of F2 frequencies, as explained in Section 3.5, and confirmed by t-tests comparing the effects of age, gender, and place. The influence of Afrikaans in the Potchefstroom community may explain the slower GOOSE-Fronting shift in comparison to that observed in Cape Town. This confirms that the sociolinguistic environment plays a critical role in shaping language change, as discussed in Chapter 2 on sociolinguistic variation.

3. **To what degree are L1-SAIE speakers who have moved into the main town of Potchefstroom retaining or losing retroflexion and fronting their GOOSE vowel compared to those who have remained in Mohadin?**

Hypothesis 3 proposed that L1-SAIE speakers in Potchefstroom would show less retroflexion and more GOOSE-Fronting compared to those in Mohadin. This was confirmed by the analysis of VOT measurements in Section 4.3, where speakers in Mohadin maintained more conservative speech patterns, retaining retroflexion. In contrast, those in Potchefstroom showed increased GOOSE-Fronting, demonstrating a shift toward standard SAE norms. However, some speakers in Mohadin displayed unexpected patterns of loss of retroflexion and GOOSE-Fronting, highlighting the complexity of social and linguistic factors.

4. **Is retroflexion receding and GOOSE-Fronting accelerating more among younger individuals compared to mature individuals?**

Hypothesis 4 suggested that younger speakers would exhibit less retroflexion and more GOOSE-Fronting than mature speakers. The data in Chapter 4 confirmed this, with younger participants leading the shift toward GOOSE-Fronting and reducing their use of retroflexion. This trend, examined in detail in Section 4.5.1, aligns with Labov's (2001) theory that younger generations are typically at the forefront of linguistic change, which was discussed in Chapter 2 (see Section 2.3). The findings indicate that younger speakers are influenced by broader social networks and interactions with non-Indian communities, accelerating linguistic convergence toward standard SAE.

5. Is retroflexion receding and GOOSE-Fronting accelerating more among females than males?

Hypothesis 5 posited that female speakers would exhibit more GOOSE-Fronting and less retroflexion than their male counterparts. This was supported by the findings in Chapter 4, section 4.7, where female speakers, particularly younger women, were shown to be the leaders in GOOSE-Fronting. This aligns with broader sociolinguistic research discussed in Section 2.4, where women are often seen as leaders of linguistic change due to their tendency to use prestige forms. However, the opposite appears to be occurring with respect to retroflexion; thus, in Mohadin males are seen to be losing retroflexion while the older females retain it.

5.4 Linguistic and Social Implications

The study provides significant insights into the complex interplay between language and social factors in a multilingual and multicultural context. The findings highlight the dynamic nature of language use and the influence of social mobility, inter-ethnic interactions, and local linguistic environments on language variation and change. Despite the linguistic changes, Indian languages remain integral to cultural and religious practices, particularly among the grandparental generation. This cultural retention is evident in religious ceremonies, musical traditions, culinary practices, and traditional attire. The study illustrates a form of 'diglossic' behavior where individuals navigate between cultural traditions and contemporary linguistic practices, reflecting a balance between cultural preservation and linguistic adaptation.

5.5 Broader Implications and Future Research

This study underscores the importance of understanding the social dynamics that shape language use and highlights the need for ongoing research in this area. The findings contribute to the broader field of sociolinguistics by providing insights into the effects of large-scale social change on language variation and change in a post-apartheid South African context.

While this study provides important insights into retroflexion and the GOOSE vowel in South African Indian English (SAIE), several limitations must be acknowledged to contextualize the findings and guide future research. The study explicitly explores age-related variation, but the analysis does not account for

potential subgroups within the broad age categories. The observed patterns may be influenced by more fine-grained generational shifts, which were not examined in this study. Future research could refine these trends by incorporating narrower age bands or a longitudinal approach to better capture how language variation evolves over time.

The conditional inference tree (ctree) analysis identified social class as a significant predictor of variation, but this study does not explore whether its influence differs across allophones. It remains possible that some retroflexed and non-retroflexed tokens behave differently within specific social groups, an area that warrants further investigation.

The boxplots used for visualization identified outliers, but this study does not critically evaluate their impact on mean VOT or broader phonetic trends. While these outliers were noted, their influence on statistical significance and linguistic interpretation remains unexplored. Future studies should incorporate robust statistical techniques (e.g., mixed-effects models) to assess how extreme values shape overall findings.

Future Research Directions: As with any sociophonetic study, the results should be interpreted in light of sample size, demographic representation, and methodological choices. While the study provides valuable insights into linguistic variation, findings are limited to the specific community under investigation and should not be overgeneralized to all SAIE speakers. Future studies should; investigate subgroup trends within age cohorts to refine age-related phonetic variation, examine social class influence across different allophones to determine whether certain phonetic variants are more socially marked, apply more advanced statistical modelling to assess the impact of outliers on VOT variation as well as extend the study to a broader SAIE community to test generalizability beyond Potchefstroom and Mohadin. Future studies should also consider a broader geographic scope to include more rural communities, providing a comprehensive understanding of SAIE across different contexts. Longitudinal studies tracking linguistic changes over time would further elucidate the effects of social dynamics on language use. Additionally, investigating other linguistic variables beyond retroflexion and GOOSE-Fronting could offer deeper insights into the complexity of language variation and change.

Contribution to Sociolinguistics: This research contributes to the *Language in a Post-Apartheid South African City* (LaPASC) project, exploring the effects of dialect and language contact on traditional sociolinguistic concerns such as language variation and change. Given that the project has begun by focusing its research on sound change and variation in the two Afrikaans-speaking communities of Potchefstroom (white and coloured), it is evident that this research is significant to the project by delving deeper into another community, that of the South African English Indian speakers of Mohadin and Potchefstroom (a traditionally Afrikaans-dominated area). This is as part of a broader project that can hopefully continue to unravel the complexities of language and its impact on various aspects of human communication and culture, especially in highly multilingual contexts like the South African one.

5.6 Conclusion

This study has explored the dynamic nature of language variation within the Indian community of Potchefstroom. It highlights how social and geographic factors, such as age, gender, class, and location, influence the maintenance or change of linguistic features like retroflexion and GOOSE-Fronting. The findings emphasize that language variation and change are not solely driven by internal linguistic factors but are deeply connected to social dynamics. Understanding these interactions is key to gaining a holistic view of language evolution within diverse communities. The findings from this study contribute to the broader field of sociolinguistics, enhancing our knowledge of South African Indian English in Potchefstroom and Mohadin. These insights also provide a foundation for future research, especially in other under-researched South African communities where similar linguistic and social dynamics may be at play. This research underscores the importance of considering the multi-layered nature of identity and its impact on linguistic behavior, which extends beyond simplistic categorizations of, for example, social class. By examining the interplay between social, geographic, and linguistic factors, this study offers valuable empirical evidence to support a more nuanced understanding of language variation and change within the Indian diaspora in South Africa.

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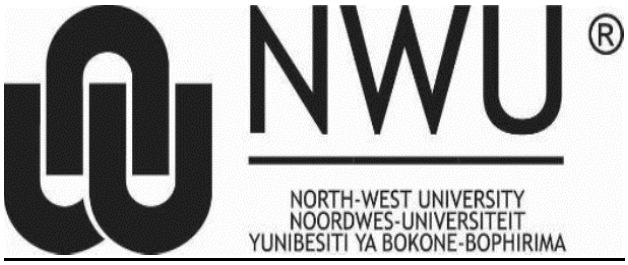
APPENDIX:



Section 1

Disclaimer and legal ethical form

I affirm **t**hat I volun**t**eere**d** for **t**his in**t**erview. **T**he in**t**erviewer has ma**d**e it clear **t**o me **t**hat I have **t**he oppor**t**uni**t**y **t**o a**b**or**t** **t**his in**t**erview a**t** any **t**ime. I**t** has been ma**d**e clear **t**o me **t**ha**t** **t**his in**t**erview will be use**d** for **d**ata collection for an aca**d**emic **d**isser**t**ation.

I am aware **t**ha**t** I am affor**d**e**d** rights as far as counselling goes. I understan**d** **t**ha**t**, shoul**d** I suffer emotional s**t**ress from **t**his in**t**erview, exper**t** counsellors can be provi**d**e**d** by Stu**d**en**t** Counselling Services in Buil**d**ing F18 of **t**he Nor**t**h-Wes**t**

Universi**t**y, Potchefstroom Campus. Fur**t**hermore, I agree to be recor**d**e**d**, knowing **t**hat my i**d**en**t**i**t**y will be kept secret after **t**he in**t**erview has run its course. In accor**d**ance with **t**he law, I concur **t**hat I may refuse **t**o give an answer to any question and un**d**erstan**d** **t**ha**t** I **t**herefore personally **d**etermine **t**he final number of questions.

Section 2

Participant information

User reference: some questions will be relevant according to speaker age; therefore, not all questions will be asked to the same speaker.

1. When and where were you born?
2. Do you recall any interesting stories regarding your birth?
3. Did you have any nicknames?
4. What were you most afraid of as a child?
5. What languages do you speak at home?
6. What languages do you speak with colleagues and friends?
7. Have you learned any other languages?
8. Was there someone you really looked up to when you were a teenager?
9. What was your first job?
10. What was your best job and best?
11. Do you have children? If so, how many and what age?
12. How would your children describe you as a parent?
13. How do you describe yourself as a parent?
14. Do you have siblings? How many, are they older or younger?
15. What is the funniest thing that's ever happened to you?
16. What is your happiest memory?
17. What accomplishment are you most proud of?
18. How do you think people will remember you?
19. What do you like to do in your spare time?
20. What is your greatest hope for the future?

Section 3

Constitutes a broadly unstructured interview guided by several topics that have the potential to get the subjects to engage in speech that is as naturalistic and un-self-conscious as possible. Possible topics:

- ✓ What are some of your favorite places in South Africa and why? What other parts of South Africa would you still like to explore?
- ✓ What according to you makes South Africa unique compared to other countries?
- ✓ Given the current struggle of load shedding in our country, how do you prepare for load shedding and what do you for the duration of that time doing?
- ✓ What have you learned from the Covid pandemic?
- ✓ Have you travelled? If so where and what were some of the highlights of that experience? Where in the world would you like to travel?

Section 4

Wordlist: a minor adaptation of Wells' (1982) lexical sets.

1. School	*2. Group*	*3. Loot*
4. Sabotage	*5. Equilibrium*	6. Photosynthesis
7. Truth	*8. Through*	9. Tuesday
10. Boot	11. Food	12. Sesotho
13. Blue	14. Juice	*15. Loose*
16. Melancholy	17. Vermillion	*18. Xenophobia*
19. Beautiful	20. Who	21. Mood
22. Students	*23. Lunatic*	24. Music
25. Spoon	26. Movies	27. Few
28. Serene	29. Bored	30. Pop corn
31. Do	32. University	33. Tooth
34. Move	35. Huge	*36. Pool*
37. Oxymoron	38. Karma	*39. Integrity*
40. Zulu		

Informed Consent

TITLE OF THE RESEARCH PROJECT: An investigation into the Indian community of Mohadin and Potchefstroom.

PRINCIPAL INVESTIGATOR: Angel Nyoni.

ADDRESS: North-West University

Potchefstroom Campus

11 Hoffman Street

Potchefstroom

2531

CONTACT NUMBER:

You are being invited to take part in a research project that forms part of my research into **the Indian community in South Africa, particularly Potchefstroom**. Please take some time to read the information presented here, which will explain the details of this project. Please ask the researcher any questions about any part of this project that you do not fully understand. It is very important that you are fully satisfied and that you clearly understand what this research is about and how you could be involved. Also, your participation is **entirely voluntary,** and you are free to decline to participate. If you say no, this will not affect you negatively in any way whatsoever. You are also free to withdraw from the study at any point, even if you do agree to take part. Prior to publication of the study's results (or the point that publication is in process), you may also withdraw the data you generate.

This study has been approved by the **Ethics Committee for Language Matters (ECLM) of the Faculty of Humanities of the North-West University (NWU Potchefstroom)** and will be conducted according to the ethical guidelines and principles of the international Singapore Statement on Research Integrity (2010) and the ethical guidelines of the National Health Research Ethics Council. It might be necessary for the research ethics committee members or relevant authorities to inspect the research records to make sure that we (the researchers) are conducting research in an ethical manner.

A. PURPOSE AND BACKGROUND

This study will be conducted on developments that have occurred in the South African Indian community in Mohadin and Potchefstroom over the past years. The purpose of your participation in this research is to help the researcher discover whether there are differences in the older generation born during apartheid and those born after that era. A total number of 32 participants, both male and female will be included in the study split in age between young 18–25-year-old participants and mature over-45 participants. You were selected as a possible participant in this study because you fit the criteria stated above.

B. PROCEDURES

If you agree to participate in this research study, the following will occur:
You will be interviewed and recorded, all of which will take approximately 30-60 minutes.

C. RISKS

Probable/possible risks/discomforts	*Strategies to minimize risk/discomfort*
Because you will spend time completing the questionnaires, it is possible that you will be tired from sitting.	The researcher will make sure that if this is the case, you will be allowed to take a break between sections to stretch, have refreshments etc.
Because the researcher will ask you questions about experiences that could make you feel uncomfortable at first	The researcher will remind you that you have a right to end the interview at any given point and will try to make you as comfortable as possible.
Fears about Covid-19	The researcher will ensure that all Covid measurements are taken, and regulations are adhered.

D. CONFIDENTIALITY

The records from this study will be kept as confidential as possible. No individual identities will be used in any reports or publications resulting from the study. You will remain completely anonymous, and all recordings will be encrypted in codes and will be stored separately from any names or other direct identification of participants. Research information will be kept in locked files at all times.

Only research personnel will have access to the consent forms and recordings and only those with an essential need to see names or other identifying information will have access to that particular file. explicit permission to use the data in future research, under the custodianship of the supervisor. Your permission to use the data in future research is required under the custodianship of the supervisor.

E. BENEFITS OF PARTICIPATION

There will be no direct benefit to you from participating in this research study, but your participation will contribute to the universal knowledge of multiracial South Africa.

F. QUERIES

You can contact (researcher) Angel Nyoni at angelnellisiwe@gmail.com/0799477289 if you have any further queries or encounter any problems.

You can contact the chair of the Ethics Committee for Language Matters (Prof Susan Coetzee-Van Rooy) at susan.coetzeevanrooy@nwu.ac.za if you have any concerns or complaints that have not been adequately addressed by the researcher.

You will receive a copy of this information and a consent form for your own records.

Declaration

By signing below, I agree to take part in a research study entitled: *An investigation into the Indian community of Mohadin and Potchefstroom.*

I declare that:

- The researcher has explained the information in this document, and I have read and understood this information and consent form and it is written in a language with which I am fluent and comfortable.
- The researcher encouraged me to ask questions and took adequate time to answer them to the best of his/her ability.
- I understand that taking part in this study is **voluntary** and I have not been pressurized to take part.
- I understand that what I contribute (what I report/say/write/draw/produce visually) could be reproduced publicly and/or quoted, but without reference to my personal identity.
- I may choose to leave the study at any time and will not be penalized or prejudiced in any way.

- I may be asked to leave the study before it has finished, if the researcher feels it is in my best interests, or if I do not follow the study plan, as agreed to.
- The researcher has explicitly asked for my permission to use the data in future research, under the custodianship of the supervisor.

I understand that I will be given a copy of this signed Consent Form.

Name of Participant (print): Signature: Date:
Name of Witness (print): Signature: Date:
Person Obtaining Consent: Signature: Date: