THE EFFECT OF GEOGRAPHIC MOBILITY

ON THE RETENTION OF A LOCAL DIALECT

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The bookshelf in my office contains, among other things, a copy of Linda Lombardi's dissertation. She starts out her acknowledgements by saying that, even though knowing that she'd get to write acknowledgements kept her going at times, when she finally got to it, it wasn't quite as thrilling as she'd hoped it would be.

I have to admit that, after a few years of working on this dissertation at some level or another, I understand a bit of what she meant. But even so, here's my acknowledgements page, and to be honest I'm generally quite happy to have the chance to write it — at the very least, it lets me publicly (and, thanks to the miracle of microfilming, permanently) thank those who have played a large role in the process that has resulted in this sheaf of paper you're reading.

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ABSTRACT

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Several studies have demonstrated that there is a "critical period" for language acquisition ending at some point approaching puberty, beyond which language acquisition can occur only imperfectly. Other studies, primarily focusing on adolescents, have also found that this concept applies to second dialect acquisition in situations of dialect contact. Even so, little is known about the mechanisms underlying the linguistic changes that can occur in dialect contact situations. This is an important question particularly because it is such a common situation — adults are, for example, faced with constant exposure to a second dialect if they move away from where they acquired their native dialect. This study investigates this issue by comparing the linguistic perception and production of two groups of individuals, one made up of individuals who have lived in the same town their entire lives and the other made up of individuals who grew up in that town but moved away as adults. The results of sociolinguistic interviews and commutation tests are used to determine the extent to which the adult emigrants from the community gained or lost features of their native dialect, or accommodated to their new dialect. The investigation finds that adult migrants do make changes in their linguistic production and perception upon constant

exposure to a second dialect, though not all features prove susceptible to change. The changes the individuals make involve both accommodations to the new dialects they are surrounded by as well as changes that do not involve such accommodation. The major generalization drawn from the data is that the linguistic features that are most susceptible to change in dialect contact situations are those features that are undergoing change in the individuals' native dialect. This result has direct applications in the field of dialectology and the speech recognition industry, as both of these fields can benefit from a deeper knowledge of the sorts of "hybridized" dialect systems than can result from dialect contact.

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1. Review of the problem

This dissertation reports the results of a study designed to provide insights into the effects of constant second dialect exposure on adults. This is done to provide an answer to an important question for linguists, particularly sociolinguists and dialectologists: Can someone who moves to a place where a dialect other than that person's native dialect is spoken be relied upon as an informant for that dialect? Or, to break it down further, when an individual grows up in a particular place, that person grows up speaking that place's particular dialect. Once that person reaches adulthood, though, there is a choice — to stay in the native community or to move away. If the individual stays, then the picture remains relatively static — that person continues speaking the native dialect.[1] If the individual moves to an area where a different dialect is spoken, however, the picture becomes more complicated — anecdotal evidence maintains that some parts of the native dialect will be retained, but some features of the dialect the individual is now surrounded by will be acquired.[2] The extent of the changes that can occur, however, has not been studied in great depth, and neither have the sorts of changes that do occur.

This study, therefore, gives an initial answer to the question of whether and how much an adult's linguistic pattern is influenced by the constant exposure to a second dialect involved in relocating

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[1] The picture is not actually as simple as I make it out to be here, of course. There are issues of age-grading, changes in social status, and physiological degradation that could potentially — and, as Feagin (1998) has pointed out, at least sometimes do — cause changes in one's manner of speaking. I am abstracting away from these issues for the moment, however.

[2] There are, of course, nearly innumerable possibilities beyond these two — there are people who move away and return, people who move away but return often not to live but for extended visits, there are people who stay where they grew up but take extended visits elsewhere, and so forth. The study outlined in this dissertation, however, deals with only the two simplest cases — those who grew up in an area and stayed, and those who grew up in that area and moved away. Crucially, this study deals only with people who grew up in a single area and moved away as adults; it does not deal with those who moved from place to place as children while acquiring language.

to a region where a dialect other than that person's native dialect is spoken. This is necessary because, when one surveys the previously existing literature on the effects of exposure to a second dialect on adult migrants, one finds that relatively little has been written on the subject. However, there have been a few such studies, as well as some studies conducted with adolescents and even children that shed light on the issues dealt with in this dissertation, and these are discussed in the remainder of this chapter.

1.1. The acquisition of linguistic systems and the effects of dialect contact

A large number of studies have been conducted on how and when individuals acquire language. Unfortunately, most of those studies have been conducted in the fields of either child language acquisition or adult acquisition of a second language, while the current study deals with the results of adult exposure to a second dialect. A few previous studies on language acquisition should, however, be mentioned here, because they raise interesting issues that should be kept in mind while reviewing the results of the current study.

1.1.1. A few notes on acquisition generally

Most of the many studies that have investigated what has been called the "critical period" for language acquisition (Lenneberg 1967) do not directly bear on the study at hand. One that does have bearing on this research, however, is Payne's (1976) study of children acquiring language in King of Prussia, Pennsylvania (a suburb of Philadelphia). Payne's study dealt with first language acquisition among children who grew up with differing early linguistic inputs. At the time of Payne's study, King of Prussia was growing largely through immigration, about half from

Philadelphia, half from other areas of the United States. Payne compared the acquisition of the Philadelphia pattern among children of parents from Philadelphia and children of parents from elsewhere, and found that in order for full acquisition of phonetic output rules to occur children need to have been exposed to them by age nine or ten. This is to some extent unsurprising, given other studies that have been undertaken in an attempt to determine the "critical period" for language acquisition. Payne discovered another fact, however, that *was* somewhat surprising — for full acquisition of certain linguistic features to occur the exposure had to occur earlier, perhaps even in the first year or two after birth. That is, while nearly all of the children, no matter where they were from, acquired phonologically conditioned vowel shifts in the Philadelphia pattern, those children who were part of out-of-region families only very rarely achieved full acquisition of the Philadelphia /æ/ pattern. To put this another way, if very early exposure to the Philadelphia /æ/ pattern, which includes various elements that are not completely phonologically predictable, did not occur, that part of the system was in almost all cases learned only imperfectly. This is an even more surprising finding when one considers that children of out-of-region parents had difficulty in fully acquiring the Philadelphia /æ/ pattern whether they were born and raised in King of Prussia or born elsewhere and raised in King of Prussia. (On the other hand, the children who were born and raised in King of Prussia whose parents were from the region acquired the Philadelphia /æ/ pattern as would ordinarily be expected of children growing up in the Philadelphia region.) All of the children from out-of-region families, however, made at least some movement toward the Philadelphia pattern.[3]

[3] This discussion, aside from this footnote, does leave out the fact that a child's age of arrival had an effect on the child's ability to fully acquire the Philadelphia pattern. This is left out because such results are echoed in many of the other studies described in this chapter, and because the most important facet of

Johnson and Newport (1989) investigated the critical period in a different sphere — namely, they looked at the critical period and its effect upon second language acquisition. Johnson and Newport studied individual Korean and Chinese speakers who came to the United States at ages ranging from three to thirty-nine. These individuals were subjected them to tests of fluency in English syntax and morphology in which they were asked to judge the grammaticality of several spoken English sentences. In general, Johnson and Newport found that the later an individual had been exposed to English, the less completely that individual had learned English. More particularly, they found that those who had arrived in the United States at age seventeen or later had acquired English less completely than those who had arrived by the age of fifteen. Also, while the fluency results for those who had arrived by the age of fifteen showed that the there was an inverse correlation between the age at which an individual had arrived in the United States and that individual's level of fluency in English, for those who had arrived at age seventeen or later there was no such correlation.[4] There is, therefore, a very real change in second language learning ability that occurs around age sixteen, but even before that age later second language exposure results in less fluency in the second language.

As noted earlier, these sorts of studies do not bear *directly* on the question at hand, but they do bring up issues of importance to anyone studying the effect of second dialect acquisition among adults. Johnson and Newport's (1989) findings underscore that there is some sort of barrier to learning language natively after a certain point in time. Whether there are similar barriers to learning a second dialect is unclear, but the fact that such exist for second language learning

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Payne's (1976) study for present purposes is that very early exposure to a particular dialect may be needed for *full* acquisition of some parts of that dialect to occur.

[4] Age of first formal instruction in English (as opposed to age of arrival in the United States) was also looked at, but this variable was found to have no real effect on individuals' fluency.

means that a study of the effects of exposure to a second dialect on adults needs to focus not simply on complete acquisition of features of the new dialect or complete loss of features of the first dialect, but rather one needs to be aware that partial acquisition or loss may occur.

Payne's (1976) study points out that there are two very different sorts of things that a study of adult language change should focus on — lexical distributions, which are learned and set fairly early in life, and phonetic output rules, which are not fixed until later.[5]

1.1.2. Language contact and dialect contact

Very little has been written on the specific differences between language contact and dialect contact situations. Braunmüller (1996), however, in describing communication among the cities of the Hanseatic League in the fourteenth and fifteenth centuries, noted that language contact and dialect contact situations[6] have different effects. In general, Braunmüller found that, while language contact situations resulted in adherence to linguistic norms, a resistance to loanwords, and a resistance to bilingualism, dialect contact situations resulted in tolerance toward linguistic variation and openness to variation in language use. Braunmüller described this by saying that dialect contact situations involved "a balanced accommodation process," while language contact situations involved "dominance" of one language over the other (Braunmüller 1996:145). Although it is unclear whether language and dialect contact situations always pattern in this way, it is necessary to keep in mind that different results may be expected in dialect contact and language contact situations.

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[5] The current study focuses on changes in phonetic output rules, leaving lexical distributions to a future study.

[6] In this case, a dialect contact situation was taken to be a case in which the contact involved multiple language varieties, all mutually intelligible, while a language contact situation involved mutually unintelligible varieties. I accept these definitions as sufficient for current purposes.

1.1.3. Dialect contact: Previous studies

A few studies of dialect contact situations have been undertaken. Perhaps the most intensive of these has been the study of Milton Keynes, a town in southeastern England that was not founded and settled until 1969, and is therefore now a laboratory for observing the effects of dialect contact in real time (Kerswill 1994; 1996a; 1996b; Kerswill and Williams 1994). Much of the study of Milton Keynes has paralleled what Payne (1976) studied in King of Prussia involving the acquisition of a dialect by children in a mixed dialect area (as described in 1.1.1 above). Some mention of the parents' dialects is included in this study, and while mostly there for purposes of comparison to the children, it is of some use for the question of adult dialect acquisition. Basically, what has been found is that the linguistic patterns of those who moved to Milton Keynes as adults reflect the dialects of the places where they grew up, rather than the emerging dialect of Milton Keynes (Kerswill 1996a).

Several studies have dealt with the speech of teenagers in what can best be described as dialect contact situations. Studies of high-school students near Detroit, Ohio (Eckert 1988; 1989) and in northern California (Mendoza-Denton 1997) show that when adolescents divide themselves along social lines, they can and do mark themselves linguistically in such a way that they could conceivably be described as different dialect groups. Crucial for the study at hand is that Eckert and Mendoza-Denton found that adolescents mark themselves linguistically in such ways even after they have passed the age marking the end of the "critical period" for language acquisition.[7]

[7] The exact age at which the critical period ends is left unstated here, as there is great disagreement over when exactly that line might be. However, Johnson and Newport's (1989) study (described in 1.1.1) sets the point at which some sort of barrier to language learning comes into existence at seventeen at the *latest,* an age at which most in the United States are still in high school.

This means that, even after the time that is generally thought of as the timeframe for acquisition of language, there is some malleability built into the system for unconscious linguistic change in response to social pressures.[8]

Surek-Clark (1998) also conducted a study of adolescents in a dialect contact situation, in this case in Curitiba, Brazil. Her study, however, focused on the effects of the relative prestige of various dialects on the acquisition of the Curitiba pattern. Surek-Clark found that individuals from areas with more prestigious dialects than Curitiba acquired fewer Curitiban features than those from areas with less prestigious dialects did. Further, adolescents with a parent who spoke a higher-prestige dialect acquired less of the Curitiban pattern and more of the higher-prestige pattern. This underscores the fact that the mechanics of dialect contact are more complicated than simply speakers of one dialect being placed in contact with speakers of another dialect — various social issues have an effect on the process.

In a paper that dealt somewhat more directly with dialect contact among those who have already fully acquired a dialect, Bortoni (1991) summarized the results of previous studies dealing with the development of a local dialect in Brasilia, Brazil. Bortoni found that, as would be expected, age of arrival corresponded well with individuals' ability to acquire the Brasilia dialect — the younger an individual was upon arrival in Brasilia, the more completely that individual acquired the Brasilia pattern. Bortoni noted that individuals who came to Brasilia at age seventeen or older have been studied as well, and that some degree of change toward the Brasilia dialect was also noted in these speakers. The reason that is given for the differing abilities of different speakers to

[8] As opposed to conscious linguistic change, which would generally be the case for learning a second language.

acquire the Brasilia dialect is the relative prestige of the individuals' original dialects and the Brasilia dialect. In other words, what was found was that speakers of higher-prestige dialects acquired less of the Brasilia pattern, while speakers of lower-prestige dialects acquired more of the Brasilia pattern. The acquisition was still a matter of degree rather than complete or near-complete acquisition of the new dialect, but the correlation between the prestige of the original dialect and the degree of acquisition of the new dialect was still visible.

Chambers (1992) studied the acquisition of British English among six Canadian teenagers who moved to England with their families. Chambers found what one might expect — that the younger an individual was upon moving to England, the more completely that individual acquired the local (and new for them) dialect. All of the subjects, however, acquired some features of the new dialect, though in some cases the changes made were very small. In fact, even the oldest subject, the one who was seventeen years old at the time of the move to England and therefore most certainly past the end of the "critical age", picked up various British English lexical items and a small amount of British English pronunciation. The subject who was fifteen years old at the time of the move showed an even more striking change — partial acquisition of the absence of the low vowel merger (that is, the subject acquired the contrast between the vowels [ɑ] and [ɔ]). Although this study dealt with teenagers and not adults, it does demonstrate that there are measurable linguistic consequences to moving to a new dialect area.

Clyne (1992) studied the linguistic patterns of (among others) adults who had moved from the United States to Australia and had been living in Australia for about fifteen or twenty years. Of the nine adults in his study, Clyne reports that five of them "still have fairly intact American English phonological systems" (Clyne 1992:311), although even those five have acquired certain

Australian lexical items. Unfortunately, Clyne does not report what it means to have a "fairly intact" American English phonological system, but whatever that might mean, it does tell us that four of the nine did not have a "fairly intact" American system. There is some question, however, as to what Clyne means by an adult subject — it appears that Clyne means simply a subject who was an adult at the time of the study. One of the four adult subjects without a "fairly intact" phonological system, for example, (and the only one who is discussed in any detail) is a woman who was seven years old upon her immigration to Australia, and was twenty-one at the time of the study. Given the fact that Clyne's definition of an adult includes those who were not adults at the time of their migration to Australia, and that he did not identify the subjects' ages at the time of their migration, this study alone cannot be the basis for a claim that significant changes are made in the linguistic patterns of adult migrants upon exposure to a second dialect. It does, however, dangle interesting though underspecified results pointing in that direction.

Huffines (1986) studied a primarily ethnically Pennsylvania German farming community in Northumberland County, Pennsylvania, and found an unexpected intonation pattern spoken by residents of the region. This intonation pattern, apparently a relic of Pennsylvania German that has survived the death of Pennsylvania German in the area,[9] involves primarily syllable-final falling (rather than rising) intonation in yes-no questions. The finding of greatest interest for present purposes was the fact that the use of this intonational pattern was dependent on an individual's surroundings. That is, the subjects of the study who had grown up in this community and continued to live there into adulthood used the local intonation pattern, as would be expected. However, another group was studied — those who had grown up in the community

[9] Actually, Pennsylvania German is still spoken in this area, but only by older individuals, and even passive knowledge of the language is restricted to older speakers. Huffines found no intonational differences in the English of those who could speak/understand Pennsylvania German and those who could not.

and moved away as adults (and therefore were surrounded by the standard rising intonation). Huffines found that those who moved away from the community had largely retained the Pennsylvania German question intonation pattern, but the rate at which the pattern was used was lower among that group than among those who had stayed.[10] This is a most interesting result: While these adults in dialect contact situations did not completely acquire the new dialect pattern, they did move toward it partially.

1.1.4. Dialect contact: Theoretical issues

As described above, several studies have found that dialect contact has linguistic effects at both the group and individual levels. The simple knowledge of this fact, however, does not explain *why* such effects appear.

Gumperz (1978) took on this question, pointing out that, despite a weakening of communicative isolation between different dialects, dialect differences may still be maintained and in some cases strengthened. (In particular, Gumperz cites the divide between African-American and other varieties of English as a case in which dialect differences have been maintained despite increasing linguistic contact.) Gumperz argued that dialect differences are maintained so that events can be framed and given social meaning that, if dialect differences were not maintained, could not be assigned. This position has interesting implications, but it is in the end unsatisfactory, as something stronger than simple stylistics is needed to keep a dialect (particularly a socially devalued one) in existence over the course of several generations. However, this article is most

[10] Unfortunately, the report of the study does not give the exact rates at which different intonation patterns were used by this group.

helpful for describing some of the social reasons a group might have for maintaining a dialect separate from that of the surrounding community. It is especially useful in that it points out the obvious but easily overlooked fact that a group's social reasons for maintaining a dialect may be strong enough to overcome other social reasons that might lead that group to abandon it.

Trudgill (1992), on the other hand, attempted to explain certain phenomena related to the position of dialect isoglosses by appealing to the concept of linguistic accommodation in dialect contact. In this view, individuals in dialect contact situations (whether in border areas or due to geographic mobility) accommodate to others' linguistic patterns, and those accommodations may become permanent. Although this sort of process must take place at the individual level, a large enough group of individuals would then be enough to cause dialect change through dialect contact.[11]

1.2. Summary

Given studies that have been conducted up to this point, it is clear that *some* sorts of changes occur, or at least can occur, in an individual's linguistic patterning when constantly exposed to a second dialect. The reasons for this are unclear, but it seems likely that any actual changes and the depth to which they occur are the result of a combination of social factors and simple exposure. The studies related in this chapter point out that children do, of course, pick up new dialects quite easily, and adolescents show an ability to undergo rather sizable shifts in their linguistic patterning.

[11] It should be noted that Herold (1997) has proposed a very similar process for the actuation of the *cot-caught* merger in eastern Pennsylvania. According to Herold, the trigger for that merger in those places was contact between native English speakers and large numbers speakers of English who were native speakers of languages without a distinction between [ɑ] and [ɔ].

The facts for adult migrants are less clear — changes do occur in adult speech upon exposure to a new dialect, but the changes seems to be a matter of degree rather than actual shift, and the changes that occur have not been studied particularly deeply. There is a need for a study that deals directly with linguistic changes that occur in the speech of adult migrants so that we can have a better idea of the degree to which the linguistic system is malleable long after language acquisition has supposedly passed completely. The study outlined in this dissertation fills that gap.

2. Description of Waldorf and the Southern Maryland region

2.1. Maryland and Charles County history

The history of Maryland generally and Charles County specifically, while not bearing *directly* on the study at hand, is useful for setting up a context within which the language change in the past century discussed in this dissertation can be better understood. As noted in the history that follows, Maryland's history has been checkered with sectarian violence and intrigue. It is important to make note of this, as even as recently as the last century Protestants and Roman Catholics tended to settle areas separately due to religious differences stemming in part from the Puritan Revolution in England. Because of this, Roman Catholic and Protestant communities developed separately, with relatively little interaction (including, presumably, linguistic interaction) between the two religious groups, leading to the possible existence of separate Protestant and Roman Catholic speech communities in different areas (Davis *et al* 1976; Potyraj 1994).[12]

The colony of Maryland was established after George Calvert, the first Lord Baltimore, was granted the territory (which also included what is now the state of Delaware) in 1632. George Calvert's son, Cecilius Calvert, headed the first settlement of English-speakers to the territory in 1634 and founded St. Mary's City as the colonial capital and county seat of St. Mary's County, the first county established in the colony. Cecilius Calvert wished to establish a colony where Roman Catholics and Protestants could all worship freely, and in 1649 the Act of Toleration was

[12] This is particularly important for this study, given that this is a study of the town of Waldorf in Charles County, and Charles County was an early center of Protestantism within what was then largely Roman Catholic colony of Maryland, though what was to become Waldorf held a large number of Roman Catholics (Klapthor and Brown 1958), as noted elsewhere in this chapter.

approved, which guaranteed freedom of worship in the colony. Because of the freedom of worship guaranteed in the colony of Maryland, Maryland's original English-speaking settlers included large numbers of both Roman Catholics and Protestants (the latter largely members of the Church of England) (Castello *et al* 1976; Davis *et al* 1976; Potyraj 1994). A few Jews also settled in the colony, and freedom of worship was extended to them, as well (Davis *et al* 1976).

In the midst of this, Charles County was formed from St. Mary's County in 1658. The boundaries were formed roughly along religious lines, with St. Mary's County being largely Roman Catholic and Charles County predominantly Protestant, although the area that would eventually become the town of Waldorf included a sizable Roman Catholic population (Klapthor and Brown 1958). In 1692 the Act of Toleration was rescinded after Virginia Puritans took over the colonial government. At this point, the Church of England was made the state religion of Maryland and the practice of Roman Catholicism was pushed underground, but whether this resulted in more or less interaction between Roman Catholics and Protestants is unclear from the historical record (Potyraj 1994).

With the exception of the importation of African slaves into the colony, which began at the latest in 1642[13] (Coates and Diggs 1976), and a scattering of Huguenot and German immigration, early immigrants into Southern Maryland came nearly exclusively from the British Isles. Also, during the eighteenth century Charles County was not only an immigration destination, but also a major transportation route between Baltimore, Maryland and Williamsburg, Virginia, as the Post Road ran through the county. The situation had changed by the Civil War, however — road traffic

[13] Coates and Diggs (1976) give this date, but it should be noted that slavery was not explicitly legal in Maryland until 1644.

shifted westward, with traffic from Baltimore now going through Washington, DC to Richmond, Virginia, and the railroads largely bypassed Southern Maryland. Partly as a result of the region's decreased importance as a transportation route, and partly as a result of slavery and its end,[14] the region's population contracted somewhat during the late nineteenth and early twentieth centuries (Kretzschmar *et al* 1993).

In the years surrounding World Wars I and II, however, large-scale immigration to the region resumed. Pennsylvania Germans[15] came to the region in sizable numbers during this time. This included a number of Pennsylvania German-speaking Catholics and Lutherans who settled throughout the region and rapidly became linguistically assimilated; those Pennsylvania Germans in this wave who maintained their language were Anabaptists who did not settle near Waldorf (Hostetler 1993).

In the years since World War II, immigration into Southern Maryland has come from all over the United States (and, much less commonly, from outside of the United States) as employment opportunities with the federal government in Washington DC have increased. The area that has seen the greatest influx of immigration in this wave has been the northern part of the region, which includes Waldorf, thereby increasing the amount of contact native speakers have with other dialects. This has occurred coincidentally with a shift from an agricultural economy to a service economy, particularly in the northern section of the region (Johnson and Karpiak 1976).

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[14] Before the abolition of slavery, slavery functioned as an impediment to European immigration; after abolition, freed slaves left the area for areas that were growing more rapidly economically.
[15] "Pennsylvania Germans" is used here in both the cultural and linguistic senses. At the time under discussion, however, nearly all rural (and a large number of urban) ethnic Pennsylvania Germans were also Pennsylvania German speakers.

2.2. Waldorf[16] history

Waldorf is the furthest north of all Southern Maryland communities and is the closest of them to Washington, DC, at twenty-three miles away. Waldorf first appeared on maps in the mid-nineteenth century, and the Baltimore and Potomac Railroad placed a station at Waldorf in 1872, but the town did not receive a post office until 1880 (Edelen *et al* 1976). The town did not begin to grow appreciably until after the completion of the Potomac River Bridge between Pope's Creek (in Charles County), Maryland and Dahlgren, Virginia in the late 1930s, when several gambling establishments were set up in Waldorf. When gambling was outlawed in Maryland shortly after that, however, Waldorf's population growth slowed greatly and did not take off until the founding of the St. Charles development. St. Charles is a planned community that was originally thought of as being part of Waldorf when it was begun in the late 1960s, but since then it has started to appear on maps as a larger town separate from Waldorf (Klapthor and Brown 1958; Edelen *et al* 1976). Because St. Charles is served by the Waldorf post office, subjects who are from St. Charles are considered to be from Waldorf for the purposes of this dissertation.

2.3. Demographic characteristics of Charles County and Waldorf

Slaves were held in Charles County from at least 1642 until slavery was outlawed in Maryland in 1864, and as late as the mid- to late nineteenth century the black population was nearly as large as the white population of the county (Coates and Diggs 1976). There are, however relatively few

[16] Waldorf and the communities immediately surrounding it are all unincorporated municipalities, and so their borders are not legally set. Therefore, the area that is referred to as Waldorf throughout this dissertation uses the US Postal Service's definition of Waldorf: currently, those areas that fall under ZIP codes 20601, 20602, and 20603. (There is also a ZIP code 20604 assigned to Waldorf, but that ZIP code includes only post office box addresses.)

individuals of African descent now in the area, as shown in Table 1, which gives 1990 census data reporting the population of the county by race. There has never been a large Hispanic presence in Charles County; 1990 census data reporting the population of the county by ethnic classification is given in Table 2.

Racial Classification	Number	Percent of Total
White	80,234	79.3%
Black	18,419	18.2%[17]
Asian	1,338	1.3%
Native American	761	0.8%
Other	402	0.4%

Table 1: Population of Charles County by racial classification, 1990 (US Bureau of the Census 1997)

Ethnic Classification	Number	Percent of Total
Non-Hispanic	99,449	98.3%
Hispanic	1705	1.7%

Table 2: Population of Charles County by ethnic classification, 1990 (US Bureau of the Census 1997)

[17] Although this percentage is higher than the national average, it is significantly lower than the percentage for the state of Maryland as a whole, which is 24.9% (US Bureau of the Census 1999).

According to historians' reports (particularly Edelen *et al* 1976 and Potyraj 1994), the population of the Waldorf area has grown extremely quickly since World War II. Unfortunately, as Waldorf is an unincorporated municipality, reliable population statistics are difficult to come by. However, to demonstrate the Waldorf's dramatic population growth, Figure 1 shows the resident population of Charles County as a whole with the population of Maryland given as a benchmark to rate the growth of Charles County's population against. It should be noted that Waldorf's population growth has likely been even more dramatic than Charles County's as a whole, as Waldorf has gone from being one of the smaller towns in Charles County to being the county's largest municipality.[18]

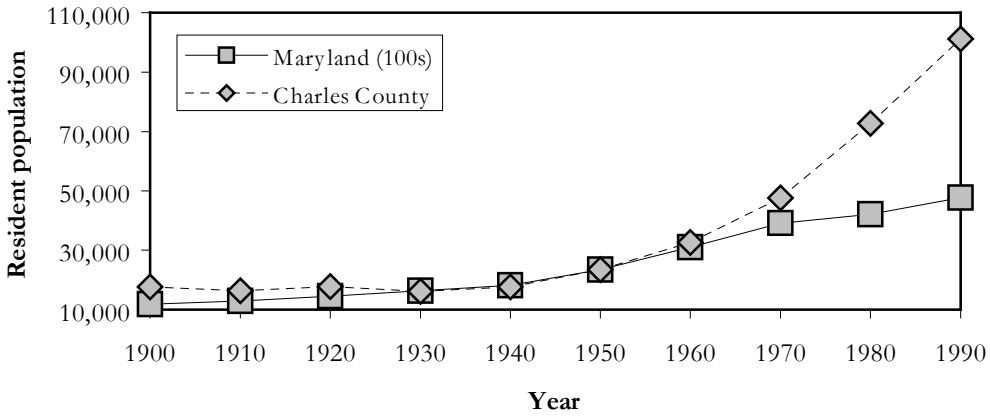

Figure 1: Resident population of Maryland and Charles County (US Bureau of the Census 1995)

[18] This is the case if St. Charles is considered part of Waldorf. If St. Charles is considered to be separate from Waldorf, however, the picture is even more striking — St. Charles is the largest municipality in Charles County, and Waldorf is the second-largest (*Rand McNally road atlas* 1998).

2.4. Linguistic features of the region

Traditional dialectologists disagree on the exact position of the line separating the South and South Midland dialect regions in Maryland, as shown in Figure 2. This figure shows the approximate position of the South-South Midland dialect isogloss according to Kurath and McDavid 1961 and to Kretzschmar *et al* 1993; Waldorf is marked by the oval at the northern edge of Charles County.

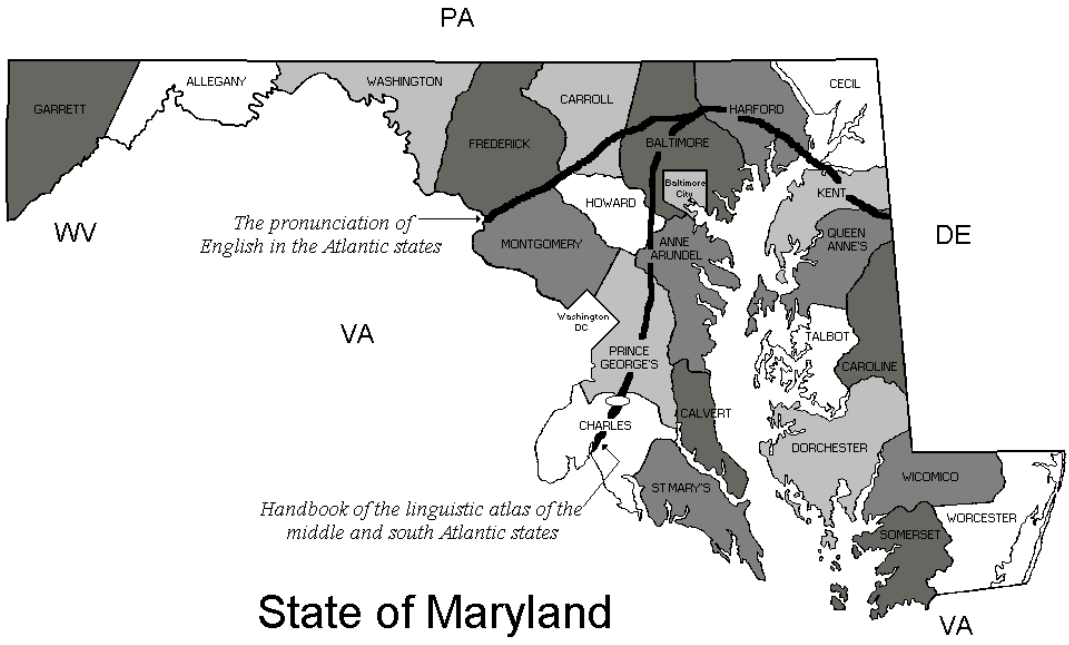

Figure 2: South-South Midland dialect isoglosses in Maryland according to *The pronunciation of English in the Atlantic states* (Kurath and McDavid 1961) and *Handbook of the linguistic atlas of the middle and south Atlantic states* (Kretzschmar *et al* 1993)

According to Kurath and McDavid 1961, Waldorf lies clearly within the Southern dialect region, while according to Kretzschmar *et al* 1993, Waldorf lies in an undefined border area between the Southern and South Midland dialect regions.[19] Although the technical question of whether Waldorf falls within the South or the South Midland is, in the end, unimportant for the purposes of this dissertation, it is necessary to determine what exactly the "Waldorf pattern" is, and so this is dealt in chapter 5.

[19] This is possible because no interviews for the LAMSAS project were undertaken in Waldorf itself. The nearest interview was in Gallant Green, Maryland, an adjoining but (at least at that time) very separate community. In any event, the reliability of the informant in Gallant Green may be called into question, as he was described as "slow of thought and association (effect of age); somewhat deaf" (Kretzschmar *et al* 1993:307).

3. Fieldwork and analysis methods

3.1. The interview phase

Interviews were conducted from the fall of 1997 (when a small pilot study was done) through the summer of 1999. Interviewees for the pilot study came from my own kinship and friendship networks, and contacts for further interviews were set up through the interviewees' kinship and friendship networks — that is, interviewees were asked what friends they had who could be interviewed for the study, and those friends were then contacted and an interview was set up with them. The interviews were conducted either in the interviewees' own homes or in their friends' homes. All told, sixty-three people were interviewed, and of those, forty-three met the demographic requirements to fit into the study sample; they are discussed in chapter 4. The study sample included four people in my kinship network as well as five people who at one point were in my friendship network, but in all five cases those friendships had lapsed by the time the interviews were conducted.

3.1.1. The form of the interviews

There were two different sorts of interviews, one which contained only commutation tests (described in detail in 3.1.1.1) and one which contained both commutation tests and an interview designed to obtain natural speech from the subject; for convenience, in this section I refer to these as, respectively, a "partial interview" and a "full interview".

A full interview had three distinct parts — first the subject was recorded reading word lists (for the commutation tests, which came later), then an interview designed to elicit casual speech (described in 3.1.1.2) was conducted, and then the subject performed commutation tests.[20] This follows the pattern described in Labov 1984, except that formal language routines were done at the beginning of the interview as well as at the end. The entire interview generally took about an hour, but if the subject was comfortable and talkative enough the interview might last a bit longer.

The partial interview did not contain the section designed to elicit casual speech, but rather was focused exclusively on obtaining results from the commutation tests. Therefore, the order in which the partial interviews proceeded was that first the subject was recorded reading the same word lists those who participated in the full interviews read, then demographic information was obtained from the subject, and finally the subject performed the commutation tests. The entire interview in this case took up to about fifteen minutes.

There were a few occasions in which it was possible for two people to be interviewed at once in a full interview. The pairs interviewed in this manner were all husband-wife pairs; the cases in which two people were interviewed at once and one or both of the interview participants were included in the sample were the following: Blake and Charles,[21] Bo and Paulie, Jeri and Pippin, Delsie and

[20] The commutation test was conducted with Dean and Warren (all of the subjects' names given in this dissertation are pseudonyms) but the results are not reported here due to concerns about diminished hearing on those subjects' parts.
[21] The formal elicitation and commutation test sections of the interview for these two were conducted in separate interviews at a later date.

Klement,[22] and Derry[23] and Jan. The general format of the full interview was unchanged in these cases, in that each individual was first recorded reading the word lists for the commutation test, after which the informal sociolinguistic interview was conducted with both of them present,[24] and then each of them performed the commutation test separately. An interview in which two people were interviewed at once generally took about ninety minutes.

3.1.1.1. The commutation tests

The casual interview portion of the interview was bracketed by commutation tests (following the methodology of Labov, Yaeger, and Steiner 1972 and Labov, Karan, and Miller 1991), which were conducted to determine the progress of the mergers in the pre-lateral non-low back vowels (i.e., the vowels in *pull, pole,* and *pool*) in perception and production. The subjects took a series of three commutation tests, each comparing a minimal pair with different pre-lateral non-low back vowels in order to determine the presence or absence of mergers in perception.

At the beginning of the interview the subject was recorded reading three lists, each a randomly ordered list of thirty words made up of minimal pairs covering each pair of sounds under study.[25] The subject was asked to read through each list slowly, but was not told what the purpose of reading through the lists was. If an error was made in reading the list, the subject was asked to

[22] Klement did not fit in the sample, and the formal elicitation and commutation test sections of the interview were not conducted with him. He was, however, present as an active participant during the narrative interview section.
[23] Derry did not fit into the sample, but participated in all sections of the interview.
[24] The formal elicitation subsection of the interview, of course, resulted in separate answers from each individual.
[25] So there was one list made up of the words *pole* and *pull*, another of *pull* and *pool*, and one of *pole* and *pool*.

read the list again, and the corrected reading was used. In the case of the full interviews, the casual sociolinguistic interview (see 3.1.1.2) was then conducted, and in both the partial and full interviews demographic information was obtained from the subject. The subject was then presented with the recordings of the minimal pair lists and was asked to rate what was heard.

Although each subject was recording reading three different word lists, each subject was asked to rate *four* different lists. The first list each subject rated was a dummy list. The subject was given a form consisting of twenty pairs of checkboxes for the *pull*/*pole* pair and was told that a list of twenty words would be played, each of them either *pull* or *pole*, and that the subject was to mark down what was heard. The recording consisted of an individual with a pattern approaching full merger of the vowels in *pull* and *pole;* the subject was warned that the person on the recording was "being difficult on purpose". This dummy test was performed first for a few reasons, the most important being to get the subject used to guessing in the face of being unsure of the identification of the word, as well as simply getting the subject used to rating utterances generally. In addition, this provided some practice for the subject, so that the chance of errors resulting from simply not being used to the testing method would be minimized in rating the next three word lists.

After the dummy test, the subject was presented with the recordings of the minimal pairs that the subject had been recorded reading earlier. For each of the lists the subject had read,[26] the subject was given a corresponding form with twenty pairs of checkboxes and was asked to mark down

[26] That is, one list of *pull* and *pole*, one of *pull* and *pool*, and one of *pool* and *pole*.

which words were heard on the tape. Making a choice was forced — the subject was explicitly told that if a decision couldn't be made on which box to check, guesses were in order and one or the other choice should be marked. It should be stressed that, unlike the dummy test, the subject was listening to the subject's own production of these words for these tests. As noted above, the subjects read lists of thirty words in each minimal pair list; however, the form provided had only twenty pairs of checkboxes. This is because the subject heard only twenty words from each list — the tape was started at the fourth utterance of each list and the next twenty utterances were played.[27] In this way, difficulties involving intonation and volume at the beginning and particularly the end of reading such a list were eliminated, as was the remote but real danger of the subject having simply memorized the list while reading it and marking down the answers accordingly. The subjects were told that the tape was not being started at the beginning (though they were not told which utterance the playback started with) and why. This was done so that if someone who *had* memorized the list was taking the test, that person wouldn't get items unnecessarily wrong simply due to being out of phase with the words that were actually being played.

3.1.1.2. The casual interview section

Less detail is needed regarding the casual sociolinguistic interview segment, as it involves methods that are in more widespread use by sociolinguists. This part of the interview began with a few demographic questions, followed by questions directed toward getting a measure of neighborhood involvement (for the lifelong Waldorfians) or hometown connections (for the Waldorf exiles). After this came the longest part of the interview, a section designed to encourage

[27] In other words, the subject heard the fourth through the twenty-third (inclusive) utterances from each list.

spontaneous speech, particularly narratives, using question modules. For the most part, the modules that were the most successful for eliciting narratives were questions about social life in high school (especially questions about cheating) and about meeting one's significant other. A formal elicitation section, including a word list and elicitation of individual words and minimal pairs, followed this. Finally, a few demographic questions (some repeating earlier questions) were asked so that those answers could all be easily found at the end of the tape.

After this, the subject was asked to rate the minimal pairs read for the commutation tests as described above in Section 3.1.1.1.

3.2. The analysis phase

The analysis phase followed (with some overlap) the interview phase. Two issues in particular were dealt with in the analysis phase: the perception of the non-low pre-lateral vowels in comparison with their production, and the shape of the vowel system generally. These are discussed below, along with a short discussion of a few primarily statistical issues that came up in the analysis of the commutation test data.

3.2.1. Perception and production of the non-low pre-lateral vowels

After the commutation tests were completed, the answers given by the subjects as to what they believed they heard were checked against a master list. If the subject correctly identified all of the words in a particular minimal pair list, then that subject was identified as not having a merger in perception for that pair. On the other hand, if the subject misidentified any of the words on a

particular list, that subject was identified as having a merger in perception in pre-lateral environments for the vowel pair in question.[28] In addition, the words rated by the subjects in the commutation tests were subjected to acoustic analysis to measure production. Specifically, the vowels in all of the words rated by each subject in the commutation tests were put through a linear predictive coding analysis (in the same way as described in 3.2.2). This gave first and second formant values for each utterance, so the existence or absence of mergers in production could be determined using first formant-second formant plots. It should be noted that the same utterances were tested for evidence of merger in perception and production, and therefore the danger of differences due to style or setting was avoided.

3.2.2. Production of the vowel system generally

To get a look at the vowel system generally, monosyllabic words[29] were taken from the casual interview section and the stressed vowels in them were analyzed; the target was three to five examples of each vowel class in various environments.[30] Production of the general vowel system for each subject was measured by conducting a linear predictive coding analysis (using the equipment detailed in Appendix A), which resulted in first and second formant values for each

[28] This is a very strict standard — even just one misidentified word resulted in the subject being labeled as having a merger in production. The rationale, however, is that if there is a robust distinction between two phonemes (as an example, consider the initial consonants in *mat* and *cat*), there could be absolutely no confusion between them (Labov, Karan, and Miller 1991).

[29] That is, monosyllabic words with limited exceptions — for example, to obtain tokens of /ə/ polysyllabic words such as *about* were used, and the polysyllabic words *Mary, merry,* and *Mary* were specifically taken to test for the merger of /eɪ/, /ɛ/, and /æ/ before /ɹ/.

[30] Generally, the selection of vowels for acoustic analysis followed the system used by the Phonological Atlas of North America/TELSUR project at the University of Pennsylvania, outlined by Labov, Ash, and Boberg (1997). The various vowel classes, along with the symbols used for them, are listed in Appendix B.

utterance. These formant values were then normalized so that they could be compared directly.[31] The resulting normalized values were then placed on first formant-second formant scatterplots to give a visual impression of the progress of mergers in production. The results of this analysis, simplified, are shown in Appendix C.

3.2.3. Statistical issues from the commutation test data

Examples of production from the commutation tests are shown in Figure 3, Figure 4, and Figure 5. Figure 3 shows a case in which the production of the vowels in the minimal pair *pull-pool* is visibly distinct, while Figure 4 shows the opposite case, in which the vowels in the minimal pair *pull-pool* are produced visibly merged. Figure 5, however, is a somewhat more interesting case. In Figure 5 the production of the vowels overlaps somewhat, but the vowel spaces are largely separate, reflecting what Maekawa (1989), in discussing such cases of unclear production, called a "doubtful merger" in production. In order to conduct an adequate analysis of each subject's perception and production, something must be done to identify these sorts of questionable mergers. There are three immediately obvious ways to deal with them, each outlined below, and each method has advantages and disadvantages.

[31] The normalization method used was a simple arithmetic mean-based normalization, which could be used because relative values of the formants were compared, rather than comparing the shapes of distributions, which would have likely required a different approach to normalization. It should be noted here that this normalization was only done with the values for the study of the vowel system generally; as the values resulting from the commutation test results were not directly compared between speakers, those values were not put through a normalization process.

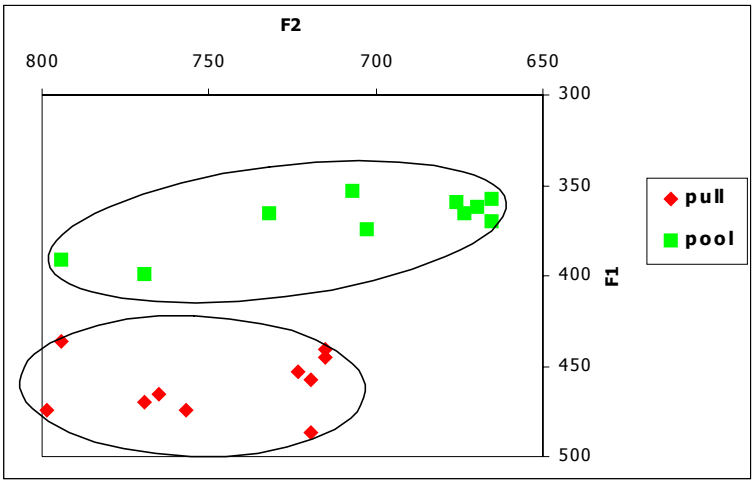

Figure 3: An example of distinct production (*pull* versus *pool*, produced by Pippin, lifelong Waldorfian, born 1951, not normalized)

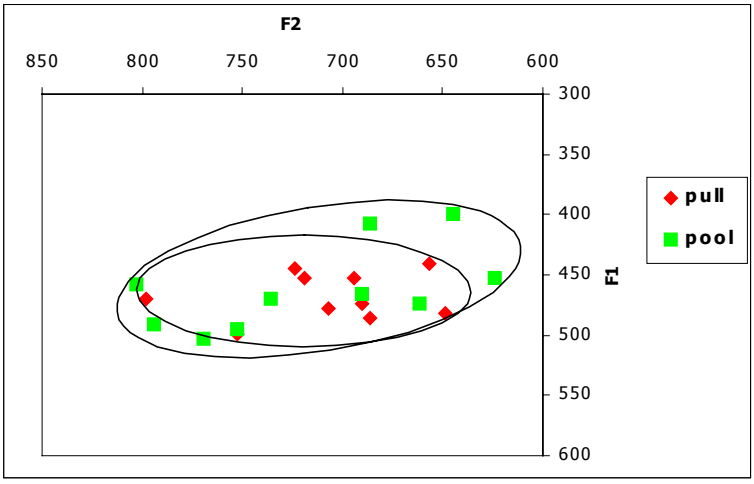

Figure 4: Example of merged production (*pull* versus *pool*, produced by Charles, lifelong Waldorfian, born 1969, not normalized)

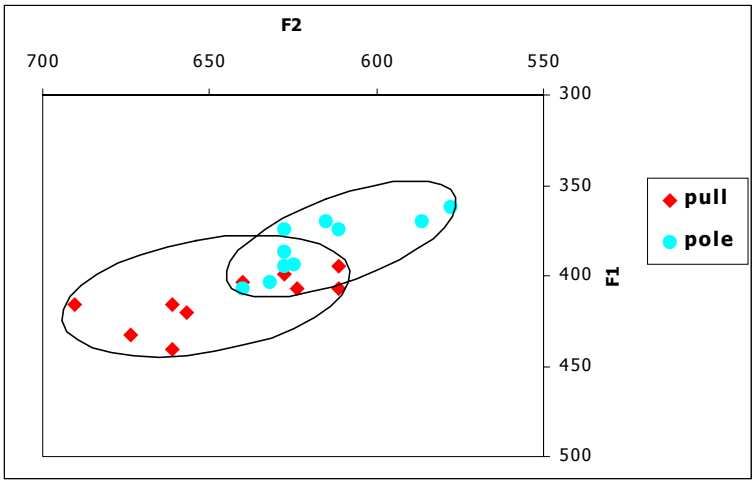

Figure 5: Example of a "doubtful merger" in production (*pull* versus *pole*, produced by Monique, Waldorf exile, born 1974, 7 years away from Waldorf, not normalized)

3.2.3.1. Analyzing "doubtful mergers" as partial mergers

The most obvious — and at first glance, the simplest — way to analyze cases like those in Figure 5 is to classify them as partially merged on a ternary fully merged-partially merged-unmerged scale. There are strong disadvantages to taking this approach, however.

The first is that taking such an approach introduces a great deal of complexity into determining what a partial merger as opposed to a complete merger might be. A look at Figure 4 underscores

this problem — although the vowel spaces overlap to a great extent, making it visibly apparent[32] that this is a complete merger, the overlap is not *absolutely* complete.[33]

In addition, classifying subjects' production as partially merged reduces the ability to directly compare the results of analyzing the production of vowels with the results of commutation tests testing the perception of those same vowels. As commutation tests give as their result a binary distinction between merged and distinct forms in perception, it would seem best if the test of merger in production used for this analysis also resulted in a binary distinction.

For these reasons, the approach of analyzing "doubtful mergers" as partial mergers was not taken in this study. However, it is worth noting that future studies of this sort of phenomenon might try to come up with a scalar means[34] of describing mergers in both production and perception. If such a system can be found it would lead to more exactness in future studies of the perception and production of phonemic change.

3.2.3.2. Analyzing "doubtful mergers" as complete mergers

An alternative approach to questionable cases of merger — and one that I have used in earlier work (Bowie 1998) — is to classify them as cases of complete merger. The logic behind such a method of classification is, crucially, that the produced vowels are to be compared to the results of commutation tests. As the commutation tests give a result such that *any* overlap at all in

[32] And, when the method outlined in 3.2.3.3 is used, statistically apparent.
[33] In fact, given the analog nature of speech production, it would be a rather rare thing to see *complete* overlap among vowel spaces—outliers are, after all, a fact of life.
[34] Whether using a ternary scale of merged-partially merged-distinct or, preferably, a finer scale.

perception is rated as a full perceptual merger,[35] it seems reasonable to demand that the rating of production should follow the same standard.

This approach, however, oversimplifies the situation. A look at Figure 4 and Figure 5 shows situations that this approach would rate both of these situations as exactly the same, when there is visibly a difference between them. Given this problem, this method of analysis is not used in this dissertation.

3.2.3.3. Analyzing "doubtful mergers" using statistical methods

After the discussion of drawbacks of the other methods one could use to analyze cases of "doubtful merger", using some sort of statistical test of distribution to determine whether a case like the one in Figure 5 is actually a case of merger in production or not becomes very appealing. The main problem that presents itself, then, becomes one of which statistical test is best used for this.

Maekawa (1989) has proposed using the Hotelling's T^2 test (the bivariate analogue of Student's t test) to test for merger in production. This approach allows each pair of vowel spaces to be tested all at once, as the Hotelling's T^2 test analyzes bivariate distributions. This is appealing, but there is one significant drawback — it assumes that the first and second formants are of equal importance for the progress of merger. Although the differences are not that great, it is known that individuals can generally perceive smaller distinctions in the first formant than in the second formant (Flanagan 1955). As a result, it is possible (though not necessarily the case) that testing

[35] As noted in Footnote 28.

both formants at once could mask the effects of just one formant. As a result, the primary method used in this study was to test the values of each formant for each of the sets of vowels using a Student's t test assuming unequal variances. This test was conducted for each formant with a null hypothesis that the formants being tested were equal, and a result of $p<0.05$ (with two tails) was taken to mean that the formants were in fact different. The assumption of unequal variances was made because some of the pairs tested required this method, and those pairs that did not require this approach could still be safely tested with it (Berk and Carey 1998).

Under this analysis, if both formants for each pair of vowels came up as merged the vowels could be safely described as merged, while if both formants for each pair came up as distinct they were definitely distinct. If one formant for a pair of vowels came up as merged while the other formant was distinct, then the vowels could — pending finer analysis — be described as distinct,[36] but the separate treatment of each formant would allow for patterns to emerge if one formant consistently caused odd effects.[37] It should be noted that this is *not* a claim that a statistical difference between means or distributions of the production of two vowels is necessarily a reflection of a phonemic difference between the two vowels. Rather, this test for differences in production is quite simply that — a test to see if two vowels are produced

[36] It is, after all, entirely possible for completely distinct vowels — for example, an extremely fronted /u/ and an /i/ — to happen to have the same first or second formant value as their target, but they would not have the same first *and* second formant values unless they were also distinguished by something not directly reflected by formant values (for example, rounding).

[37] That this approach uses the same cut-off point for *p* values for both formants involves, of course, ignoring one of the advantages of separate t tests over a single T^2 test — the ability to reflect the reality that humans perceive the first and second formants with different sensitivities. The method of using separate t tests is still used, however, as it allows for future reanalyses of the data to be conducted more easily, and also because it allows patterns in the difference between the behavior of the first and second formants to be more easily seen.

differently. Whether there is actually a phonemic distinction made between two vowels that are produced differently to a significant degree would have to be determined in other ways.

Using the method of testing production via Student's t tests, the pattern shown in Figure 3 is, as expected, rated distinct in production for both formants[38] while the pattern shown in Figure 4 is, also as expected, rated as merged in production for both formants.[39] In the "doubtful merger" case of Figure 5, the statistical approach results in the vowels being rated as distinct.[40]

Given all this, the statistical approach, as it is the most mathematically defensible and lends itself well to adaptation and refinement, is used in this dissertation.[41]

[38] With probability values of $p<0.0001$ for the first formant and $p<0.05$ for the second formant.
[39] With t tests confirming that both formants are merged the same. (Note that here and elsewhere in this dissertation probability results that confirm the null hypothesis are not given.)
[40] With values of $p<0.001$ for the first formant and $p<0.05$ for the second formant.
[41] Note that, as mentioned earlier, analyses of the distribution of production were conducted on unnormalized formant values.

4. Individuals in the sample

All of the individuals interviewed for the current study are natives of Waldorf, and therefore native speakers of Waldorf's local dialect. This means that all of the speakers discussed in this dissertation moved to Waldorf no later than age four,[42] as that is a safe cut-off age to allow for complete acquisition of the phonological system of a local dialect.[43]

The speakers were divided into two groups — those who moved away from Waldorf as adults[44] (referred to as the "Waldorf exiles") and those who remained in Waldorf as adults (referred to as "lifelong Waldorfians"). Social variations were kept to a minimum in the sample to allow a greater focus on the difference between the Waldorf exiles and the lifelong Waldorfians; all subjects of this study were lower-middle- and middle-middle-class at the time of their interviews.[45] The samples were selected differently, as described in sections 4.1 and 4.2.

As described in chapter 3, several of the individuals in the sample underwent an interview consisting of at least a section designed to elicit narrative responses and a selection of formal methods such as minimal pair comparisons, a word list, semantic differentials, and such. In addition, all of the speakers except for two of the lifelong Waldorfians underwent a series of commutation tests comparing minimal pairs of *pull, pole,* and *pool;* whether each of the lifelong Waldorfians took commutation tests were taken is indicated in Table 3.

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[42] Age two was originally set as a cut-off for the minor children interviewed, but all of the minor children were for all intents and purposes born in Waldorf (that is, there is no hospital in Waldorf, but they arrived in Waldorf itself very shortly after being born).
[43] This age cut-off would, of course, be unacceptable for studying lexical distributions, which are in any event not dealt with in the current study.
[44] That is, at age seventeen or later.
[45] As defined by the individuals' occupations.

4.1. The lifelong Waldorfians

The lifelong Waldorfians were selected to provide a broad range of ages, so that a picture of the Waldorf pattern as it has changed over time could be drawn. Lifelong Waldorfians in the sample are shown in Table 3, arranged by year of birth. Table 3 also shows the gender of each individual, whether each individual underwent commutation tests for *pull, pole,* and *pool,* and whether they participated in a casual interview. All of the lifelong Waldorfians except for Dean and Warren took the commutation tests. Dean and Warren did not take the commutation tests because they were somewhat hard of hearing (Warren more so than Dean), and it was feared that that would throw off the results.[46]

pseudonym	year of birth	sex	commutation tests?	casual interview?
Warren	1909	Male	No	Yes
Theona	1919	Female	Yes	Yes
Elden	1921	Male	Yes	No
Rowan	1929	Female	Yes	Yes
Gerald	1941	Male	Yes	Yes
Randall	1942	Male	Yes	No
Elise	1946	Female	Yes	Yes
Raymond	1948	Male	Yes	No
Jeri	1951	Female	Yes	Yes

[46] For both of them, according to both relatives and the individuals themselves, the hearing loss occurred well into adulthood. Because it appeared that there had been no hearing-related impediment to acquiring language normally as children, they were still both included in the general sample.

pseudonym	year of birth	sex	commutation tests?	casual interview?
Pippin	1951	Male	Yes	Yes
Melina	1954	Female	Yes	No
Bo	1956	Male	Yes	Yes
Paulie	1957	Female	Yes	Yes
Tex	1960	Male	Yes	No
Dean	1962	Male	No	Yes
Rosa	1963	Female	Yes	No
Roy	1965	Male	Yes	No
Niels	1966	Male	Yes	No
Torren	1967	Male	Yes	Yes
Blake	1969	Female	Yes	Yes
Charles	1969	Male	Yes	Yes
Capri	1971	Female	Yes	Yes
Dayne	1973	Male	Yes	No
Joanne	1977	Female	Yes	No
Helen	1978	Female	Yes	Yes
Deanna	1979	Female	Yes	No
Dawson	1980	Male	Yes	Yes
Gus	1982	Male	Yes	No
Kelly	1986	Female	Yes	Yes
Cherokee	1988	Female	Yes	Yes
Thane	1988	Male	Yes	No

Table 3: Lifelong Waldorfians in the sample, arranged by year of birth

4.2. The Waldorf exiles

The Waldorf exiles in the sample are listed in Table 4. Table 4 is set up somewhat differently than Table 3 due to some differences in the makeup of the two subsamples. Whereas the lifelong Waldorfians spanned a large range of ages, all of the Waldorf exiles were born between 1965 and 1980, allowing for a tighter focus on a single group that learned its native dialect all around the same time. For this reason, Table 4 is sorted by the number of years elapsed since each individual moved away from Waldorf, rather than by year of birth. In addition, all of the Waldorf exiles took the commutation tests comparing *pull, pole,* and *pool,* so there is no column showing whether those tests were taken; one of them (Tully), however, did not undergo a full casual interview, so there is a column showing whether that segment of the full interview was done. The column showing the each individual's current place of residence shows simply the urbanized area the individual resided in at the time the interview was conducted. In cases where the individual had lived most of the time spent away from Waldorf in a different area than where the interview was conducted, or if the place of residence does not necessarily reflect the dialect the individual is usually surrounded with, that is indicated in footnotes.

pseudonym	years away from Waldorf	year of birth	sex	place of residence	casual interview?
Tully	2	1971	Male	Denver, Colorado	No
Delsie	2	1976	Female	San Antonio, Texas[47]	Yes
Lindsey	3	1977	Female	Phoenix, Arizona	Yes
Max	4	1975	Male	Phoenix, Arizona[48]	Yes
Jacob	5	1974	Male	Phoenix, Arizona	Yes
Monique	7	1974	Female	San Antonio, Texas[49]	Yes
Khristina	9	1971	Female	Twin Falls, Idaho	Yes
Miles	10	1969	Male	Tampa, Florida[50]	Yes
Jessica	11	1969	Female	Knoxville, Tennessee	Yes
Licia	11	1970	Female	Phoenix, Arizona	Yes
Sylvia	11	1970	Female	Logan, Utah	Yes
Jan	13	1967	Male	Portland, Maine	Yes
Alec	14	1967	Male	Provo, Utah[51]	Yes

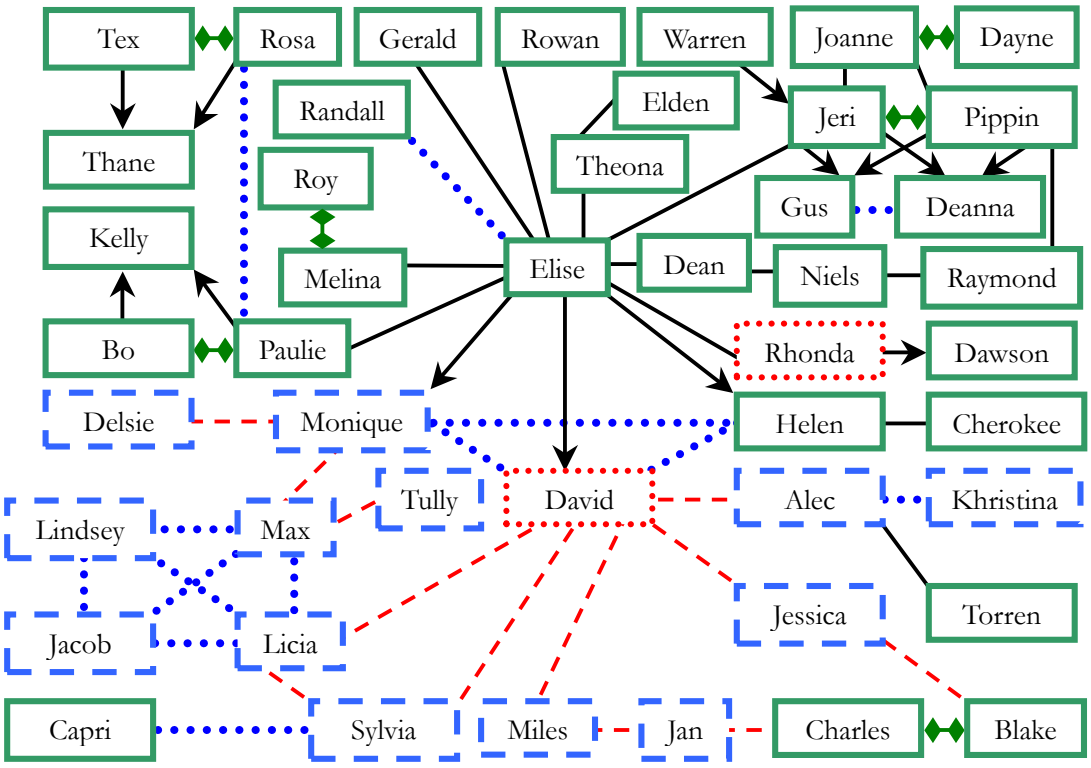
Table 4: Waldorf exiles in the sample, arranged by number of years away from Waldorf

[47] Delsie moved to San Antonio as a result of an Air Force assignment, and so she has spent her time there with mixed-dialect surroundings rather than with constant exposure to the San Antonio dialect.
[48] Max has spent about an equal amount of his time away from Waldorf in the Phoenix area and near Toronto, Ontario.
[49] Monique moved to San Antonio after joining the Air Force, and so most of her second dialect exposure has been in a mixed-dialect situation.
[50] Miles had lived several other places before this, all on assignment with the Marines. Consequently, his daily dialect exposure was generally mixed rather than that of the area in which he was living at the time.
[51] Alec had just barely moved to Provo when the interview took place. Before that, he had lived several places in the western US, with the longest stretch of time spent in Spokane, Washington.

4.3. Social relationships in the sample

Figure 6 shows the social relationships between the individuals in the sample. Two individuals who did not fit in the sample (Rhonda and David, the latter being the author of this dissertation) were included to complete the picture of the social network.

Interestingly, Figure 6 shows no lapsed friendships among the lifelong Waldorfians, but as one might expect, among those who left Waldorf as adults there were quite a few. (In fact, even Delsie and Monique, who now both live in San Antonio, Texas, are not generally in contact with each other.) Although it is not apparent from the diagram, all sets of siblings and their parents, however, whether still in Waldorf or not, are still in contact with each other. It should be noted that of the sibling sets among the Waldorf exiles in the sample, in only one case do all of them live in the same area — Jacob, Licia, Lindsey, and Max all now live near Phoenix, Arizona.



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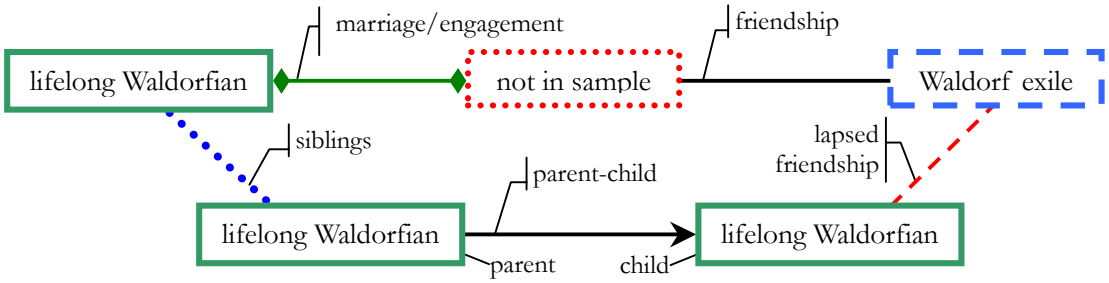

Figure 6: Social network of individuals in the sample

5. General vowel production among Waldorfians

As noted in chapter 2, there is some disagreement among traditional dialectologists regarding exactly which dialect region Waldorf falls into. Although the precise question of whether the Waldorf pattern is a Southern or South Midland pattern is unimportant for the study at hand, it is necessary to find out the Waldorf pattern itself is. This chapter deals, therefore, with the pattern of the Waldorf vowel system, with occasional discussion of the degree to which the system participates in the Southern Shift when appropriate. This chapter presents the vowel production of both the lifelong Waldorfians and the Waldorf exiles, but they are not compared in depth here; a direct comparison between the two subsamples is given in 8.2.

The main reason that the results for the lifelong Waldorfians and the Waldorf exiles are not compared in depth in this chapter is because of differences between the subsamples, the biggest difference being the relative ages of the speakers. As noted in chapter 4, whereas the lifelong Waldorfians covered a broad range of ages, the subsample of Waldorf exiles covers a fairly narrow band of ages (they were all born between 1965 and 1980). Also because of this difference, although the same linguistic features are described for both groups in this chapter, the results for each group are discussed somewhat differently here — where the results for the lifelong Waldorfians are generally discussed in terms of changes in apparent time, the results for the Waldorf exiles are discussed primarily in terms of correlation with the amount of time that individuals have lived away from Waldorf.

It should be noted that the data in this chapter is taken from the casual interviews, which were only undertaken with a subset of all of the speakers in the overall sample.[52] For this reason the results in this chapter are not as rigorous as the results for the progression of the mergers in the pre-lateral non-low back vowels described in chapters 6 and 7, but this chapter is still included to give a more general view of the situation among Waldorfians than those chapters do.[53]

5.1. Overall vowel production among lifelong Waldorfians

For reference and to give an overview of what might be called the "Waldorf system", Figure 7 is a first formant-second formant graph showing the average placement of the lifelong Waldorfians' (normalized) production of a selection of English vowels and diphthongs in various environments. (The symbols for the various vowel classes used in this figure and elsewhere in this dissertation are given in Appendix B.) As noted above, these vowels all come from casual speech, and therefore only the production of those lifelong Waldorfians who took part in casual interviews is included here.

[52] A list of the Waldorf exiles, including which of them participated in casual interviews, can be found in Table 4, and a corresponding list of the lifelong Waldorfians and which of them participated in casual interviews is to be found in Table 3.
[53] Somewhat simplified vowel mean charts for all of the speakers who took part in the casual interviews can be found in Appendix C.

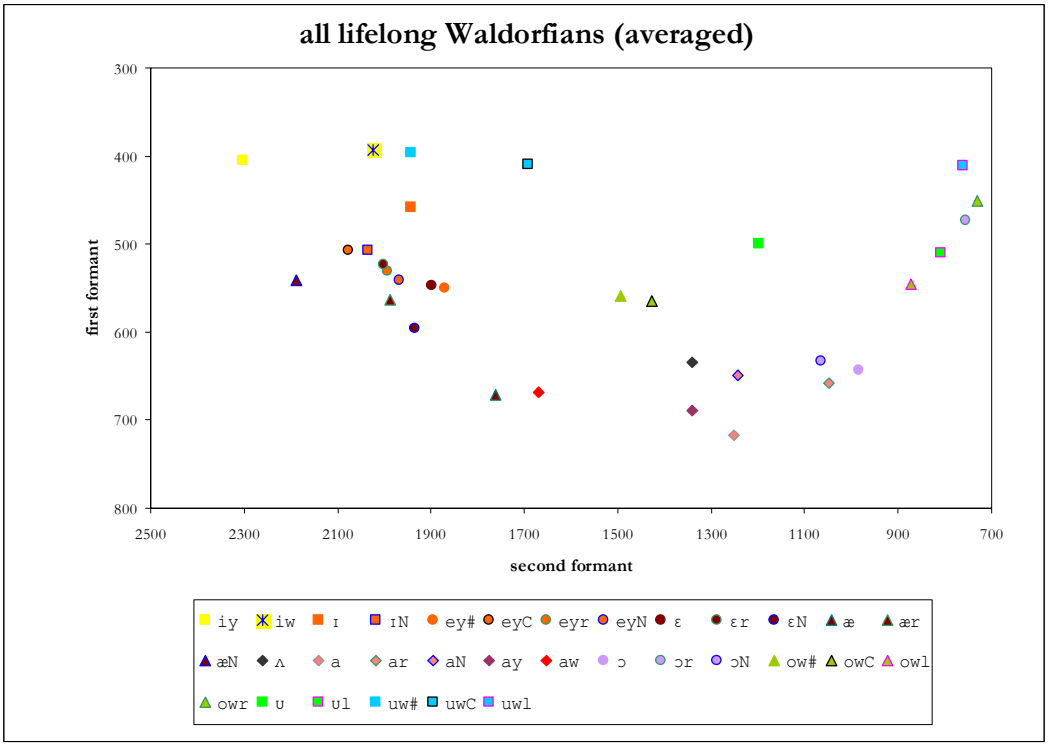

Figure 7: Averages of lifelong Waldorfians' production of vowel means

5.2. The front diphthongs /iy/ and /ey/[54]

One of the main markers of a Southern dialect is shown in the patterning of the diphthongs /iy/ and /ey/, in that /iy/ and /ey/ are centralized and lowered in relation to their commonly expected places (high front and mid front) in the vowel system (Labov, Ash, and Boberg 1997; Labov 1996). If Waldorf participates fully in the Southern Shift, one would expect

[54] This section does not deal with /ey/ followed by /r/. For a discussion of that case, see section 5.8.1.

that /iy/ and /ey/ would pattern in this way. On the other hand, if the Waldorf pattern is not Southern, then such centralization and lowering should not be apparent.

The picture is more complicated than either of these options, however, as /iy/ and /ey/ pattern very differently in Waldorf. This is reflected in the simplified vowel mean charts shown in Appendix C, where all samples of /iy/ are shown collapsed into one mean, while the samples of /ey/ are broken up by environment. This was done because it reflects the reality of Waldorf speech — the production of /iy/ is consistent regardless of environment, but the production of /ey/ is not.

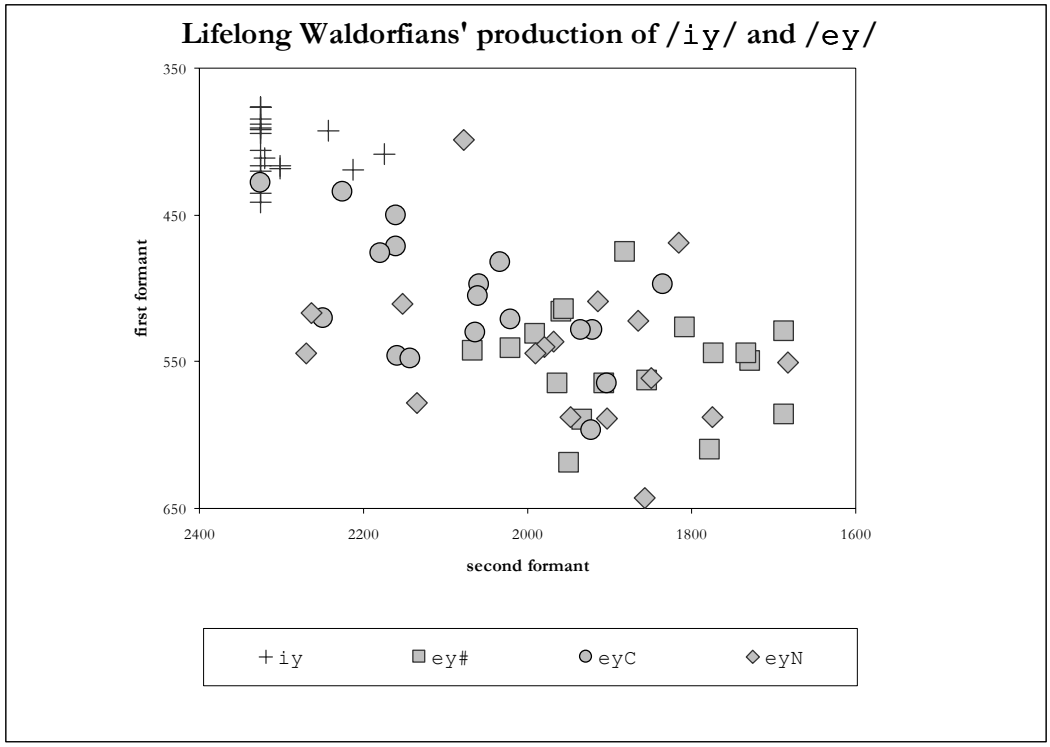

Figure 8: Lifelong Waldorfians' production of /iy/ and /ey/

Figure 8 shows the (normalized) position of /iy/ and /ey/ in relation to each other for each of the lifelong Waldorfians who underwent casual interviews. Quite simply, /iy/ is, as would generally be expected in a non-Southern dialect, produced in the extreme high front corner of the articulatory space, and this positioning is fairly stable for all speakers. This does not necessarily mean, however, that the Waldorf pattern can be described as non-Southern because of the position of /iy/. Lowering and centralization of /iy/ does not occur in all dialects that take part in the Southern Shift; most notably, that characteristic is not found in the Upper South (William Labov, p.c. 1999). The diphthong /ey/, however, appears to be centralized in the speech of some of the lifelong Waldorfians, and that process is more apparent in some environments than others.

Warren, the oldest speaker in the sample, shows what is presumably the earliest position of /ey/ accessible from living speakers — /ey/ is more or less in a mid front location in all environments, with word-final /ey/ slightly more back than in other environments. As one's view moves on to younger speakers, however, one sees what at first appears to be a tendency to change the positioning of /ey/, although any such tendency over apparent time turns out not to be statistically significant. Something can still be gleaned from the production of /ey/ among these speakers, however, which is shown in Figure 9. Figure 9 shows the distance (in terms of hertz) in the second formant between /iy/ and /ey/ (with the latter broken down into word-final and word-internal[55] environments). As the relative position of /iy/ is fairly stable for all of these speakers, this chart reflects the position of /ey/ in these environments.

[55] Excepting, as noted in footnote 54, /ey/ followed by /r/.

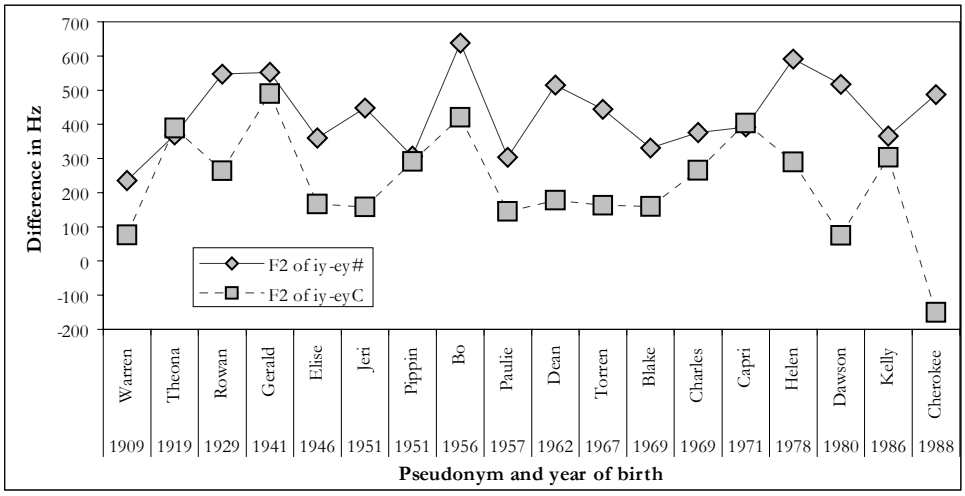

Figure 9: Differences in normalized F2 values for /iy/ and /ey/ in various environments among lifelong Waldorfians

The most striking of the environments of /ey/ is the word-internal[56] environment (which excludes the pre-nasal and pre-rhotic environments here). In the oldest male speaker, the second formant distance showing the amount /iy/ was in front of word-internal /ey/ is very small; any apparent possible increase in later generations turns out to be statistically insignificant, however. It should be noted, though, that no matter the speaker, the lifelong Waldorfians produce word-final /ey/ further back than word-internal /ey/, and this difference in treatment of word-internal and word-final /ey/ *is* statistically significant.[57]

[56] Here and elsewhere in this chapter I speak of "word-internal" and "word-final" sounds. This only states the case partially; as the words analyzed were monosyllabic (except as noted in footnote 29), a more detailed investigation may show that these results may actually better describe sounds that are syllable-final and syllable-internal.

[57] With a t test producing a result of $p<0.0001$.

In summary, what can be said about /iy/ and /ey/ among lifelong Waldorfians is that /iy/ is fairly fronted and stable in this dialect, which appears to involve a partial distancing from the Southern Shift (though this is not necessarily the case, given that the Upper South does not generally centralize /iy/), but /ey/ is produced back of /iy/, and word-final and word-internal /ey/ are treated differently by these speakers.

Like the lifelong Waldorfians, the Waldorf exiles produce /iy/ in the high front corner of the articulatory space,[58] which allows the relative positioning of word-final and word-internal /ey/ to be shown using the same method as was used in Figure 8, in which the position of /iy/ was used as a reference point to measure the relative position of /ey/. The production of word-internal and word-final /ey/ is shown in Figure 10.

[58] It is worth noting that this was even the case for Jessica, the one speaker among the Waldorf exiles who had been constantly exposed to a Southern dialect (in Knoxville, Tennessee). Whereas the Southern Shift involves lowering and centralization of /iy/, she was resistant to such a change.

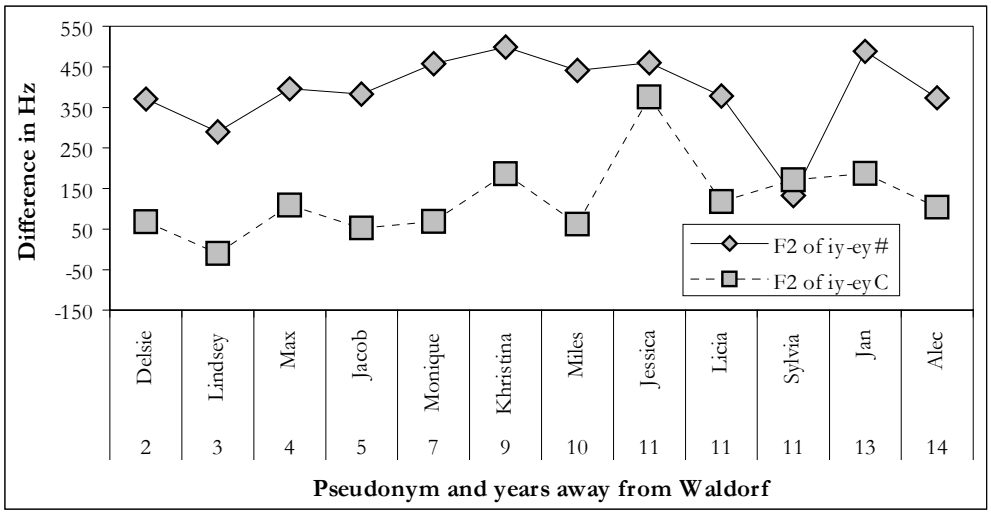

Figure 10: Differences in normalized F2 values for /iy/ and /ey/ in various environments among Waldorf exiles, arranged by years spent away from Waldorf

Figure 10 shows that both word-internal and word-final /ey/ are generally produced back of /iy/ (the one exception is Lindsey's production of word-internal /ey/, which is slightly in front of her production of /iy/). In addition, in nearly every case word-final /ey/ is produced further back than word-internal /ey/ (the one exception is Sylvia's production). For the entire group as a whole, word-internal and word-final /ey/ were treated differently, as was the case for the lifelong Waldorfians.[59] When looking at the group in smaller units, however, an interesting pattern emerges: Those Waldorf exiles who had lived away from Waldorf for ten years or less treated word-final and word-internal /ey/ differently,[60] but statistical testing of those who had

[59] With a t test giving a value of $p<0.00001$.
[60] As verified with a t test giving a value of $p<0.00001$.

been away for more than a decade showed that for them there was no difference in the treatment of /ey/ in these environments.

5.3. The front vowels /ɪ/ and /ɛ/[61]

The vowels /ɪ/ and /ɛ/ do not appear to be produced particularly "Southern" by the lifelong Waldorfians, in that they do not produce these vowels with off-glides and their place of articulation is in the high and mid (for /ɪ/ and /ɛ/ respectively) front section of the mouth. In conversation, however, some of the lifelong Waldorfians volunteered that they produced /ɪ/ and /ɛ/ the same before nasals (that is, they believed they merged *pin* and *pen*). Figure 11 shows the total (diagonal) differences in the formant values[62] for /ɪ/ and /ɛ/ before nasals among lifelong Waldorfians. This graph shows that there is a fair amount of individual variation in the production of /ɪ/ and /ɛ/ before nasals, but the difference between them is generally relatively small, though whether the difference is so small as to be actually imperceptible is an open question. To answer this question, the minimal perceptible difference for sounds with these formants according to Flanagan (1955)[63] is shown with a dashed line in Figure 11; one can see from the graph that, although a few individuals (namely Warren, Rowan, and Torren) actually do produce these sounds with an imperceptible difference between their means, most of the lifelong

[61] This section does not deal with the behavior of /ɛ/ in pre-rhotic environments; that is covered in 5.8.1.
[62] In this and other such cases in this dissertation, "total differences" in formant values refer to diagonal differences (and, notably, absolute value diagonal differences). In this sense, the labeling of the measure of distance in graphs that show such differences as "difference in Hz" is misleading, as it is not truly a hertz measurement. The labeling is done as it is, however, because it is mathematically consistent. It should be remembered, though, that what is discussed here is not truly a physical difference in hertz, but the length of the hypotenuse of a right triangle, the legs of which are measured in hertz.
[63] That is, about 61 hertz measured along the diagonal (please note footnote 62). This number was arrived at by taking the average difference limens Flanagan (1955) lists for the first formant values of 500 hertz and second formant values of 2000 hertz, and determining the length of the hypotenuse of a triangle with those legs.

Waldorfians produce these sounds with a perceptible difference. It should be stressed that this does not necessarily mean that /ɪ/ and /ɛ/ are phonemically different before nasals among the lifelong Waldorfians, but it does mean that there is for the most part a perceptible distinction between them. Further investigation in Waldorf would reveal whether /ɪ/ and /ɛ/ before nasals might be in, for example, a state of *near*-merger there.

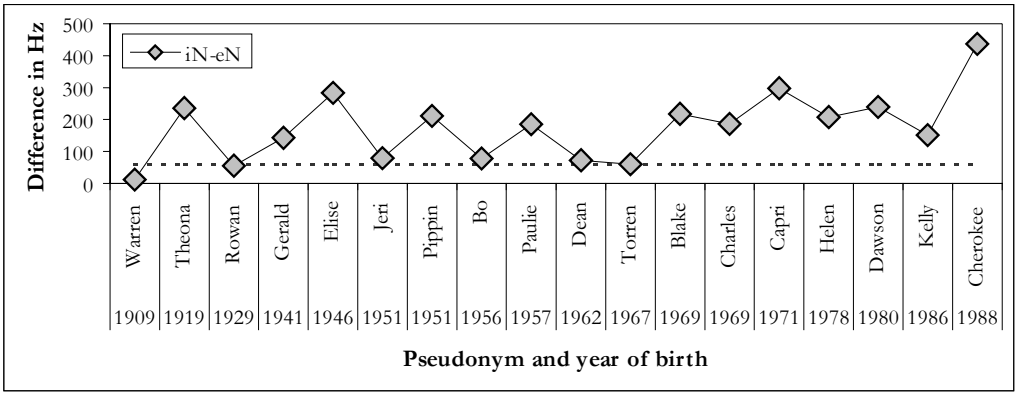

Figure 11: Total differences in normalized formant values for /ɪ/ and /ɛ/ before nasals among lifelong Waldorfians, arranged by year of birth, showing the minimal perceptible difference

As was the case with the lifelong Waldorfians, the Waldorf exiles did not exhibit off-glides with /ɪ/ and /ɛ/. The treatment of /ɪ/ and /ɛ/ specifically before nasals (i.e., *pin* and *pen*) is shown in Figure 12, which shows the total (diagonal) distances between the Waldorf exiles' production of those vowels, and as was done with the lifelong Waldorfians in Figure 11 a dotted line is included in the graph showing the minimum perceptible distance derived from Flanagan's experiments (1955). As was the case with the lifelong Waldorfians, the Waldorf exiles are mixed, with the vowel means lying close enough to each other that they are imperceptibly different in a few cases (specifically Jacob and Jan), but this does not lead to any conclusions regarding

whether /ɪ/ and /ɛ/ before nasals are phonemically different for these speakers. Finally, it should also be noted in passing that there does not appear to be a visible trend toward increasing or decreasing distance between the means of /ɪ/ and /ɛ/ before nasals along with time spent away from Waldorf.

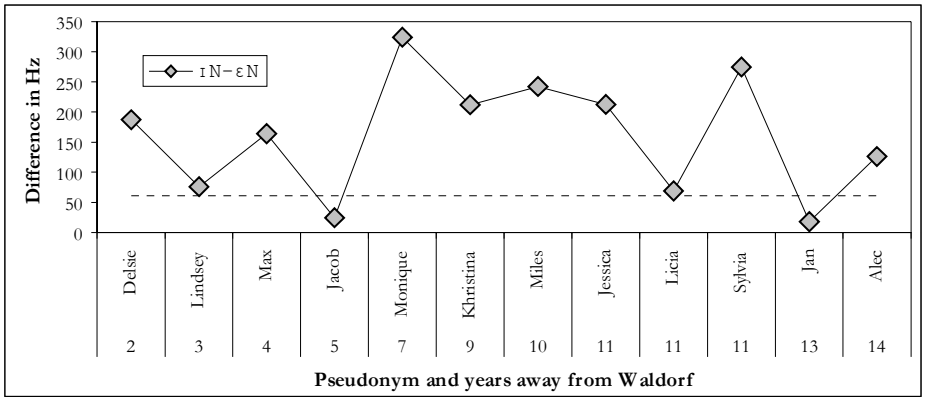

Figure 12: Total differences in normalized formant values for /ɪ/ and /ɛ/ before nasals among Waldorf exiles, arranged by years spent away from Waldorf

5.4. Monophthongization of /ay/

Monophthongization of /ay/ follows a clear pattern in Waldorf over apparent time — as one moves through apparent time, one sees that /ay/-monophthongization occurs less and less frequently, until in the youngest speakers one finds that it is completely absent. This is shown in Table 5, which shows the number of tokens of monophthongal and diphthongal /ay/ produced by the lifelong Waldorfians during ten-minute (mostly narrative) stretches of casual interviews.

pseudonym	sex	year of birth	monophthongal /ay/	diphthongal /ay/	percent monophthongal /ay/
Warren	m	1909	10	26	27.78%
Theona	f	1919	16	54	22.86%
Rowan	f	1929	11	66	14.29%
Gerald	m	1941	7	31	18.42%
Elise	f	1946	5	46	9.80%
Jeri	f	1951	4	45	8.16%
Pippin	m	1951	7	39	15.22%
Bo	m	1956	5	37	11.90%
Paulie	f	1957	1	23	4.17%
Dean	m	1962	5	46	9.80%
Torren	m	1967	6	88	6.38%
Blake	f	1969	1	29	3.33%
Charles	m	1969	2	30	6.25%
Capri	f	1971	0	138	0.00%
Helen	f	1978	0	56	0.00%
Dawson	m	1980	0	87	0.00%
Kelly	f	1986	0	35	0.00%
Cherokee	f	1988	0	49	0.00%

Table 5: Tokens of monophthongal and diphthongal /ay/ in ten minutes of casual interview speech among lifelong Waldorfians, arranged by year of birth

The picture is even more striking than is immediately apparent from Table 5, however. Figure 13 and Figure 14 show the percent of /ay/-monophthongization separated among, respectively, lifelong Waldorfian women and men, arranged by each individual's year of birth. Looking at the rate of monophthongization of /ay/ in Figure 13 and Figure 14, one can see that monophthongization of /ay/ is being reversed, and that in the most recent generations that change has moved to completion — and in both cases there is a statistically significant inverse relationship between the year an individual was born and the amount of monophthongization of /ay/ that that individual exhibits.[64] As diphthongal /ay/ is generally thought of as a non-Southern trait, a possible conclusion that can be drawn from this is that, in this way at least, the Waldorf pattern is becoming less Southern.

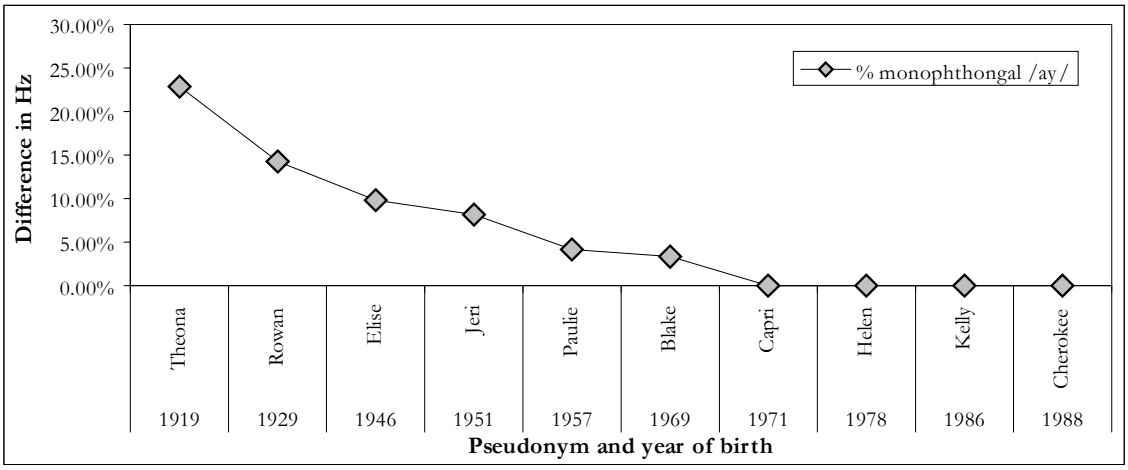

Figure 13: Percent monophthongization of /ay/ among female lifelong Waldorfians, arranged by year of birth

[64] With an F test of the distribution giving a result of $p<0.01$ in both cases.

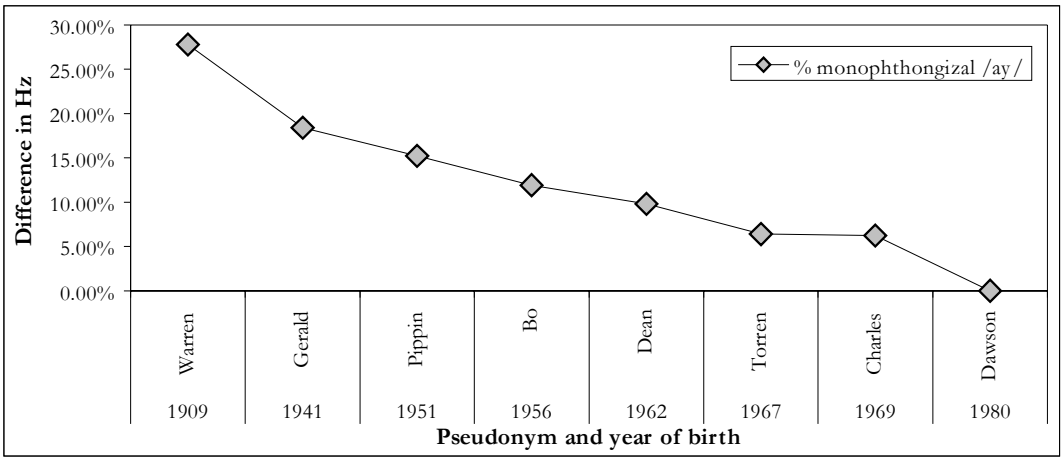

Figure 14: Percent monophthongization of /ay/ among male lifelong Waldorfians, arranged by year of birth

Monophthongization of /ay/ generally occurs only rarely among the Waldorf exiles, as can be seen in Table 6, which shows the number of tokens of monophthongal and diphthongal /ay/ during ten minutes of each of the casual interviews with the Waldorf exiles. This is to be expected in light of the results in Table 5, which show that monophthongization of /ay/ only occurs rarely among the lifelong Waldorfians born between 1965 and 1980, and even then only among the oldest members of that group.

pseudonym	sex	years away from Waldorf	year of birth	monophthongal /ay/	diphthongal /ay/	percent monophthongal /ay/
Delsie	f	2	1976	0	67	0.00%
Lindsey	f	3	1977	0	88	0.00%
Max	m	4	1975	0	73	0.00%
Jacob	m	5	1974	0	91	0.00%
Monique	f	7	1974	0	75	0.00%
Khristina	f	9	1971	0	122	0.00%
Miles	m	10	1969	0	87	0.00%
Jessica	f	11	1969	10	48	17.24%
Licia	f	11	1970	0	79	0.00%
Sylvia	f	11	1970	0	77	0.00%
Jan	m	13	1967	2	47	4.08%
Alec	m	14	1967	0	97	0.00%

Table 6: Tokens of monophthongal and diphthongal /ay/ in ten minutes of casual interview speech among Waldorf exiles, arranged by years spent away from Waldorf

As shown in Table 6, only two of the Waldorf exiles, Jan and Jessica, show any /ay/-monophthongization at all. Both of them are among the oldest individuals in the subsample of Waldorf exiles, as expected in light of the pattern shown by the lifelong Waldorfians, but whereas Jan's rate of /ay/-monophthongization is of an order of magnitude similar to that of the lifelong Waldorfians born in the late 1960s, Jessica's is notably higher (17.24% /ay/-monophthongization as opposed to, for example, Blake's 3.33%). This may be an effect of the dialect Jessica has been consistently exposed to in Knoxville, Tennessee since

her move from Waldorf — of all of the Waldorf exiles, she is the only one who has been consistently exposed to a dialect participating fully in the Southern Shift, which involves at its core /ay/-monophthongization (Labov, Ash, and Boberg 1997).

5.5. The behavior of /æ/[65]

The behavior of /æ/ in Waldorf is generally relatively unremarkable, but there is a split of /æ/ based on its environment that should be mentioned. The position of /æ/ in most environments is stable for all speakers, but /æ/ in pre-nasal contexts has generally moved further front in apparent time. This can be seen in Figure 15, which shows the distance that /æ/ in nasal contexts is in front of /æ/ generally by showing the difference in (normalized) second formant values between /æ/ before nasals and /æ/ in other environments for each of the lifelong Waldorfians who underwent casual interviews.[66] The graph shows some variation along the way, but the general trend is that the distance between /æ/ generally and /æ/ pre-nasally increases over time as /æ/ before nasals moves forward — or, more directly, that /æ/ is being fronted in Waldorf before nasals.[67]

[65] This section does not deal with the behavior of /æ/ in pre-rhotic environments; that is covered in 5.8.1.
[66] As noted in footnote 65, this section does not deal with /æ/ before /r/; therefore, when it says "/æ/ in other environments" here, that excludes pre-rhotic contexts.
[67] With an F test finding the correlation between each individual's year of birth and the amount of fronting of /æ/ before nasals to be significant to a level of $p<0.05$.

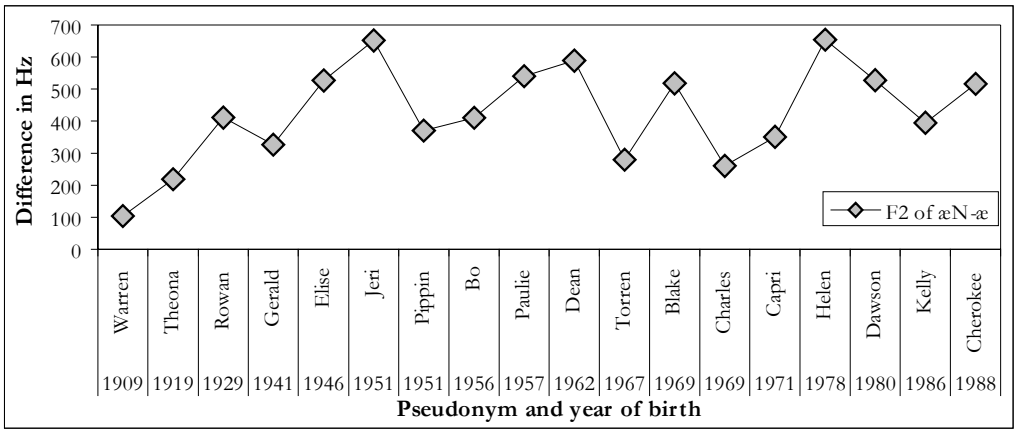

Figure 15: Differences in normalized second formant values for /æ/ before nasals and /æ/ elsewhere among lifelong Waldorfians, arranged by year of birth

The production of /æ/ in non-pre-nasal contexts is stable among the Waldorf exiles, as it was among the lifelong Waldorfians. The degree of fronting of /æ/ before nasals, however, is not stable among this group, and it appears to be affected by the amount of time spent away from Waldorf. This can be seen in Figure 16, which shows the distance /æ/ is fronted before nasals. This graph shows those who have been away from Waldorf for a shorter amount of time with a fairly consistent degree of fronting, but several of those who have been away from Waldorf for longer show less fronting, or at least more of a tendency toward less fronting. This difference can be confirmed by t tests comparing the results for those who have been away from Waldorf for

seven or fewer years with those who have been away for nine or more years; the difference between the two groups turns out to be statistically significant.[68]

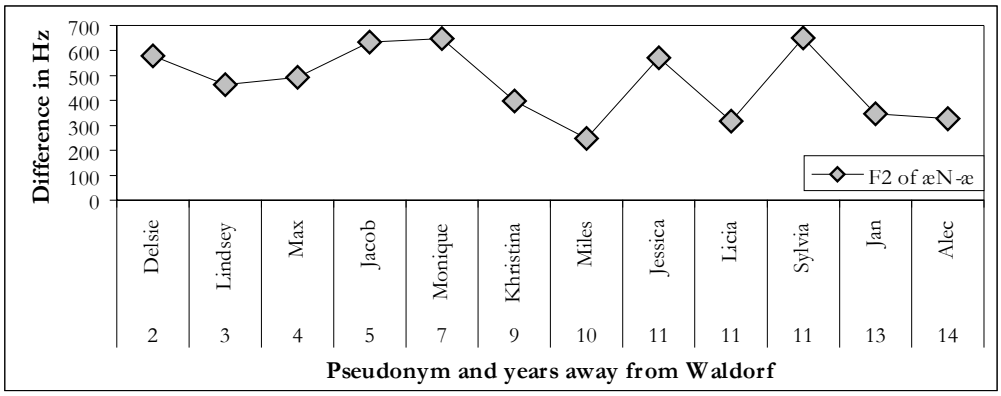

Figure 16: Differences in normalized second formant values for /æ/ before nasals and /æ/ elsewhere among Waldorf exiles, arranged by years away from Waldorf

5.6. The behavior of /ʌ/

Like /æ/, the behavior of /ʌ/ among the lifelong Waldorfians is mostly unremarkable — in fact, there is even less to say about /ʌ/, as its position does not appear to have changed over time at

[68] To a level of $p<0.05$. No other split of the Waldorf exiles into two groups gives a statistically significant result for the treatment of pre-nasal /æ/.

all. It should be mentioned, though, that /ʌ/ is produced a bit low and back of center by the lifelong Waldorfians in the sample.

The Waldorf exiles' production of /ʌ/ is also rather static — /ʌ/ is produced a bit low and back of center by nearly every Waldorf exile in the sample.[69] Separate t tests of first and second formant values result in rejecting the possibility that production of /ʌ/ is different among the lifelong Waldorfians and the Waldorf exiles; to visually underscore this statistical result, Figure 17 shows the mean production of /ʌ/ by each of the Waldorf exiles and lifelong Waldorfians who participated in casual interviews.

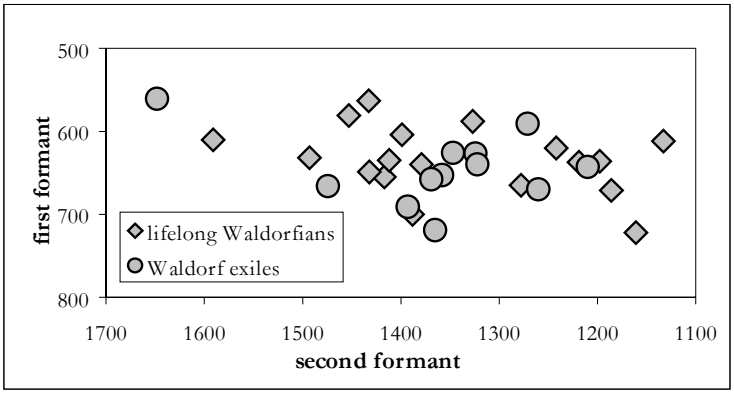

Figure 17: Production of /ʌ/ by lifelong Waldorfians and Waldorf exiles

[69] The only exception is Monique, whose production of /ʌ/ is still low, but in front of center. Her production, though, is not very far front — it is less than two hertz (normalized) in front of the mean.

5.7. /a/ and /ɔ/ (*cot* and *caught*)[70]

In general, the Waldorf pattern involves maintaining a clear distinction between /a/ and /ɔ/; for the most part, Figure 18 reflects this. Although there are a few individuals (namely Elise, Pippin, Paulie, Charles, and Capri) among the lifelong Waldorfians who maintain only a small difference between the means of /a/ and /ɔ/, even in these cases the distribution of /a/ and /ɔ/ was separate. It may be that this scattered state of affairs foretells a coming collapse of the /a/-/ɔ/ distinction in Waldorf, but such a prediction cannot be made at the present time. It would be useful to check the behavior of /a/ and /ɔ/ in a generation or two to determine whether the community is in fact progressing toward merger.

It should also be noted that there are no cases among the lifelong Waldorfians of /a/ or /ɔ/ developing an off-glide, as is found in some Southern dialect regions where *cot* and *caught* are produced, respectively, as [kat] and [ka°t].

[70] This section does not deal with these vowels in pre-rhotic environments; /ɔr/ is covered in section 5.8.2.

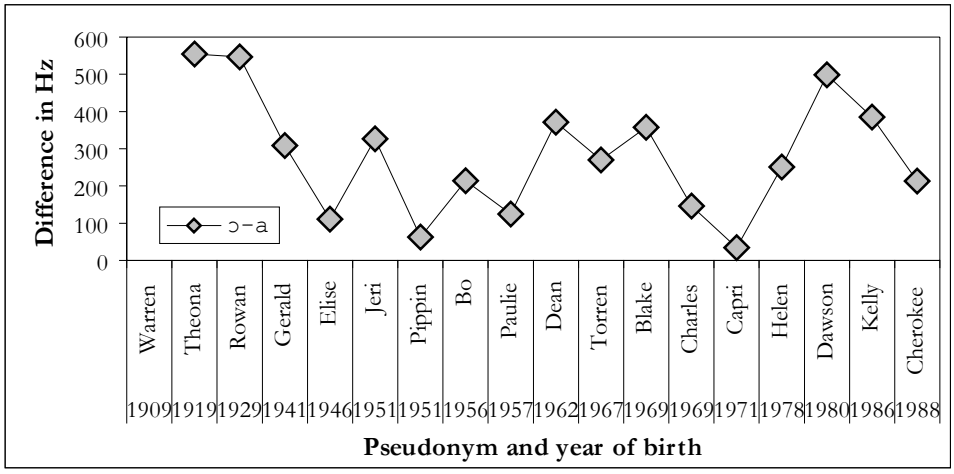

Figure 18: Total differences in normalized formant values for /a/ and /ɔ/[71] among lifelong Waldorfians, arranged by year of birth[72]

The total (diagonal) distance between the nuclei of /a/ and /ɔ/ among the Waldorf exiles is shown in Figure 19. There is a great deal of individual variation in regard to this pair of vowels, just as there was among the lifelong Waldorfians as shown in Figure 18, and statistical testing uncovers no significant pattern underlying the distribution of /a/ and /ɔ/ among the Waldorf exiles related to the number of years spent away from Waldorf.

[71] Excepting pre-nasal and pre-rhotic contexts. Pre-rhotic contexts for /ɔ/are dealt with in 5.8.2.
[72] There were no usable samples of /ɔ/ for Warren.

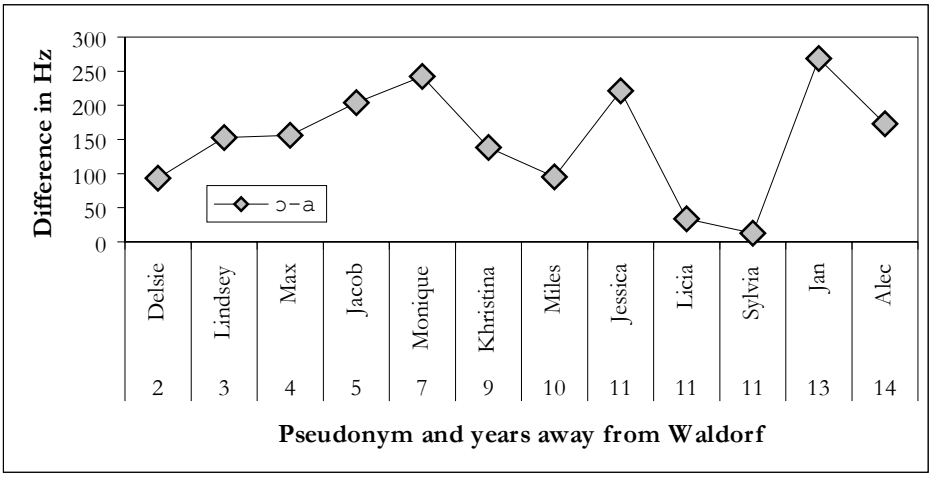

Figure 19: Total differences in normalized formant values for /a/ and /ɔ/[73] among Waldorf exiles, arranged by years away from Waldorf

Although a statistical analysis of the group as a whole does not yield any interesting results, two individual members of the Waldorf exiles, Jessica and Jacob, should be mentioned here. Jacob, now living in Phoenix, Arizona, was the *only* Waldorfian (lifelong or exile) interviewed who claimed to pronounce the vowels /a/ and /ɔ/ the same.[74] Jessica is the only one of the Waldorf exiles constantly surrounded by a purely Southern dialect, and like all of the other Waldorf exiles she does *not* add an off-glide to /ɔ/, as in the classic Southern production of *cot* and *caught* as [kat] and [ka°t]. It should be noted that none of the Waldorf exiles other than Jessica would be consistently faced with a pronunciation model that kept these vowels separate, as all of the

[73] Excepting pre-nasal and pre-rhotic contexts. Pre-rhotic contexts for /ɔ/are dealt with in 5.8.2.
[74] Jacob does, however, produce those vowels clearly distinctly. There may be an issue here with the definition of the word "same".

other dialect regions the Waldorf exiles moved to involve a situation at least in part approaching a full merger of /a/ and /ɔ/ (*Phonological atlas of North America* 1999d).[75]

5.8. Vowels followed by /r/[76]

Because certain mergers of vowels occur before /r/ in Waldorf, they have been separated out into their own section. These include the merger of /eyr/, /ɛr/, and /ær/ (the vowels in *Mary, merry,* and *marry,* respectively) in 5.8.1, and the merger of /ɔr/ and /owr/ (the vowels in, respectively, *horse* and *hoarse*) in 5.8.2.

5.8.1. /eyr/, /ɛr/, and /ær/ (*Mary, merry,* and *marry*)

The vowels /ey/, /ɛ/, and /æ/ before /r/ are often involved with mergers in various configurations (along, occasionally, with the syllabic /r/ in *Murray*). Judging from data elicited during the interviews, among the lifelong Waldorfians /eyr/, /ɛr/, and /ær/ have all merged into one unit, but the syllabic /r/ in *Murray* does not participate in the set of mergers. This pattern has been described as being representative of parts of the Midland and Western dialect

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[75] There is some difficulty of expression here because of the Waldorf exiles who moved away from Waldorf because of military service. Among those who moved away from Waldorf for other reasons, Jessica is the only one who is not consistently exposed to a situation approaching full merger of /a/ and /ɔ/ (with the possible partial exception of Alec's experience when he lived in Spokane, Washington) (*Phonological atlas of North America* 1999a, 1999b, 1999c). Those who moved away from Waldorf due to military service would, by nature of the US military community, be faced with mixed-dialect surroundings, with some speakers providing a model for merger of /a/ and /ɔ/ and some speakers providing a model for keeping them separate.

[76] Although this study deals primarily with vowels, a short note on the production of /r/ itself should be made before discussing vowels preceding /r/. Kretzschmar *et al* (1993) identify the area near Waldorf as an *r*-less region. While Warren and Theona, the oldest speakers in the sample, exhibit nearly complete *r*-lessness and some *r*-lessness is heard in the speech of Rowan (the next oldest), *r*-lessness no longer appears to be a feature of Waldorf speech.

regions (Labov 1994), making this yet another way in which the Waldorf pattern appears to be "non-Southern" . The reader is referred to the vowel charts in Appendix C to see the degree of closeness of these vowels in this context; the merger is in any event complete, and it appears to be a merger of long standing.

As was the case among the lifelong Waldorfians, the Waldorf exiles merge /eyr/, /ɛr/, and /ær/ together into one unit while keeping them all separate from the syllabic /r/ in *Murray*. (The reader is once again referred to the vowel charts in Appendix C to see the degree of closeness of these vowels in this context; the merger is complete for all of the Waldorf exiles.) Basically, all that can be said here is that these vowels before /r/ are merged for these speakers, and as would be expected from a merger that has proceeded to completion, exposure to another dialect has not resulted in a reversal of the merger.

5.8.2. /ɔr/ and /owr/ (*horse* and *hoarse*)

The vowels /ɔ/ and /ow/ before /r/ are widely merged in English, although in some areas this merger is a fairly recent one (Labov 1994). The vowels /ɔ/ and /ow/ have merged before /r/ among the lifelong Waldorfians, as well; Figure 20, which shows the overall (diagonal) difference in the means of these vowels pre-rhotically for each speaker, shows that the last gasp of this distinction can really only be found in the oldest speakers (and really only robustly in the very oldest speaker's speech).[77]

[77] From the graph, it may appear that Helen and Kelly may have split this merger apart, but this is actually not the case — the distributions overlap rather completely, but due to the nature of the distributions the

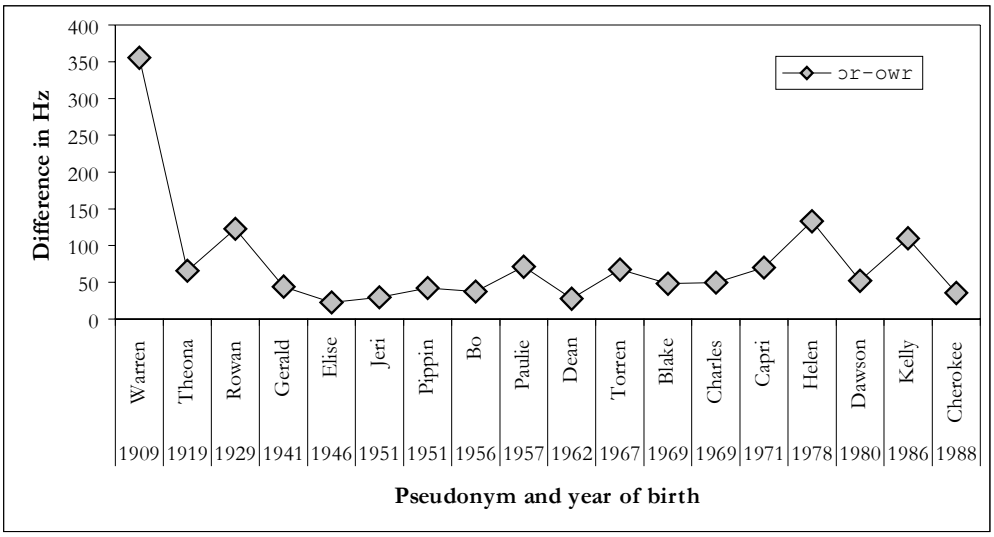

Figure 20: Total differences in normalized formant values for /ɔr/ and /owr/ among lifelong Waldorfians, arranged by year of birth

As can be seen from Figure 20, at least among the lifelong Waldorfians born since World War II the vowels /ɔ/ and /ow/ before /r/ are completely merged; this is also the case for all of the Waldorf exiles. This, it should be stressed, is also the case for Jan, who is the only one of the Waldorf exiles to have moved to a place where /ɔr/ and /owr/ are consistently produced distinctly (*Phonological atlas of North America* 1999a, 1999b, 1999c);[78] despite thirteen years of exposure to such a model, his production of /ɔ/ and /ow/ before /r/ has not separated.

means appear relatively far apart. In any event, the means are still relatively close (less than 150 hertz in total distance) even for these two speakers.

[78] As noted in footnote 75, there is some difficulty of expression here, as those who are in military surroundings would be exposed to some individuals who merge /ɔr/ and /owr/ and some who maintain the distinction. Jan, however, is the only one who has been *consistently* exposed to the distinction.

5.9. The non-low back vowels

The non-low back vowels, particularly /ow/ and /uw/, deserve special attention for two reasons, one purely linguistic and the other because of the nature of the study at hand. The purely linguistic reason is that /ow/ and /uw/ are moving from the back to the front of the articulatory space in several dialect regions; the fronting of /ow/ and /uw/ among Waldorfians is discussed in 5.9.1. In addition, the study at hand involves a substudy of the perception and production of the non-low back vowels before /l/ (see chapters 6 and 7), and so /ow/ and /uw/ before /l/ are dealt with separately in 5.9.2.

Another reason that the case of these vowels before /l/ is dealt with separately is that /ow/ and /uw/ are undergoing a split in Waldorf — they are universally fronted *except* when they precede /l/. Therefore, 5.9.1 deals with /ow/ and /uw/ in environments where they are fronted and 5.9.2 deals with /ow/ and /uw/ in the environment in which they remain backed.

5.9.1. The diphthongs /ow/ and /uw/[79]

As mentioned above, the broadest generalization that can be made about /ow/ and /uw/ among lifelong Waldorfians is that they are fronted everywhere except for pre-lateral environments. The diphthong /ow/ tends not to be fronted as extremely as /uw/ in Waldorf, but it is still fronted to a relatively large degree. Figure 21 shows the amount of fronting of /ow/ both word-internally and word-finally, with the amount of fronting in both cases shown in relation to the position of

[79] This section does not deal with /owr/; that is covered in 5.8.2.

pre-lateral /ow/ (as pre-lateral /ow/ remains back in all cases). This graph reflects the fact that little appears to have changed over time in the Waldorf treatment of /ow/.[80]

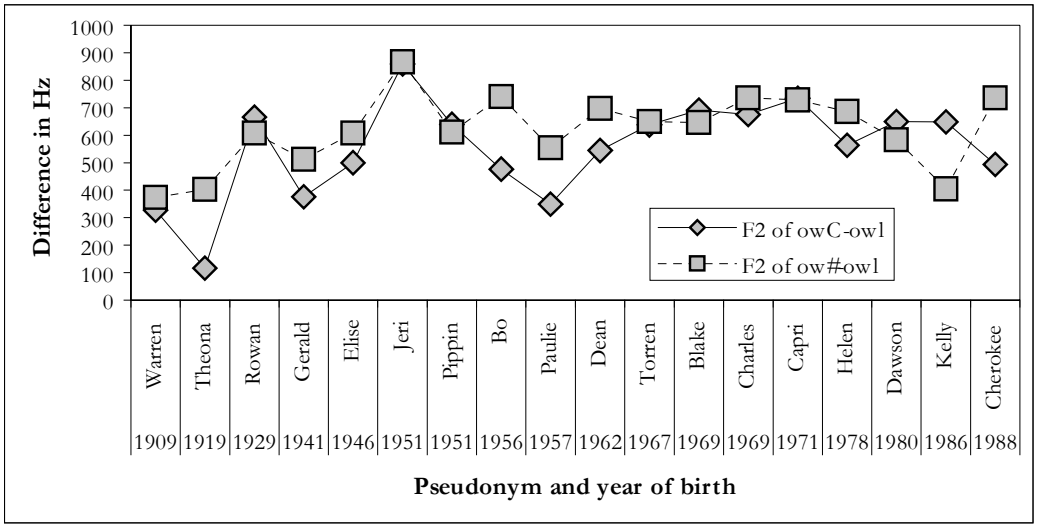

Figure 21: Normalized second formant values for pre-lateral /ow/ compared with word-internal and word-final /ow/ among lifelong Waldorfians, arranged by year of birth

As is the case for the lifelong Waldorfians, the Waldorf exiles generally front /ow/ and /uw/ both word-internally and word-finally, but not pre-laterally. The degree to which this fronting occurs, though, varies from individual to individual; Figure 22 shows the case of /ow/ and the individual variation involved. It is worth noting, however, that all speakers seem to treat

[80] The hints of gradual changes over time in Figure 21 — a possible miniscule increase in /ow/-fronting over apparent time and an increasing similarity with which word-final and word-internal /ow/ appear to be treated as apparent time progresses — turn out to be not statistically verifiable. An F test confirms that the fronting of /ow/ does not change over time, and a t test shows that word-final and word-internal /ow/ are not treated the same by lifelong Waldorfians.

non-pre-lateral /ow/ as a single unit, whether it is word-internal or word-final;[81] also, even for Khristina, whose /ow/ is the furthest back of all of the Waldorf exiles, every occurrence of pre-lateral /ow/ was produced back of all other occurrences of /ow/. It should also be noted that the individual variation in the Waldorf exiles' treatment of /ow/-fronting does not appear to correlate well with either a speaker's sex or the length of time the speaker spent away from Waldorf.

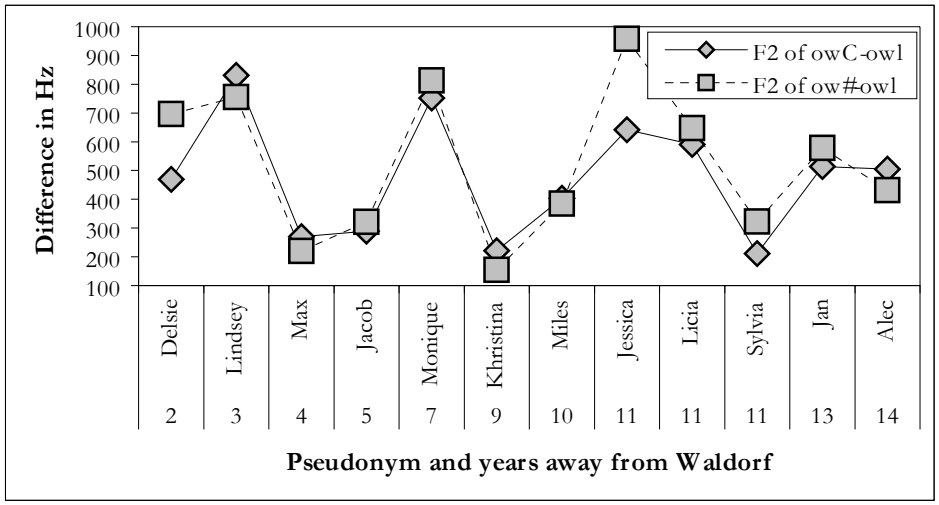

Figure 22: Normalized second formant values for pre-lateral /ow/ compared with word-internal and word-final /ow/ among Waldorf exiles, arranged by years away from Waldorf

The sizable individual variation in /ow/-fronting among the Waldorf exiles is actually somewhat unexpected, as (as can be seen in Figure 21) /ow/-fronting among the lifelong Waldorfians, particularly among those born between 1965 and 1980, is not subject to this same degree of

[81] As verified by a t test, which accepted the hypothesis that the distributions are the same.

variation. The thing that makes this particularly puzzling is that there appear to be fairly large changes that the Waldorf exiles are making in their treatment of /ow/ — not only is there notable individual variation in the degree of /ow/-fronting, but the lifelong Waldorfians also treated word-internal and word-final /ow/ differently, whereas the Waldorf exiles treat them the same. This is a strange situation that does not lend itself to an easy analysis, but it is discussed further in chapter 8.

Returning to the lifelong Waldorfians, Figure 23 shows the amount of fronting of word-final and word-internal /uw/ in relation to pre-lateral /uw/, which remains backed among this group. This graph is more complicated that the parallel one for the behavior of /ow/, because information about a third vowel class, (iw),[82] is included. The vowel class (iw) is the vowel class found in the word *tune,* as opposed to the vowel class /uw/ which is found in the word *toon.* In many British dialects, where this distinction is perhaps best known, the distinction is found in that *tune* and *toon* are pronounced as, respectively, [t^{y}uwn] and [tuwn]. In Waldorf, however, the palatalization that is found in England is not present — the initial consonants in *tune* and *toon* are pronounced, respectively, as [t]une and [t]oon. As can be seen in Figure 23, though, it appears possible that there is a distinction between /uw/ and (iw), as (iw) is generally more fronted than /uw/ in any environment. Tests of significance, however, show that while there is a significant difference between the realization of word-internal and word-final /uw/ as well as between word-internal /uw/ and (iw), the difference between word-final /uw/ and (iw) is not

[82] In using the symbol (iw) I follow Labov (1994) in referring to a historical vowel class that may refer to either a specialized subset of the vowel class /uw/ or, possibly, to a completely separate vowel class that could be thought of as at some level /^{y}uw/. For the current study it is unimportant what the (iw) vowel class is thought to be underlyingly, but it is probably easier to think of it as a subset of the /uw/ class, since (as noted in the main text) the Waldorf pattern does not exhibit a pre-glide with (iw).

significant.[83] This result that word-final /uw/ and (iw) are treated similarly by this population should be investigated further in the future, however, as the vowel class (iw) as it is presented here includes both word-internal and word-final examples of (iw) (i.e., it includes both *new* and *newt*). Therefore, the results of these significance tests do not say anything regarding whether, for example, word-final /uw/ and word-final (iw) are treated the same or differently by this population.

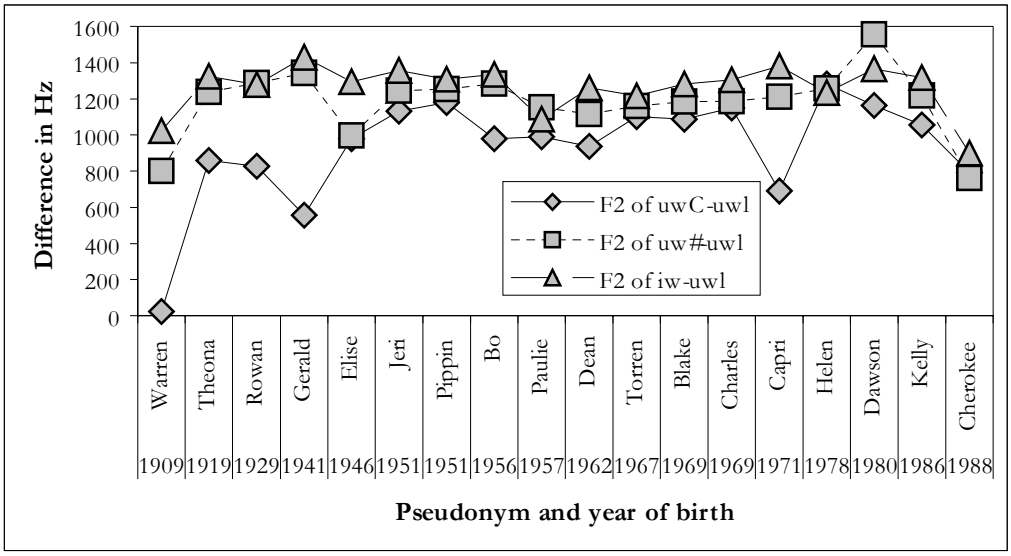

Figure 23: Normalized second formant values for pre-lateral /uw/ compared with word-internal and word-final /uw/ and vowel class (iw) among lifelong Waldorfians, arranged by year of birth

One final note to make in relation to Figure 23 is that it appears that the production of word-final /uw/, word-internal /uw/, and (iw) has remained relatively constant over recent time

[83] With t tests on the difference between word-internal and word-final /uw/ resulting in a significance value of $p<0.01$, and the difference between word-internal /uw/ and (iw) being significant to a value of $p<0.001$.

in Waldorf. There is some hint that all three vowel classes may have been produced a bit further back a century ago, as Warren produces them further back than those born later, but the data does not go back far enough to allow a conclusion to be drawn for that time depth.

The pattern of /uw/-fronting among Waldorf exiles, on the other hand, can be seen in Figure 24. In this chart the values shown reflect the distance of each vowel class in front of pre-lateral /uw/, which is kept back by all of the speakers (as was the case for the lifelong Waldorfians, as well). As was the case with the parallel graph for the lifelong Waldorfians (Figure 23), the vowel class (iw) is included in these graphs. Although Figure 24 appears at first glance to show a case similar to that of /ow/-fronting, in that there appears to be a great deal more individual variation shown by the Waldorf exiles than the lifelong Waldorfians, statistical tests, though, show that the pattern of /uw/-fronting is actually not different for the two groups. Like the lifelong Waldorfians, the Waldorf exiles front word-internal /uw/ differently from both (iw) and word-final /uw/,[84] while they treat (iw) and word-final /uw/ the same. In addition, once again like the lifelong Waldorfians, the Waldorf exiles never produce (iw) with an initial glide.

[84] With t tests giving results of $p<0.05$ for the difference in fronting of word-internal and word-final /uw/ and $p<0.01$ for the fronting of (iw) and word-internal /uw/.

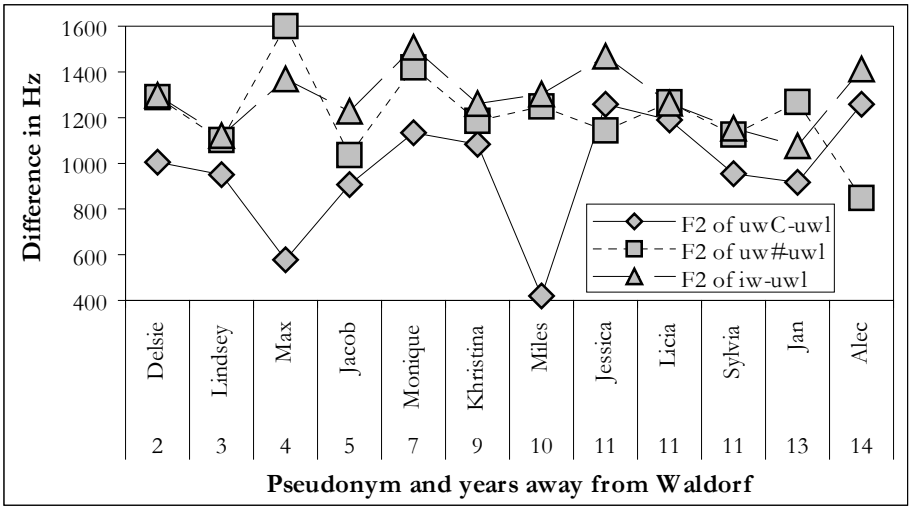

Figure 24: Normalized second formant values for pre-lateral /uw/ compared with word-internal and word-final /uw/ and vowel class (iw) among Waldorf exiles, arranged by years away from Waldorf

One final note that should be made regarding the fronting of word-internal /uw/, word-final /uw/, and (iw) among the Waldorf exiles is that the level of fronting does not appear to be affected by either the sex of he individual or the amount of time the individual has lived away from Waldorf.

5.9.2. Non-low back vowels followed by /l/ (*pull, pole,* and *pool*)

As will be seen in chapters 6 and 7, the non-low back vowels before /l/ (that is, /ul/, /owl/, and /uwl/) are involved in a most interesting set of mergers in progress in both perception and production in Waldorf. The production of these vowels by lifelong Waldorfians as the result of formal tests of production is dealt with in 6.2 and by the Waldorf exiles in 7.2; in this section,

however, what is presented is instances of /ul/, /owl/, and /uwl/ as they occurred in the casual interviews.

The total (diagonal) distances between the nuclei of each lifelong Waldorfian's production of /ul/, /owl/, and /uwl/ are shown in Figure 25. In general, this chart shows that the distinctions between these three vowels pre-laterally is weakest for /ul/ and /owl/, next weakest (or in some cases the same) for /ul/ and /uwl/, and strongest for /owl/ and /uwl/.[85] The order of the strength of these distinctions, however, ties in well with the results described in 6.2, in which /ul/ and /owl/ were found to be merged in production by the lifelong Waldorfians earliest in apparent time, then (nearly at the same time) /ul/ and /uwl/ was merged, and finally /owl/ and /uwl/ was only merged rarely, and then only by some of the very youngest subjects.

[85] Of course, this is the relative strength of the distinctions; the nuclei of these vowels are in most cases quite close to each other, often to the point of being a possibly meaningless distinction. In addition, t tests of the distributions shown in Figure 25 show that the distribution of the differences between /ul/ and /owl/ is statistically the same as the differences between /ul/ and /uwl/, but distribution of the differences between /ul/ and /owl/ versus /owl/ and /uwl/ is different (to the level of $p<0.05$), as is the distribution of the differences between /ul/ and /uwl/ versus /owl/ and /uwl/ (to the level of $p<0.01$).

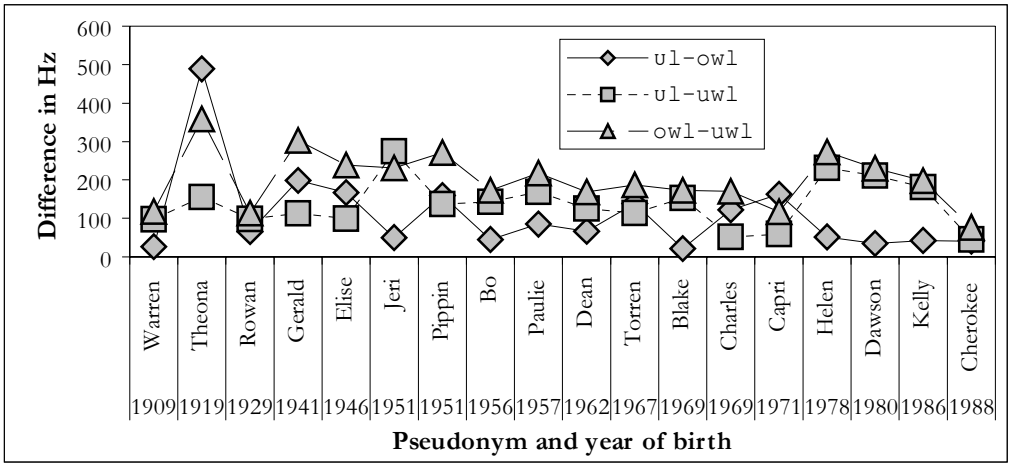

Figure 25: Total differences in normalized formant values for pairs of /ul/, /owl/, and /uwl/ among lifelong Waldorfians, arranged by year of birth

Figure 26 shows total (diagonal) differences between the means of /u/, /ow/, and /uw/ before /l/ for each of the Waldorf exiles. There is really not much of great interest to say about the graph except for one result of statistical testing: Among the Waldorf exiles, there is a direct correlation between the number of years spent away from Waldorf and the difference between /owl/ and /uwl/ in production.[86] (This fact is noted mainly in relation to the findings in 7.2.)

[86] With an F test giving a result of $p<0.05$.

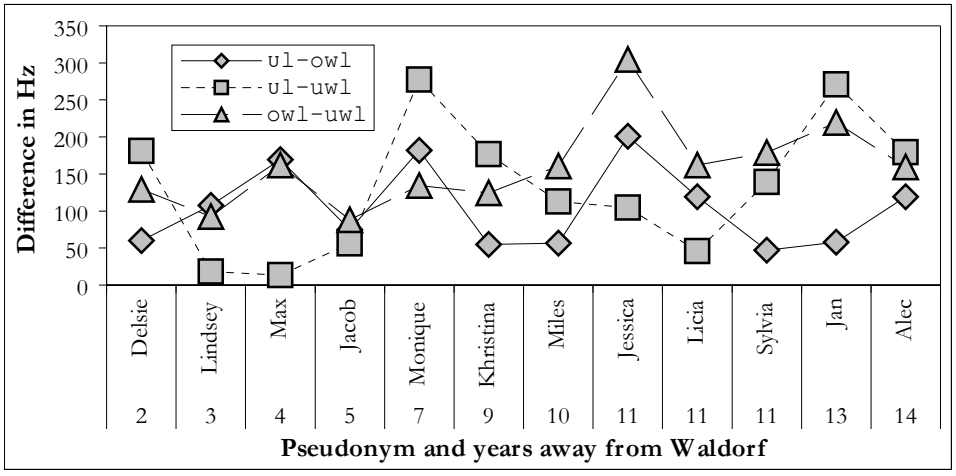

Figure 26: Total differences in normalized formant values for pairs of /ul/, /owl/, and /uwl/ among Waldorf exiles, arranged by years away from Waldorf

6. Perception and production among lifelong Waldorfians.[87]

This chapter deals with the mergers among the pre-lateral non-low back vowels among Waldorf natives who have lived in Waldorf their entire lives. The results for mergers in perception among this group are discussed in 6.1, and the (somewhat more complex) results for mergers in production are discussed in 6.2. The parallel findings for the group of Waldorf exiles studied are discussed in chapter 7.

6.1. Mergers in perception.

The results of the testing for mergers in perception among lifelong Waldorfians using apparent time reveals that these mergers have proceeded in a particular order in this speech community — first *pull* and *pool* merged in perception, then *pull* and *pole* merged a bit later but close to the same time, and *pole* and *pool* merged quite a bit later. This can be seen in Table 7, which gives the results for merger in perception for each of the pairs tested, arranged by the year of birth of the subjects from oldest to youngest. The results shown in this table come from the commutation tests taken by the individuals listed here.

[87] Some of the data in this chapter was originally presented with a somewhat different method of analysis at NWAV(E) 27 in Athens, Georgia as Bowie 1998 and at the Shenandoah Language and Linguistics Symposium in Buena Vista, Virginia as Bowie 1999. As noted in 4.1, all the participants in this study except for two of the lifelong Waldorfians — Dean and Warren — underwent commutation tests and so were studied for the progress of mergers in perception and production.

pseudonym	sex	year of birth	pull-pole	pull-pool	pool-pole
Theona	f	1919	merged	merged	distinct
Elden	m	1921	merged	merged	distinct
Rowan	f	1929	distinct	distinct	distinct
Gerald	m	1941	distinct	merged	distinct
Randall	m	1942	merged	merged	distinct
Elise	f	1946	merged	merged	merged
Raymond	m	1948	merged	merged	distinct
Jeri	f	1951	merged	distinct	distinct
Pippin	m	1951	merged	distinct	distinct
Melina	f	1954	merged	merged	merged
Bo	m	1956	merged	distinct	distinct
Paulie	f	1957	merged	distinct	distinct
Tex	m	1960	merged	merged	distinct
Rosa	f	1963	distinct	merged	distinct
Roy	m	1965	merged	distinct	distinct
Niels	m	1966	merged	merged	distinct
Torren	m	1967	merged	merged	distinct
Blake	f	1969	merged	merged	distinct
Charles	m	1969	merged	merged	merged
Capri	f	1971	merged	merged	distinct
Dayne	m	1973	merged	merged	distinct
Joanne	f	1977	merged	merged	distinct

Helen	f	1978	merged	merged	distinct
Deanna	f	1979	merged	merged	merged
Dawson	m	1980	merged	merged	merged
Gus	m	1982	distinct	merged	distinct
Kelly	f	1986	merged	merged	merged
Cherokee	f	1988	merged	merged	distinct
Thane	m	1988	merged	merged	merged

Table 7: Mergers in perception among lifelong Waldorfians,[88] arranged by year of birth

In Table 7, as in all other tables in this dissertation that use a merged/distinct classification, *merged* following an individual's name means that that individual has collapsed the vowels in the words at the top of the column together to such an extent that they are rated as merged, while *distinct* means the opposite — that they are not merged. To summarize the table, while there was some individual variation before (and in some cases after) each merger took hold, the most significant difference in the perception of *pull* and *pole* exists between those born in 1963 or earlier and those born in 1965 or later, in that *pull* and *pole* are merged in perception by 78.57% of the older group while the merger in perception is found in 93.33% of those born in 1965 or later, a significant difference.[89] For *pull* and *pool,* the most significant split is between those who were born in 1957

[88] All of the lifelong Waldorfians in the sample participated in commutation tests except for Dean and Warren, who were not tested due to concerns about their hearing, as discussed in 4.1.

[89] Verified by a chi-square test to a level of $p<0.0001$ (all chi square tests done on these tables assume as a null hypothesis a random distribution of merged/distinct ratings among a given age range, rather than a random distribution of all speakers in all categories). For this and all other such splits of these tables, there are usually other points at which the table can be split to produce a significant result, but the point given are is the points at which the difference is at its *most* significant statistically. Of course, this sort of analysis can

or earlier, 58.33% of whom merged those sounds, and those who were born in 1960 or later, 94.12% of whom merge them.[90] The merger in perception of *pool* and *pole* takes place much later, with the most significant split occurring between those born in 1978 and earlier (13.04% of whom show the merger) and those born in 1979 and later (66.67% of whom show it).[91] These splits are shown in Table 7 with double lines.

The question naturally arises whether the male and female subjects treated this set of mergers in perception differently, and so the breakdown is shown for women in Table 8 and for men in Table 9. Among the women, the adoption of the perceptual merger of *pull* and *pole* shows a significant split between those women born in 1963 and earlier (71.43% merged) and those born in 1969 and later (100% merged),[92] and the perceptual merger of *pull* and *pool* shows a similar (and, as was the case for the group as a whole, earlier) split between those born in 1957 and earlier (50.00% merged) and those born in 1963 and later (100% merged).[93] The perceptual merger of *pool* and *pole* shows a split several years later, with the most significant split occurring between those born in 1978 and earlier (18.18% merged) and those born in 1979 and later (66.67% merged).[94] As was done in Table 7, in Table 8 these splits are delineated by double lines to make them easier to visualize. It should be noted that these splits among the female subjects are located at the same points in apparent time as the splits among the sample as a whole.

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cause its own problems, as sometimes the *most* significant result might be to group all of the individuals together as one when there's a visible difference within the group. Cases where there were difficulties in analysis, along with the rationale for dealing with them as was done, are noted in footnotes.

[90] A chi-square test verifies this as significant to a level of $p<0.001$.

[91] Verified by chi-square testing to a level of $p<0.001$.

[92] With a chi-square test giving a result of $p<0.01$.

[93] With chi-square testing giving a result of $p<0.01$.

[94] Chi-square testing gives a result of $p<0.05$.

pseudonym	sex	year of birth	pull-pole	pull-pool	pool-pole
Theona	f	1919	merged	merged	distinct
Rowan	f	1929	distinct	distinct	distinct
Elise	f	1946	merged	merged	merged
Jeri	f	1951	merged	distinct	distinct
Melina	f	1954	merged	merged	merged
Paulie	f	1957	merged	distinct	distinct
Rosa	f	1963	distinct	merged	distinct
Blake	f	1969	merged	merged	distinct
Capri	f	1971	merged	merged	distinct
Joanne	f	1977	merged	merged	distinct
Helen	f	1978	merged	merged	distinct
Deanna	f	1979	merged	merged	merged
Kelly	f	1986	merged	merged	merged
Cherokee	f	1988	merged	merged	distinct

Table 8: Mergers in perception among female lifelong Waldorfians, arranged by year of birth

pseudonym	sex	year of birth	pull-pole	pull-pool	pool-pole
Elden	m	1921	merged	merged	distinct
Gerald	m	1941	distinct	merged	distinct
Randall	m	1942	merged	merged	distinct
Raymond	m	1948	merged	merged	distinct
Pippin	m	1951	merged	distinct	distinct
Bo	m	1956	merged	distinct	distinct
Tex	m	1960	merged	merged	distinct
Roy	m	1965	merged	distinct	distinct
Niels	m	1966	merged	merged	distinct
Torren	m	1967	merged	merged	distinct
Charles	m	1969	merged	merged	merged
Dayne	m	1973	merged	merged	distinct
Dawson	m	1980	merged	merged	merged
Gus	m	1982	distinct	merged	distinct
Thane	m	1988	merged	merged	merged

Table 9: Mergers in perception among male lifelong Waldorfians, arranged by year of birth

Among male lifelong Waldorfians, the same sort of analysis can be done, and gives mostly similar results. The first is the surprising result that men appear to be leading women in the adoption of the perceptual merger of *pull* and *pole* — the most natural significant break in the data is between those born in 1941 and earlier (50.00% merged) and those born in and after 1942 (92.31%

merged).[95] For *pull* and *pool,* on the other hand, the men match the women — the most significant break in the data is between men born in 1956 and earlier (66.67% merged) and those born in 1960 and later (88.89% merged).[96] Finally, regarding perception of the vowels in *pool* and *pole,* the most significant split occurs between those born in 1967 and earlier (0% merged) and those born in 1969 and later (60.00% merged);[97] in this case, like *pull* and *pole,* the men appear to be adopting this merger before the women. (As was done with the other similar tables, double lines are used to show when the switch from distinction to merger occurred, with no such result being shown for the last of the three.) The "difference" between men and women in the perception of *pull* and *pole* on the one hand and *pole* and *pool* on the other, however, appears to be entirely the result of one individual's behavior — in one case Rosa's perception of *pull* and *pole* and in the other Charles's perception of *pole* and *pool*. As the "differences" are the result of only one possible outlier in each case, making strong claims about the behavior of men versus women based on this result would necessarily be premature.

6.2. Mergers in production.

As noted in chapter 3, rating mergers in production is not quite as clear-cut as rating mergers in perception. However, as discussed in 3.2.3.3, one can use t tests to determine the presence or absence of merger, creating a binary distinction that can be compared to the results for mergers

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[95] A chi square test gives a result of $p<0.01$ for this split of the results. The distribution of the data, however, results in a bit of statistical ambiguity — it would be just as significant, for example, if the results were split between those born in 1980 and earlier (92.31% merged) and those born in 1982 and later (50.00% merged). The results are split as they are primarily because the break as given is the most natural-looking place for such a break to occur — the results for the lifelong Waldorfians as a whole make it clear that this is a merger in progress, and to split it any other way would match less well with that fact.
[96] Chi square testing shows that these results are significant to a level of $p<0.05$.
[97] A chi square test gives a result of $p<0.01$ for this split.

in perception. Conducting t tests as outlined there, one finds the pattern of merger in production among lifelong Waldorfians as given in Table 10.

The first thing that leaps out of Table 10 is that there is far less merger in production than there is merger in perception; this is discussed further in 6.3.[98] The next thing that the table shows is that, like the mergers in perception, the mergers in production appear to be changes in the linguistic system over time. Unlike the mergers in perception, however, none of the mergers in production have been adopted even nearly completely, but the rate at which the mergers in production each appear seems to increase over time.

To be specific, for *pull* and *pole* the productive merger appears variably only among those born in or after 1946,[99] but the most significant split appears among those born in or before 1967 (12.50% of whom show the merger) and those born later (53.85% of whom show the merger)[100] and for *pull* and *pool* the variable productive merger — with the exception of Theona, born 1919 — appears variably only among those born in or after 1969 (5.88% of those born earlier produce this pair merged, as opposed to 25.00% of the younger group).[101] The merger in production of *pool* and *pole* is more interesting, given that the only individual who merges them is Helen, born 1978. Whether this is the beginning of variable adoption of a merger

[98] This is not an artifact of the method used to determine whether a merger in production is present or absent. An analysis of the data that makes the assumption that *any* overlap of two vowels in production constitutes a merger in production still results in a finding that merger in perception is more widespread than merger in production (Bowie 1998).

[99] Although, given the variable adoption of this merger, it may be that this merger had actually appeared sporadically among those born before 1919. As there is no data to support this, however, the possibility is not pursued here.

[100] The difference between those born in or before 1967 and those born later is significant (a chi square test gives a result of $p<0.01$), and this is a more significant break than the one between those born in and after 1946 and those born earlier (which is also significant, but only to a degree of $p<0.05$).

[101] Chi square testing declares this difference significant to a degree of $p<0.0001$.

in production of these two vowel classes is in the end impossible to know with certainty,[102] but as will be seen in 6.3 this one case is interesting for other reasons, as well. Finally, it is worth noting that the relative order of the three mergers in production is similar though not the same as the mergers in perception: first *pull* and *pole* merge in production, then *pull* and *pool,* and finally (possibly) *pole* and *pool*. The boundaries showing when in apparent time these mergers can be determined to have taken hold are shown in Table 10 with double lines.

pseudonym	sex	year of birth	pull-pole	pull-pool	pool-pole
Theona	f	1919	distinct	merged	distinct
Elden	m	1921	distinct	distinct	distinct
Rowan	f	1929	distinct	distinct	distinct
Gerald	m	1941	distinct	distinct	distinct
Randall	m	1942	distinct	distinct	distinct
Elise	f	1946	merged	distinct	distinct
Raymond	m	1948	distinct	distinct	distinct
Jeri	f	1951	merged	distinct	distinct
Pippin	m	1951	distinct	distinct	distinct
Melina	f	1954	distinct	distinct	distinct
Bo	m	1956	distinct	distinct	distinct
Paulie	f	1957	distinct	distinct	distinct
Tex	m	1960	distinct	distinct	distinct
Rosa	f	1963	distinct	distinct	distinct

[102] Though, in my opinion, it is likely. Getting reliable significance results on numbers like this, though, is problematic, as nearly any split of the data results in a highly "significant" result from chi square testing.

pseudonym	sex	year of birth	pull-pole	pull-pool	pool-pole
Roy	m	1965	distinct	distinct	distinct
Niels	m	1966	distinct	distinct	distinct
Torren	m	1967	merged	distinct	distinct
Blake	f	1969	merged	distinct	distinct
Charles	m	1969	merged	merged	distinct
Capri	f	1971	distinct	distinct	distinct
Dayne	m	1973	distinct	distinct	distinct
Joanne	f	1977	distinct	distinct	distinct
Helen	f	1978	merged	merged	merged
Deanna	f	1979	merged	distinct	distinct
Dawson	m	1980	distinct	distinct	distinct
Gus	m	1982	distinct	distinct	distinct
Kelly	f	1986	distinct	distinct	distinct
Cherokee	f	1988	merged	merged	distinct
Thane	m	1988	merged	distinct	distinct

Table 10: Mergers in production among lifelong Waldorfians, arranged by year of birth

As was done with mergers in perception earlier, the results for mergers in production are also shown in separate tables for men and women; those results are in Table 11 (for women) and Table 12 (for men). Among the women, there is no point at which one can pinpoint a significant split in the table regarding the merger of *pull* and *pole* — any split gives insignificant results. For pull and *pool,* however, the most significant split can be pinned down to those born in or before 1977

(10.00% merged) and those born later (50.00% merged).[103] The merger in production of *pool* and *pole* shows a significant split at the same point (with the older group merging them 0% of the time and the younger group merging them 25.00% of the time).[104] The breaks that can be pinned down are shown with double lines in Table 11.

pseudonym	sex	year of birth	pull-pole	pull-pool	pool-pole
Theona	f	1919	distinct	merged	distinct
Rowan	f	1929	distinct	distinct	distinct
Elise	f	1946	merged	distinct	distinct
Jeri	f	1951	merged	distinct	distinct
Melina	f	1954	distinct	distinct	distinct
Paulie	f	1957	distinct	distinct	distinct
Rosa	f	1963	distinct	distinct	distinct
Blake	f	1969	merged	distinct	distinct
Capri	f	1971	distinct	distinct	distinct
Joanne	f	1977	distinct	distinct	distinct
Helen	f	1978	merged	merged	merged
Deanna	f	1979	merged	distinct	distinct
Kelly	f	1986	distinct	distinct	distinct
Cherokee	f	1988	merged	merged	distinct

Table 11: Mergers in production among female lifelong Waldorfians, arranged by year of birth

[103] Chi square testing confirms this as significant to a level of $p<0.05$.
[104] A chi square test gives a result of $p<0.001$ for this split.

pseudonym	sex	year of birth	pull-pole	pull-pool	pool-pole
Elden	m	1921	distinct	distinct	distinct
Gerald	m	1941	distinct	distinct	distinct
Randall	m	1942	distinct	distinct	distinct
Raymond	m	1948	distinct	distinct	distinct
Pippin	m	1951	distinct	distinct	distinct
Bo	m	1956	distinct	distinct	distinct
Tex	m	1960	distinct	distinct	distinct
Roy	m	1965	distinct	distinct	distinct
Niels	m	1966	distinct	distinct	distinct
Torren	m	1967	merged	distinct	distinct
Charles	m	1969	merged	merged	distinct
Dayne	m	1973	distinct	distinct	distinct
Dawson	m	1980	distinct	distinct	distinct
Gus	m	1982	distinct	distinct	distinct
Thane	m	1988	merged	distinct	distinct

Table 12: Mergers in production among male lifelong Waldorfians, arranged by year of birth

Among the male lifelong Waldorfians, the picture is also somewhat murky — there are multiple locations where one can find a significant break between the behavior of older and younger individuals, but the location that is the most significant splits the group into those born in or

before 1966 (0% merged) and those born later (50.00% merged).[105] Similarly, a split in the productive merger of *pull* and *pool* can be placed between those born in 1967 and earlier (0% merged) and those born later (20.00% merged).[106] These two splits are marked in Table 12 by double lines; nothing, of course, can be said about the distribution of the merger in production of *pool* and *pole,* as all of the male lifelong Waldorfians in the sample produce them as distinct.

There is not much of interest to say about the difference in the patterning of male and female lifelong Waldorfians regarding these mergers in perception, but it should be noted that the women's adoption of the merger appears to be more irregular than the men's. That is, there is more variation among the behavior of women as a group than among men as a group — among the women as a group, some of them are more conservative in all respects and some are less conservative in all respects. This may be a confirmation of Labov's (in press) finding that women are as a group more linguistically progressive than men, but as individuals they tend to be both more progressive and more conservative than men.

6.3. Comparing the occurrence of mergers in perception and production

A comparison of Table 7 and Table 10 reveals that there is often a mismatch between production and perception among those tested. A table showing a summary of the status of the mergers in perception and production in one place is given in Table 13.

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[105] This split is significant to a level of $p<0.01$, according to a chi square test.
[106] A chi square test confirms the difference as significant to a level of $p<0.001$. This may actually be a result that's simply an artifact of the distribution of the merger, rather than being an actual significant difference, but it does no harm to place the break there in this case.

pseudonym	sex	year of birth	pull-pole	pull-pool	pool-pole
Theona	f	1919	*perception*	M	D
Elden	m	1921	*perception*	*perception*	D
Rowan	f	1929	D	D	D
Gerald	m	1941	D	*perception*	D
Randall	m	1942	*perception*	*perception*	D
Elise	f	1946	M	*perception*	*perception*
Raymond	m	1948	*perception*	*perception*	D
Jeri	f	1951	M	D	D
Pippin	m	1951	*perception*	D	D
Melina	f	1954	*perception*	*perception*	*perception*
Bo	m	1956	*perception*	D	D
Paulie	f	1957	*perception*	D	D
Tex	m	1960	*perception*	*perception*	D
Rosa	f	1963	D	*perception*	D
Roy	m	1965	*perception*	D	D
Niels	m	1966	*perception*	*perception*	D
Torren	m	1967	M	*perception*	D
Blake	f	1969	M	*perception*	D
Charles	m	1969	M	M	*perception*
Capri	f	1971	*perception*	*perception*	D
Dayne	m	1973	*perception*	*perception*	D
Joanne	f	1977	*perception*	*perception*	D
Helen	f	1978	M	M	production

pseudonym	sex	year of birth	pull-pole	pull-pool	pool-pole
Deanna	f	1979	M	*perception*	*perception*
Dawson	m	1980	*perception*	*perception*	*perception*
Gus	m	1982	D	*perception*	D
Kelly	f	1986	*perception*	*perception*	*perception*
Cherokee	f	1988	M	M	D
Thane	m	1988	M	*perception*	*perception*

Table 13: Mergers in perception and production among lifelong Waldorfians, arranged by year of birth

By way of explanation, in Table 13, as in all other similar tables in this dissertation, a *D* represents a distinction in both production and perception, an *M* indicates a merger in both perception and production, *production* indicates a merger in production but not perception, and *perception* indicates a merger in perception but not production. This is done as a means of collapsing together related tables showing results for the progress of mergers in perception and production and presenting all of the data in them in one place.

One important thing that Table 13 shows is that, once a merger progresses through both perception *and* production, it is almost never completely reversed in both perception and

production.[107] This only makes sense — what is being dealt with here *are* processes of merger, after all, and the reversal of mergers is an exceptional occurrence.

Another thing that can be seen from Table 13 is that, although the perception and production of the various mergers and distinctions does match in the majority of cases, there are still a large number of cases in which there is a mismatch. Most notably, however, of the forty-three cases of a mismatch between perception and production, only *one* of them shows a merger in production and not perception (Helen's *pool* and *pole*). Leaving this one exceptional case to the side for the moment (to be returned to in 6.4.1), this means that, where there is a mismatch between perception and production, the various mergers in perception have preceded the corresponding mergers in production in this speech community.

This is actually not all that surprising in light of previous studies of what have been called "near-mergers" or "apparent mergers" — quite simply, similar cases in which a merger in perception exists without a corresponding merger in production. The phenomenon was first discussed in print by Labov, Yaeger, and Steiner in 1972,[108] and since then several studies since have confirmed its existence; the reader is referred to the 1991 work of Labov, Karan, and Miller for a summary of research done on near-mergers up to that point. The study of near-mergers has proven to be

[107] There are two exceptions to this: Theona both perceives and produces *pull* and *pool* as merged, but several speakers born in the forty years following her birth both produce and perceive those words as different. On the other side of the issue, both Elise and Jeri (born 1946 and 1951, respectively) merge *pull* and *pole* in both perception and production, but Rosa (born 1963) and Gus (born 1982) maintain a complete distinction. For this reason the text is phrased as it is — such almost never appears. It is clear that to say that it never happens would overstate the case; because these exceptions are so uncommon, however, they are left to the side for the current analysis.

[108] It should be noted that this phenomenon was documented earlier than 1972 — Labov, Karan, and Miller (1991) report personal communication from David de Camp that the phenomenon was documented but unrecognized in the early 1950s.

more than just a simple linguistic curiosity, but also a valuable tool for explaining certain odd situations, as for example the apparent reversal of the merger of *line* and *loin* since they were reported merged in 1700 (Nunberg 1980).

Among the studies conducted on this phenomenon are those of Di Paolo and Faber (1990) and Faber and Di Paolo (1995), which investigated mergers of perception and production among tense and lax vowels before /l/ in Utah English and found that near-mergers are in existence there.[109] Similar results were found by Kontra (1993) in a study of /e/ and /ɛ/ in the Hungarian spoken in South Bend, Indiana, and near-merger-type situations have been found to occur even in the realm of second-language learning, as reported by Sheldon and Strange (1982) in their study of the perception and production of /r/ and /l/ among Japanese speakers learning English as a second language.

In relation to all of this, however, Janson and Schulman (1983) raise an important point when, after conducting an experiment that systematically verified the existence of a near-merger in a Swedish community, they ask why a near-merger might ever occur — in particular, of what use is a distinction that no one can perceive? They conjectured that these cases of near-merger might have some sort of social importance — and, in fact, Di Paolo (1992) has found that when there is a near-merger, even though individuals cannot consciously perceive a produced distinction between the two sounds they hold in near-merger, they can still perceive the distinction in that

[109] Although nearly all of the work that has been done on near-mergers has looked at native speakers' vowel production, it should be noted that Diehm and Johnson (1997) have found that near-mergers exist in mergers of palatalized consonants in Russian.

they can make social judgments based on it.[110] This is not only an interesting result in general, it is a vitally important one for the study at hand, as will be seen in 8.3.

Before the data in Table 13 can be taken as absolute evidence that near-mergers exist in this speech community and that mergers in production are temporally following corresponding mergers in perception, there are two difficulties that must be dealt with, each involving only a few speakers. The first is the existence of distinctions in these vowels produced through means other than tongue position (as reflected by formant values) seen in three speakers, and the second is an interesting example of hypercorrection seen in one speaker, both of which are dealt with in 6.4.

6.4. Difficulties in the data

In any real-life data set, there are issues that pop up and muddy the picture a bit. The two that emerge from the data discussed above are discussed in the remainder of the chapter.

6.4.1. Distinctions not reflected by formant values

There are four logical possibilities for the relationship between a merger in production and the corresponding merger in perception for any member of a speech community; these are shown in Table 14.

[110] Di Paolo's (1992) study used matched guise experiments and found that speakers were rated differently by members of the Salt Lake City, Utah speech community based on the extent to which they produced /a/ and /ɔ/ as merged or distinct (in this case, less favorable ratings were given to speakers with a clearer distinction than others). This was even the case among those in who were unable to perceive a distinction between those vowels.

		perception	
		merged	distinct
production	merged	☑	☑
	distinct	☑	☑

Table 14: Logical possibilities for the distribution of mergers in perception and production[111]

A look at Table 13 confirms that all four logical possibilities are found in this study — but this is a problem. All four logical possibilities have been found in some studies, but the current study was set up in such a way that an individual would not be expected to exhibit a merger in production without a corresponding merger in perception. This is because this study was set up so that each individual rated their own production, and so an individual's merger in production would be expected to guarantee the existence of a merger in perception — if an individual's production were actually merged, then perception would have to be merged. With the case of Helen, however, and her perception and production of *pole* and *pool,* we have a case that goes against this.

The answer, obviously, is that since in this study the presence or absence of mergers in production is determined solely from first and second formant values, that Helen must be differentiating these vowels by means not reflected by formant values. A closer examination shows that this is, in fact, the case — Helen uses an exaggerated rounding distinction, in that she

[111] Derived from the discussion of near-mergers by Labov, Yaeger, and Steiner (1972).

consistently exhibits an extreme rounding of *pole* which allows her to tell the difference between it and her less-rounded *pool*.[112]

This brings up the question of whether there are other such cases, in which individuals use methods to make distinctions that are not reflected by formant values. Upon listening to the production of all of the Waldorf natives, it becomes apparent that there are only two other cases in which methods of distinguishing a pair of these vowel classes that do not involve formant differences appear. One of these is Paulie's production of *pull* on the one hand (which she produces with a very short vowel) and *pole* and *pool* on the other (which she produces with a longer vowel). The other case is Cherokee's production of *pool* (which she produces with a broken[113] vowel) versus *pull* and *pole* (which she produces with unbroken vowels). It should be stressed that these are not cases of hypercorrection (unlike the case dealt with in 6.4.2) with the variation that is found in such cases, but rather that these are consistent parts of these individuals' linguistic systems.

Two items need to be noted regarding this new data. The first is that Paulie's and Cherokee's unexpected production appears to serve no purpose — the values of the first and second formants are quite enough to tell them apart. The second is that it seems rather odd that these three individuals have adopted three different methods of differentiating these vowels aside from tongue position (as reflected by formant values).

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[112] This rounding actually have resulted in a measurable production difference in the formants above F2, but the method used for measuring production did not allow this to be checked. If this is the case, though, then the results for Helen may not actually be as unusual as they appear.

[113] In discussing Cherokee's production, "broken" means that the vowel is broken into two syllables (almost pronounced as a triphthong, something like [pu^{w}ul]) and "unbroken" means that the vowel is produced as a single syllable's nucleus.

These two puzzles can be dealt with by pointing to the same fact — all three of these people (Helen, Paulie, and Cherokee) produce at least some of the vowels they differentiate oddly very close together. It is only in Helen's case that the statistical test of production results in a claim that a pair she differentiates in an unexpected way is actually produced the same according to formant values, but Paulie's production of *pull* and *pool* and Cherokee's production of *pole* and *pool* both overlap physically (just not significantly).

This points to a possibility that will have to remain a conjecture for the moment, but that solves this puzzle quite neatly, which is based on the fact that all three of these cases occurs on the cusp of a merger in production (Bowie 1998) . It may be that, when the spaces occupied by two vowels start to collapse so that the vowels may merge in production, the individual learner's linguistic system has the option of focusing on secondary differences, even to the point of changing the features of one or both vowels so that they can remain separate in production while their formant values merge. This conjecture may seem strange when all of the speakers involved are participants in the merger in perception of at least some of the contrasts involved in this, but it should be noted that Nunberg (1980) and Di Paolo (1992) have produced evidence that a contrast in production, even absent a contrast in perception, is enough to allow the individual to learn to differentiate a pair of vowel classes.[114] The fact that all of the methods used in such a way are unique points to the possibility that these were all abortive attempts to change the system,[115] and

[114] It should be noted that these individuals' ability of to tell vowel classes apart using data other than formant values appears limited even in these cases. For example, Cherokee consistently produces *pool* with a broken vowel and *pole* with an unbroken vowel, but she is unable to access this to distinguish those two words in perception.

[115] It is, of course, too early to tell if Cherokee's innovation is something that will be picked up by those younger than she is. It is worth noting that Cherokee's broken vowel is the sort of thing that some Waldorf residents offered me as a stereotype of *Calvert* County (the next county to the east, and a more rural county than Charles County) speech. Future research on changes as they occur in Charles and Calvert Counties is

therefore they are the sorts of things that would only be found sparsely scattered about in the speech community.

6.4.2. Hypercorrection in production

A different sort of problem appears in only one case in this study — Capri and her exhibition of what appears to be hypercorrection in production. The basic problem is shown in Figure 27, which is a rather complicated graph, but one that gives quite a bit of information. The graph shows the high and mid back section of Capri's articulatory space, with her production of the vowels in *pull, pole,* and *pool* shown. There are six different symbols on the graph, with each vowel represented by two different symbols; this is because each vowel is separated into two groups, one for each of the vowels it was in minimal comparison with. Therefore, the symbol that is described on the legend as "pull (vs pole)" is the vowel in *pull* when Capri read from the minimal pair list contrasting *pull* and *pole,* while "pull (vs pool)" is the vowel in *pull* when read from the list contrasting *pull* and *pool*.

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needed to determine if this innovation of Cherokee's might be the result of a change spreading from the east.

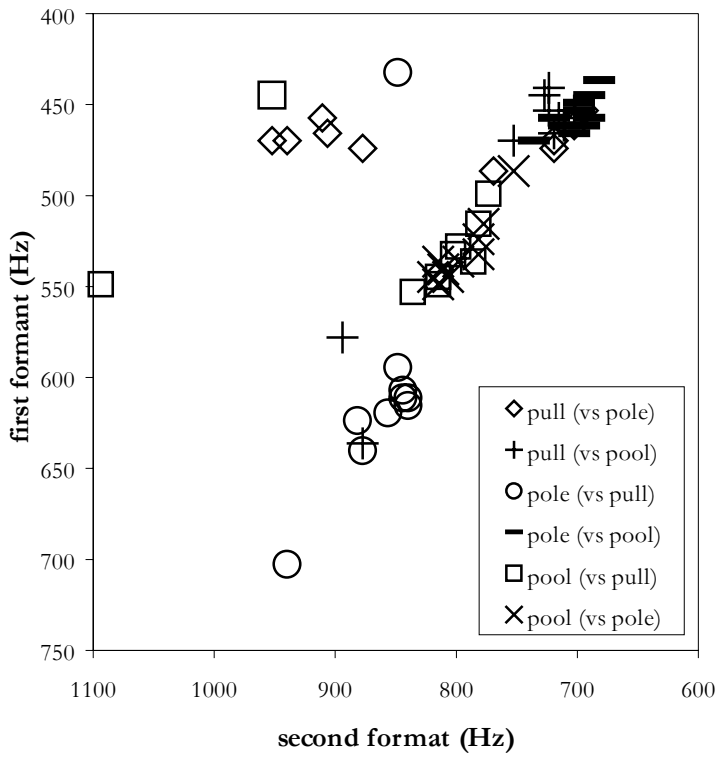

Figure 27: Production of *pull, pole,* and *pool* in minimal pair lists by Capri (not normalized)

The problem is immediately apparent — Capri made changes in her production of the various vowels depending on what she was comparing them with. As opposed to the cases described in 6.4.1, Capri's changes were not consistent across all cases, and so appear to be the result of hypercorrection. That is, when Capri produced the word *pool,* her production was generally consistent.[116] However, when she produced the word *pole,* her production was dependent on what

[116] Except for a couple of moderately fronted outliers.

was being contrasted — when *pole* was contrasted with *pool,* the vowel in *pole* was extremely high and back, but when *pole* contrasted with *pull,* the vowel in *pole* was mid back. Similarly, *pull* was always subject to a front-back bifurcation,[117] but where the further-front tokens fell was related to what *pull* was being compared to. If *pull* was being compared to *pool,* the vowel in *pull* was extremely high back as well as mid back, and if *pull* was compared to *pole,* the vowel in *pull* was extremely high back as well as high and somewhat fronted. It seems that Capri was somehow aware that there was "supposed" to be a difference among *pull, pole,* and *pool,*[118] and that she used the extreme high back corner of the articulatory space as a landing pad in an attempt to produce the distinction.

The question then naturally arises — how is this production pattern different from or similar to Capri's pattern in less formal situations? To help answer this, a graph demonstrating Capri's natural-speech production of the vowels in /owl/, /ul/, and /uwl/ sequences (five cases of each) is provided as Figure 28. Once again, this is a graph representing the high back corner of Capri's oral cavity, but here the picture is quite different. Whereas the overall production of Capri's non-low back pre-lateral vowels centers around the same region in both the naturally occurring and minimal pair list cases, the distribution is quite different. In the minimal pair case, there was what appears to be an attempt on Capri's part to keep the various vowel classes separate. On the other hand, in the case of naturally occurring words, the points of articulation of the three vowel classes shows that there is some degree of overlap among them.

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[117] Strictly speaking, the amount of fronting was not very large. It should be kept in mind that the graph in Figure 27 shows only the high and mid back corner of the articulatory space, and so what looks very front in the graph is not really very fronted at all.

[118] This may well have been triggered by the fact that these tokens come from reading minimal pair lists, and so the supposed differences would not have been reinforced only by minimal comparison, but also by the spelling of the words.

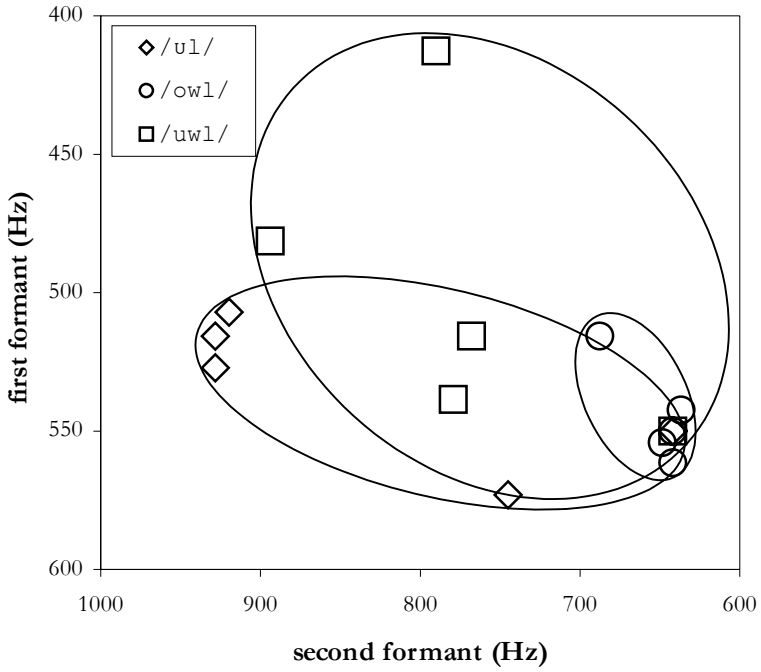

Figure 28: Capri's natural production of the vowels in words containing /ul/, /owl/, and /uwl/ sequences (not normalized)

A direct comparison of Capri's production as shown in Figure 27 and Figure 28 shows some interesting differences in her natural and minimal pair production. Firstly, Capri's production of /uwl/ is generally consistent in both her reading of minimal pair lists and her natural production. Her natural production of /ul/, however, matches better with her minimal pair production of /ul/ when contrasted with /owl/ than it does with her production of /ul/ contrasted with /uwl/, in which her /ul/ was generally backed and raised (aside from a couple of instances that were for some reason lowered). Her natural production of /owl/, on the other hand, does not match very well with either of her minimal pair productions; her production of /owl/ contrasted with /ul/ is generally (with one raised exception) lower and further front than

her natural production, and her production of /owl/, when contrasted with /uwl/, is consistently higher than her natural production of /owl/.

Given that Capri's behavior in the reading lists for the commutation test show some sort of effort to keep the vowel classes separate, it should be noted that she was unable to access the differences she created for *pull* and *pole* and for *pull* and *pool* despite the effort. This is not surprising — by definition, if an individual exhibits a merger in perception in two vowel classes, that person should be unable to hear even robust produced differences between those vowel classes.[119] Therefore, even by artificially creating a distinction in production, Capri was, due to her merger in perception, unable to use that artificial produced distinction to create an artificial perceptive distinction. This means that, although this problem is an issue to keep aware of, in this situation it does not cause a terrible amount of trouble, as her behavior in minimal pair contrasts does not differentiate her normal production from that of other people with near-mergers.

[119] There are limits on this, of course. Consider that linguistics students often have to learn to "hear" (i.e., perceive) differences that they did not previously have in their perceptual system, or often in their production system, and can afterwards make judgments on the learned differences. This ability to learn to perceive phonemic differences can occur with all types of mergers, and I have known people who were never able to reverse a merger in production but who were able to learn to consistently perceive that same distinction.

7. Perception and production among Waldorf exiles[120]

This chapter deals with mergers among the pre-lateral non-low back vowels among Waldorf natives who grew up in Waldorf, but who moved away as adults. The results for mergers in perception among this group are discussed in 7.1, and the results for mergers in production are discussed in 7.2. This report parallels the report of findings for the group of lifelong Waldorfians given in chapter 6.

It should be noted that, due to differences in the way the samples of lifelong Waldorfians and Waldorf exiles were constructed, the findings in this chapter are structurally different from those in chapter 6. Whereas the sample of lifelong Waldorfians covered a broad range of ages, allowing for a look at the mergers' progress in apparent time, the sample of Waldorf exiles is focused on one particular age group. Therefore, this chapter concerns itself with simply reporting the linguistic behavior of the Waldorf exiles, not with outlining the changes that they or their dialect has undergone. That is dealt with in chapter 8, in which the linguistic behavior of the lifelong Waldorfians and the Waldorf exiles is directly compared.

7.1. Mergers in perception

Table 15 gives the results for mergers in perception among the Waldorf exiles. As in the corresponding Table 7 in chapter 6, *merged* means that the pair at the head of the column have collapsed together and are rated as merged, while *distinct* means that they are rated as distinct.

[120] Some of the data in this chapter was originally presented at the Shenandoah Language and Linguistics Symposium in Buena Vista, Virginia as Bowie 1999.

Unlike the parallel table of lifelong Waldorfians, however, this table is arranged not by the year of birth of each subject, but rather by the number of years since each subject's move away from Waldorf. This is done for two reasons. The first is that the range of ages for the subjects in this group is rather narrow — all of them were born between 1965 and 1980 — and so looking at results in apparent time would not likely give a clear picture. The second, and more important, reason is that these people are being constantly surrounded by a second dialect. As it seems reasonable that the amount of time spent away from one's native dialect would have an effect on the degree of accommodation made to the new dialect, that is used as the ordering criterion in the tables in this chapter.[121]

[121] This may not the only variable that has an effect. Most other imaginable variables tend not to be scalar enough, however, to provide a decent ordering criterion for sorting a table.

pseudonym	sex	years away	year of birth	pull-pole	pull-pool	pole-pool
Tully	m	2	1971	merged	merged	distinct
Delsie	f	2	1976	merged	merged	distinct
Lindsey	f	3	1977	merged	merged	distinct
Max	m	4	1975	merged	merged	distinct
Jacob	m	5	1974	merged	merged	distinct
Monique	f	7	1974	merged	distinct	distinct
Khristina	f	9	1971	merged	distinct	distinct
Miles	m	10	1969	merged	merged	distinct
Licia	f	11	1969	merged	merged	distinct
Sylvia	f	11	1970	merged	distinct	distinct
Jessica	f	11	1970	merged	merged	distinct
Jan	m	13	1967	distinct	distinct	distinct
Alec	m	14	1967	merged	distinct	distinct

Table 15: Mergers in perception among Waldorf exiles, arranged by years away from Waldorf[122]

The first, and most obvious, thing that Table 15 shows is that the Waldorf exiles were consistently able to perceive the difference between *pole* and *pool*. However, the much more interesting results appear in the other two columns — distinctions between the other vowel classes are more likely to be made by individuals who have been away from Waldorf longer. Specifically, a perceptual

[122] The results for mergers among the Waldorf exiles are not shown broken down by sex, as they were for the lifelong Waldorfians in chapter 6. Looking carefully at the tables that are given, however, should demonstrate that there is really nothing of importance shown by such a breakdown in this case.

distinction between *pull* and *pool* is made only by individuals who have been away from Waldorf seven years or longer (those away from Waldorf for a shorter period have the perceptual merger 100% of the time, while those away longer have it only 37.50% of the time),[123] while the perceptual distinction between *pull* and *pole* was made only by an individual who had been away from Waldorf thirteen years (meaning that those who have been away from Waldorf thirteen years or more make a perceptual distinction 50.00% of the time, while those away less time have the distinction 100% of the time).[124] These breaks are shown with double lines in Table 15.

Basically, the pattern is that an individual leaves Waldorf with perceptual mergers in the *pull-pole* and *pull-pool* pairs and a distinction in perception in the *pole-pool* pair.[125] However, given the pattern visible in Table 15, it appears that upon being constantly faced with a new dialect, the individual learns over time to perceive the difference between *pull* and *pool* (and then possibly later, *pull* and *pole*).[126]

For the clearest case of a reversal of a perceptual merger — that of *pull* and *pool* — it should be noted that in most cases the dialect the Waldorf exiles are now surrounded by keeps those two vowel classes separate (*Phonological atlas of North America* 1997, 1999a, 1999b, 1999c). The only possible exceptions are Knoxville, Tennessee (where Jessica lives), where the picture is mixed, and

[123] A chi square test shows this to be a significant difference to a level of $p<0.05$.
[124] A chi square test gives a result of $p<0.01$ for this split; this may, however, simply be an artifact of the distribution of the data rather than a difference of true significance. For this reason, although this break is noted in Table 15, the analysis will generally focus on the perception of *pull* and *pool*.
[125] This assumption comes from the distribution of mergers in perception among lifelong Waldorfians born between 1965 and 1980 listed in Table 7.
[126] The evidence for the learning of the *pull-pole* pair is rather thin, as there is only one case of it happening. However, given that a reversal of the perceptual merger of *pull* and *pool* can occur, it is only consistent to mention that a reversal of the perceptual merger of *pull* and *pole* might be able to occur, but only after more exposure to the new dialect.

those who are in military surroundings (Delsie, Monique, and Miles), and therefore in mixed-dialect situations. In any event, however, the four people in such situations are still surrounded by a dialect or dialects in which *pull* and *pool* are both perceived and produced differently at least in part. (Although this does not necessarily give any great insight into the method by which the reversal of the perceptual merger comes about, it is important to note because it eliminates a possible variable from the analysis.)

7.2. Mergers in production

The general picture for mergers in production among the Waldorf exiles is shown in Table 16. The picture in this table is fairly uninteresting — most of the Waldorf exiles keep the three pairs distinct in production, with no clear pattern discernible. That is, the Waldorf exiles all keep *pole* and *pool* distinct in production, so nothing else can be said about their behavior there, and there is no significant split in the Waldorf exiles' treatment of *pull* and *pole*. There *is* a significant distinction between those who have been away from Waldorf three years or fewer (33.33% merged) and those who have been away longer (0% merged),[127] but it is unclear whether this is an actual difference of whether the significance is an artifact of the distribution of the merger, so it is not shown in the table.

[127] A chi square test shows this as significant to a level of $p<0.01$.

pseudonym	sex	years away	year of birth	pull-pole	pull-pool	pole-pool
Tully	m	2	1971	distinct	distinct	distinct
Delsie	f	2	1976	merged	distinct	distinct
Lindsey	f	3	1977	distinct	merged	distinct
Max	m	4	1975	distinct	distinct	distinct
Jacob	m	5	1974	merged	distinct	distinct
Monique	f	7	1974	distinct	distinct	distinct
Khristina	f	9	1971	distinct	distinct	distinct
Miles	m	10	1969	distinct	distinct	distinct
Licia	f	11	1969	distinct	distinct	distinct
Sylvia	f	11	1970	merged	distinct	distinct
Jessica	f	11	1970	merged	distinct	distinct
Jan	m	13	1967	distinct	distinct	distinct
Alec	m	14	1967	distinct	distinct	distinct

Table 16: Mergers in production among Waldorf exiles, arranged by years away from Waldorf

7.3. Comparing the occurrence of mergers in perception and production

A combination of Table 15 and Table 16 is given in Table 17. Although the pattern shown here is not terribly regular, there is one thing that is quite interesting — the occurrence of distinctions appears to increase the longer an individual has lived away from Waldorf. In all cases every individual keeps *pole* and *pool* separate in both perception and production, so there is nothing to be said of interest there. However, in the case of *pull* and *pool*, what could be called a "complete"

distinction — a distinction in both perception and production — is found *only* among those who have lived away from Waldorf seven years or longer. Similarly (though not as impressively), the only case of a complete distinction for *pull* and *pole* that was found was in an individual who has lived away from Waldorf for thirteen years.

While this is in itself an interesting set of facts, it becomes even more interesting when these results for the Waldorf exiles are compared with those for the lifelong Waldorfians of equivalent ages (which were given in chapter 6). This is done in chapter 8.

pseudonym	sex	years away	pull-pole	pull-pool	pole-pool
Tully	m	2	*perception*	*perception*	D
Delsie	f	2	M	*perception*	D
Lindsey	f	3	*perception*	M	D
Max	m	4	*perception*	*perception*	D
Jacob	m	5	M	*perception*	D
Monique	f	7	*perception*	D	D
Khristina	f	9	*perception*	D	D
Miles	m	10	*perception*	*perception*	D
Licia	f	11	*perception*	*perception*	D
Sylvia	f	11	M	D	D
Jessica	f	11	M	*perception*	D
Jan	m	13	D	D	D
Alec	m	14	*perception*	D	D

Table 17: Mergers in perception and production among Waldorf exiles, arranged by years away from Waldorf[128]

[128] As was already mentioned in 6.3, in this table, as in other similar tables in this dissertation, a *D* represents a distinction in both production and perception, an *M* indicates a merger in both perception and production, and *perception* indicates a merger in perception but not production. (The entry *production,* which does not appear in this table, would indicate a merger in production but not perception.)

8. A linguistic comparison of lifelong Waldorfians and Waldorf exiles

Comparing the linguistic patterns of the lifelong Waldorfians and Waldorf exiles in this study involves two main comparisons. The first of these is a comparison of their vowel production generally (the data discussed in chapter 5), and the second is a comparison of their perception and production of /ul/, /owl/, and /uwl/ (which was discussed in chapters 6 and 7).

8.1. The groups being compared

It should be noted that what is done in this chapter does not involve a comparison of all of the lifelong Waldorfians with all of the Waldorf exiles. Rather, as the subsample of Waldorf exiles included only individuals in a limited age range, the comparisons drawn involve all of the Waldorf exiles and only those lifelong Waldorfians of equivalent ages. As the Waldorf exiles were all born between 1965 and 1980, the lifelong Waldorfians born between 1965 and 1980 were selected out of the larger subsample for comparison; they are listed in Table 18.

pseudonym	year of birth	sex	casual interview?
Roy	1965	Male	No
Niels	1966	Male	No
Torren	1967	Male	Yes
Blake	1969	Female	Yes
Charles	1969	Male	Yes
Capri	1971	Female	Yes
Dayne	1973	Male	No
Joanne	1977	Female	No
Helen	1978	Female	Yes
Deanna	1979	Female	No
Dawson	1980	Male	Yes

Table 18: Lifelong Waldorfians born between 1965 and 1980

All of the individuals listed in Table 18 were subjected to commutation tests, and so all of them are used for comparison in 8.3, but only those six who participated in casual interviews are used for comparison in 8.2. As a result, the findings in section 8.3 and its subsections are generally more robust than those in 8.2 and its subsections.

8.2. Comparing overall vowel production

This section directly compares the results for the Waldorf exiles and the lifelong Waldorfians described in chapter 5. First all of the variables that were described in those chapters are

compared, and then generalizations that can be drawn from the comparison as a whole are mentioned.

8.2.1. The front diphthongs /iy/ and /ey/[129]

The first and simplest thing that can be said about the way the lifelong Waldorfians and the Waldorf exiles treat /iy/ and /ey/ is that they both treat /iy/ the same — that diphthong is consistently in the high front corner of the articulatory space, regardless of environment. The treatment of /ey/, however, deserves more attention.

As mentioned in 5.2, all of the lifelong Waldorfians treat word-internal and word-final /ey/ differently, with no change in this by age of speaker.[130] The situation among the Waldorf exiles, however, is different: The Waldorf exiles generally treat word-internal and word-final /ey/ differently, but that distinction breaks down when individuals have lived away from Waldorf for a long period of time (specifically, more than ten years). This is an interesting result, as it points to geographic mobility having a clear effect on the structure of the phonological system.

[129] This section does not deal with /ey/ followed by /r/. For a discussion of that case, see section 8.2.7.1.
[130] Only significant results are discussed in this chapter, except as explicitly stated. For probability levels resulting from statistical tests previously mentioned, please refer to the chapters in which each phenomenon was originally discussed.

8.2.2. The front vowels /ɪ/ and /ɛ/[131]

The results of comparing the production of /ɪ/ and /ɛ/ by Waldorf exiles and lifelong Waldorfians are fairly uninteresting. One thing that should be pointed out, though, is that, like the lifelong Waldorfians (those born between 1965 and 1980 as well as the group as a whole), none of the Waldorf exiles produce /ɪ/ and /ɛ/ with off-glides. This is the case even for Jessica, who has for eleven years been surrounded by a dialect where /ɪ/ and /ɛ/ are pronounced with off-glides.

Note that this is not necessarily the opposite case of the one described in 8.2.1 — there one sees a change in the treatment of speech sounds along with more time spent away from Waldorf, but that is a change in the phonological system; it may be that the lack of change described in this section is a lack of change in the phonetic system.

8.2.3. Monophthongization of /ay/

Monophthongization of /ay/ among lifelong Waldorfians born between 1965 and 1980 is shown in Table 19 (which is itself taken from Table 5), which shows the percentage of monophthongal /ay/ exhibited by these individuals. As can be seen from this table, monophthongization of /ay/ is in the process of disappearing among this age group (note that none of the individuals born after 1980 demonstrated *any* /ay/-monophthongization). Table 20 shows the equivalent information for the Waldorf exiles; however, unlike Table 6, which shows the same data, Table 20 is arranged by year of birth so that the two groups can be compared

[131] This section does not deal with the behavior of /ɛ/ in pre-rhotic environments; that is covered in 8.2.7.1.

more directly. As a result of the arrangement of the data in these tables, one can see that /ay/-monophthongization appears in the speech of only the oldest of the Waldorf exiles and lifelong Waldorfians of similar ages, which makes it seem at first that there is perhaps no difference between the two groups. This may actually be the case when one looks at the level of the entire groups,[132] but it is not necessarily the case when one looks at the way individuals behave.

pseudonym	sex	year of birth	monophthongal /ay/	diphthongal /ay/	percent monophthongal /ay/
Torren	m	1967	6	88	6.38%
Blake	f	1969	1	29	3.33%
Charles	m	1969	2	30	6.25%
Capri	f	1971	0	138	0.00%
Helen	f	1978	0	56	0.00%
Dawson	m	1980	0	87	0.00%

Table 19: Tokens of monophthongal and diphthongal /ay/ in ten minutes of casual interview speech among lifelong Waldorfians born between 1965 and 1980, arranged by year of birth

[132] Although the sample size in this instance is a bit small to allow results of t tests to be *completely* reliable, the one-tailed result of a t test assuming unequal variances supports the hypothesis that the distribution of /ay/-monophthongization among the two groups is the same.

pseudonym	sex	years away from Waldorf	year of birth	monophthongal /ay/	diphthongal /ay/	percent monophthongal /ay/
Alec	m	14	1967	0	97	0.00%
Jan	m	13	1967	2	47	4.08%
Jessica	f	11	1969	10	48	17.24%
Miles	m	10	1969	0	87	0.00%
Licia	f	11	1970	0	79	0.00%
Sylvia	f	11	1970	0	77	0.00%
Khristina	f	9	1971	0	122	0.00%
Jacob	m	5	1974	0	91	0.00%
Monique	f	7	1974	0	75	0.00%
Max	m	4	1975	0	73	0.00%
Delsie	f	2	1976	0	67	0.00%
Lindsey	f	3	1977	0	88	0.00%

Table 20: Tokens of monophthongal and diphthongal /ay/ in ten minutes of casual interview speech among Waldorf exiles, arranged by year of birth

As noted in 5.4, a case that is immediately noticeable is that of Jessica, who exhibits monophthongization of /ay/ 17.24% of the time, an order of magnitude above the behavior of any of the other Waldorf natives in this age group, and an unexpected result given the distribution of /ay/-monophthongization among female lifelong Waldorfians. This is particularly notable in light of the fact that Jessica is the only one of the Waldorf exiles who has been constantly surrounded by a dialect (in Knoxville, Tennessee) that exhibits monophthongization of /ay/ since her move away from Waldorf.

There are possible (though not as clear) tendencies among the lifelong Waldorfians in the other direction, as well. Alec, Jan, and Miles are on the cusp of the completion of the move toward 100% diphthongal /ay/ among male lifelong Waldorfians. Jan shows a very small amount of monophthongal /ay/ while Alec and Miles do not; it is unclear, however, whether this is the result of Alec and Miles being influenced by being surrounded by dialect models with fully diphthongal /ay/, or whether they left Waldorf in such a state. In the case of Jessica, however, the influence of a second dialect is nearly unmistakable — a look at Table 5 shows that monophthongization of /ay/ at a rate of 17.24% would be expected of a female lifelong Waldorfian born in the 1910s or 1920, not in the late 1960s.

8.2.4. The behavior of /æ/[133]

The treatment of /æ/ by the Waldorf exiles as compared to the lifelong Waldorfians is similar to the case of /iy/ and /ey/, in that time spent away from Waldorf has an effect on the linguistic system. In this case, as discussed in 5.5, there is a change in progress that can be seen among the lifelong Waldorfians that results in an increase in the fronting of pre-nasal /æ/ over apparent time. Once the Waldorf exiles have been away from Waldorf for nine or more years, however, their treatment of pre-nasal /æ/ changes. The exact sort of change that occurs is not entirely clear,[134] but in any event a change occurs at that point.

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[133] This section does not deal with the behavior of /æ/ in pre-rhotic environments; that is covered in 8.2.7.1.

[134] It is actually unclear that there is *one* particular change that occurs among the Waldorf exiles who have been away from Waldorf that long — Figure 16 seems to show that there is a lessening of the amount of fronting, but there is a great deal of individual variation involved

8.2.5. The behavior of /ʌ/

The production of /ʌ/ is remarkably static among the Waldorf exiles and the lifelong Waldorfians. As discussed in 5.6, not only does one see no change in the position of /ʌ/ over apparent time, the Waldorf exiles and the lifelong Waldorfians produce it in the same way.

8.2.6. /a/ and /ɔ/ (*cot* and *caught*) [135]

The situation regarding production of /a/ and /ɔ/ is in many ways the same as that for /ʌ/. The lifelong Waldorfians show no merger of /a/ and /ɔ/,[136] nor do they show an off-glide with /ɔ/, and the Waldorf exiles behave in exactly the same way.

8.2.7. Vowels followed by /r/[137]

The mergers before /r/ described in 8.2.7.1 and 8.2.7.2 had both progressed to completion in Waldorf by the time those in the age group of the Waldorf exiles were learning language. This section, therefore, gives insight to the possibility of splitting apart a previously existing merger upon exposure to a second dialect — namely, that it does not happen.

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[135] This section does not deal with these vowels in pre-rhotic environments; /ɔr/ is covered in section 8.2.7.2.

[136] In 5.7 I said that there may be hints of a move toward merger of /a/ and /ɔ/ that might show up in a couple generations, but that was primarily speculation on my part. The data presented in this dissertation shows no such merger among any Waldorfians.

[137] See footnote 76 for a note regarding *r*-lessness in Waldorf.

8.2.7.1. /eyr/, /ɛr/, and /ær/ (*Mary, merry,* and *marry*)

These are participants in a long-standing merger in Waldorf — /eyr/, /ɛr/, and /ær/ (though not syllabic /r/) are merged among all of the lifelong Waldorfians. There was no difference between the Waldorf exiles and the lifelong Waldorfians of similar ages[138] in their treatment of these vowels in this environment — they all produced these merged.

8.2.7.2. /ɔr/ and /owr/ (*horse* and *hoarse*)

These vowels are also part of a long-standing (but not as long-standing as /eyr/, /ɛr/, and /ær/) merger. Once again, the Waldorf exiles and the lifelong Waldorfians born between 1965 and 1980 produced these the same way — merged.

8.2.8. The non-low back vowels

This section deals with the production of the non-low back vowels, particularly /ow/ and /uw/. Note that, beyond this section, 8.3 contains information on the production of these vowels as part of the discussion of the perception and production of these vowels before /l/. However, where 8.3 and its subsections deals entirely with the treatment of these vowels as a result of formal linguistic testing, this section deals with the production of these vowels as a result of participation in casual interviews.

[138] Which also, given the lifelong Waldorfians' treatment of these vowels before /r/, means that there was no difference between the Waldorf exiles and *any* of the lifelong Waldorfians.

8.2.8.1. The diphthongs /ow/ and /uw/[139]

In one very important way, the lifelong Waldorfians and the Waldorf exiles treat /ow/ and /uw/ similarly — they all keep these vowels back before /l/. Aside from that, though both groups front /ow/ and /uw/ in all other environments, the treatment of the vowels is different. This can be seen for /ow/ in Figure 29 and Figure 30, which show the degree of fronting of word-internal and word-final /ow/ relative to pre-lateral /ow/ for the different subgroups.[140] These graphs show that the lifelong Waldorfians all appear to treat word-internal and word-final /ow/ roughly the same, fronting them both by about the same amount. The Waldorf exiles, however, appear to show a much more irregular pattern — some individuals front word-internal and word-final /ow/ by the same amount as the lifelong Waldorfians, some less, and some more.

Statistical testing shows that the picture is slightly more complicated than simply saying that the Waldorf exiles behave more irregularly than the lifelong Waldorfians of similar ages, though. Tests of the distribution of the degree of fronting of word-internal /ow/ shows that the Waldorf exiles and the lifelong Waldorfians treat /ow/ differently in that environment,[141] but that they treat word-final /ow/ the same.

That is the result for the group as a whole, however — upon looking at individual behavior as opposed to the group, however, some interesting things can be seen. For one thing, although the general tendency among all of the Waldorf natives seems to be to front /ow/ about the same

[139] This section does not deal with /owr/; that is covered in 8.2.7.2.
[140] Figure 30 is the same as Figure 22. Figure 29 contains the same data as Figure 21, but is limited to the lifelong Waldorfians of ages similar to the Waldorf exiles.
[141] A t test gives a result of $p<0.05$ for this case.

amount whether word-finally or word-internally, there are exceptions — Jessica clearly fronts word-final /ow/ more than word-internal /ow/, and Delsie appears to do the same. Because of this, it may have to be the case that, although the lifelong Waldorfians appear to have collapsed word-final and word-internal /ow/ into a single vowel class, they must be accessible as different vowel classes for those who move away to be able to treat them differently. Whether this would still be the case for those of the next generation who move away from Waldorf is an interesting question.

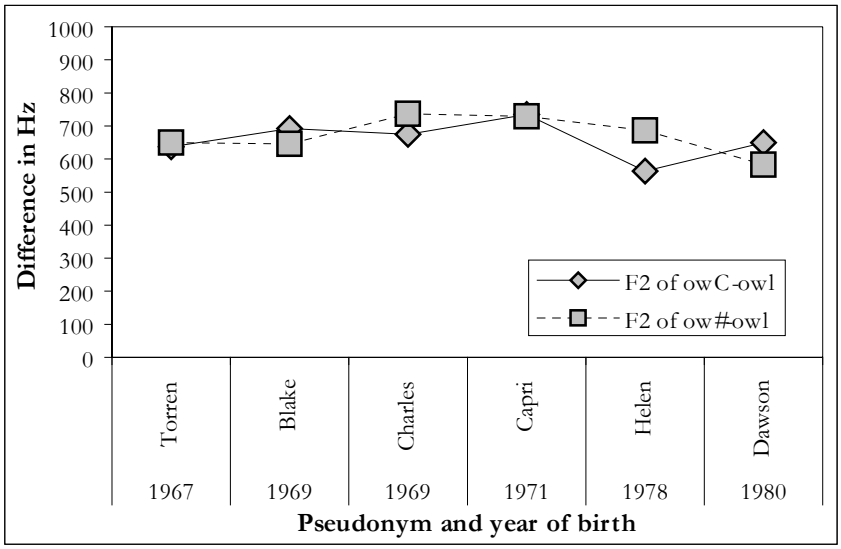

Figure 29: Normalized second formant values for pre-lateral /ow/ compared with word-internal and word-final /ow/ among lifelong Waldorfians born between 1965 and 1980, arranged by year of birth

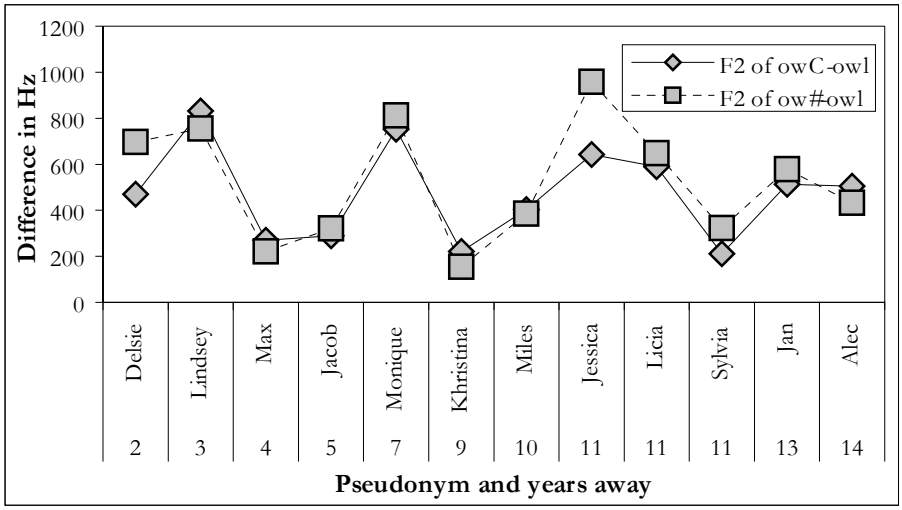

Figure 30: Normalized second formant values for pre-lateral /ow/ compared with word-internal and word-final /ow/ among Waldorf exiles, arranged by years away from Waldorf

More interesting, however, is that although there are several Waldorf exiles who do not appear to change their degree of /ow/-fronting from the general lifelong Waldorf pattern, the changes that *do* occur tend to occur in the direction of accommodation to the new dialect an individual is surrounded by. That is, Jessica changed to treat /ow/ more like the Southern dialect she is surrounded by (i.e., more /ow/-fronting), while the others who changed accommodated toward less /ow/-fronting. Therefore, in this case it appears that what is happening among those who change their system is actually an effect of being surrounded by a new dialect rather than an effect of being separated from the original dialect.

Turning to /uw/, graphs displaying the fronting of word-final and word-internal /uw/ as well as the vowel class (iw)[142] in relation to the backed pre-lateral /uw/ are shown in Figure 31 and Figure 32.[143] As was mentioned in 5.9.1, the lifelong Waldorfians as a whole and the Waldorf exiles behave the same way in relation to the fronting of /uw/; a comparison of the Waldorf exiles with only those lifelong Waldorfians of similar ages confirms this.[144] Therefore, a possible conclusion to draw is that, unlike the case of /ow/, /uw/ is not affecting by constant exposure to a second dialect.[145]

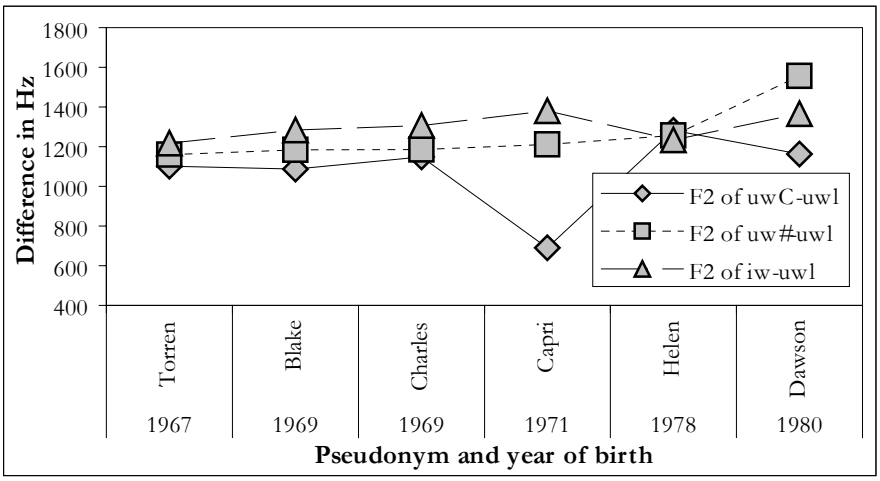

Figure 31: Normalized second formant values for pre-lateral /uw/ compared with word-internal and word-final /uw/ and vowel class (iw) among lifelong Waldorfians born between 1965 and 1980, arranged by year of birth

[142] For a discussion of the vowel class (iw), please see 5.9.1, particularly footnote 82.
[143] Figure 31 is based on the same data as Figure 23 but is limited to the lifelong Waldorfians of ages similar to the Waldorf exiles, and Figure 32 contains the data in Figure 24.
[144] Using t tests to compare each of the three sets of measures showing fronting of word-final /uw/, word internal /uw/, and (iw).
[145] This is, however, not necessarily the case, as /uw/ is either moderate or complete for all of the United States except for Wisconsin and Eastern New England (William Labov, p.c. 2000).

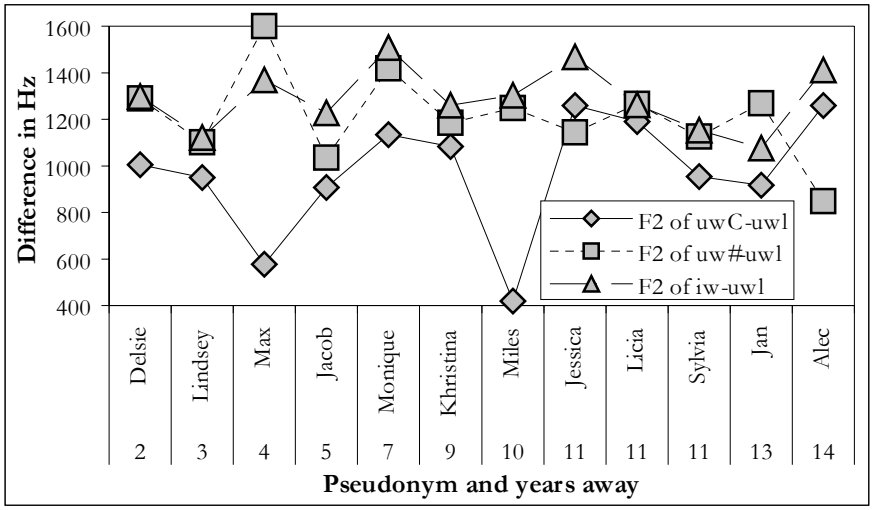

Figure 32: Normalized second formant values for pre-lateral /uw/ compared with word-internal and word-final /uw/ and vowel class (iw) among Waldorf exiles, arranged by years away from Waldorf

8.2.8.2. Non-low back vowels followed by /l/ (*pull, pole,* and *pool*)

There is not much of note to say about naturally occurring pre-lateral non-low back vowels as produced by the lifelong Waldorfians and the Waldorf exiles. The only item of importance to mention is that, as was noted in 5.9.2, the longer an individual has been away from Waldorf, the more of a distinction that person makes between /owl/ and /uwl/. This ties in very well with the results of formal tests of production of /ul/, /owl/, and /uwl/ among the lifelong Waldorfians and the Waldorf exiles as discussed in 8.3.1.

8.2.9. Generalizations about vowel production

The biggest generalization that can be made here is that those things that are not already in a state of change in the native dialect appear more resistant to change upon constant exposure to a new dialect than those things that are in a state of change. That is, those linguistic items that are not part of changes in progress appear to be more likely to have some level of stability that allows them to be affected by another dialect. The strongest case of this is the behavior of /ʌ/ — it is a stable vowel, with no change for at least a century, and it was nearly completely immune to change when placed in conflict with other dialects. The reverse also appears to be true, as demonstrated by the case of /æ/ — /æ/ is undergoing a change in progress in Waldorf, and although it takes some years for it to become apparent, the treatment of /æ/ is subject to change in the face of constant exposure to a new dialect.

This is of course only a rule of thumb, but it seems to hold true generally. There are, it should be noted, some exceptions, the clearest one being the fronting of /ow/, in that /ow/ is not undergoing change in apparent time in Waldorf, but it was very susceptible to change in the face of a new dialect, and it could be influenced in both directions. The picture here is unclear, however, because the production of /ow/ *is* undergoing a conditioned change (specifically, before /l/), as noted in 8.2.8.2 and 8.3.2.

Finally, it should be noted that the behavior of the Waldorf exiles in their treatment of the perception and production of the non-low back pre-lateral vowels is discussed in 8.3. The results of the comparison discussed there further support the hypothesis that those linguistic items that

are undergoing changes in a dialect are more susceptible to influence from a second dialect, while those that are not undergoing change are less susceptible to such influence.

8.3. Perception and production of the non-low back pre-lateral vowels

This section includes a comparison of the behavior of the Waldorf exiles and the lifelong Waldorfians of similar ages in the perception and production of the non-low back pre-lateral vowels (i.e., /ul/, /owl/, and /uwl/). Perception is dealt with in 8.3.1 and production is covered in 8.3.2; a short discussion on perception and production all at once is given in 8.3.3. Finally, generalizations that can be drawn from the data on perception and production are discussed in 8.3.4.

8.3.1. Perception of /ul/, /owl/, and /uwl/[146]

One sees an immediate, striking difference upon comparing the perception of the non-low back pre-lateral vowels among the Waldorf exiles and the lifelong Waldorfians. These are shown in Table 21 (which shows the lifelong Waldorfians) and Table 22 (which shows the Waldorf exiles),[147] and the comparison that follows from these tables is fairly straightforward. The first thing to note is that the merger in perception of *pull* and *pole* is absolutely complete for the lifelong Waldorfians, and it is complete for the Waldorf exiles with one exception — basically the same pattern shown by the two groups.[148] Conversely, a merger in perception of *pole* and *pool* is

[146] Some of the data in this section was originally presented at the Shenandoah Language and Linguistics Symposium in Buena Vista, Virginia as Bowie 1999.
[147] Table 21 includes a subset of the data in Table 7, and Table 22 is the same as Table 15.
[148] That they are in fact the same can be confirmed by a t test.

completely absent among the Waldorf exiles, while it is absent with three exceptions for the lifelong Waldorfians — a less clear case, but one in which the adoption of the merger in perception appears to be different among the two groups.[149] The perceptual merger of *pull* and *pool,* however, is most interesting and the case that will be focused on here, because the two groups are even more different than the case of *pole* and *pool*.[150]

pseudonym	sex	year of birth	pull-pole	pull-pool	pool-pole
Roy	m	1965	merged	distinct	distinct
Niels	m	1966	merged	merged	distinct
Torren	m	1967	merged	merged	distinct
Blake	f	1969	merged	merged	distinct
Charles	m	1969	merged	merged	merged
Capri	f	1971	merged	merged	distinct
Dayne	m	1973	merged	merged	distinct
Joanne	f	1977	merged	merged	distinct
Helen	f	1978	merged	merged	distinct
Deanna	f	1979	merged	merged	merged
Dawson	m	1980	merged	merged	merged

Table 21: Mergers in perception among lifelong Waldorfians born between 1965 and 1980, arranged by year of birth

[149] A t test gives a result of $p<0.05$ for this distribution.
[150] As confirmed by a t test, which gives a result of $p<0.05$.

pseudonym	sex	years away	pull-pole	pull-pool	pole-pool
Tully	m	2	merged	merged	distinct
Delsie	f	2	merged	merged	distinct
Lindsey	f	3	merged	merged	distinct
Max	m	4	merged	merged	distinct
Jacob	m	5	merged	merged	distinct
Monique	f	7	merged	distinct	distinct
Khristina	f	9	merged	distinct	distinct
Miles	m	10	merged	merged	distinct
Licia	f	11	merged	merged	distinct
Sylvia	f	11	merged	distinct	distinct
Jessica	f	11	merged	merged	distinct
Jan	m	13	distinct	distinct	distinct
Alec	m	14	merged	distinct	distinct

Table 22: Mergers in perception among Waldorf exiles by subject, arranged by years away from Waldorf

In perception, all but one of the lifelong Waldorfians merge *pull* and *pool,* but the picture among the Waldorf exiles is more complicated. Not only is there variation among the Waldorf exiles — eight of them have the perceptual merger, while five of them draw a distinction — but the variation is distributed in a non-random manner. That is, the longer an individual has lived away from Waldorf, the more likely an individual is to be able to draw a distinction between the two vowel sounds, and as noted in 7.1, there is a significant difference in the perception of this

merger among those who have been away from Waldorf for five years or less and those away for seven years or more. As all of the Waldorf exiles moved to areas where *pull* and *pool* are at least partially maintained as separate in production,[151] it would appear at first that this reversal of the merger in perception is simply the result of individuals being constantly faced with a distinction in production in the region they have moved to. This is, however, not necessarily the case — as can be seen from Table 10, the merger in production of *pull* and *pool* is in progress in Waldorf, and the distinction in production is still maintained there for the most part. Given that, it would seem that it is not simply exposure to a produced distinction that allows that distinction to be perceived, or one would expect similar results for the lifelong Waldorfians and Waldorf exiles. It appears that this is a case in which the cause is not exposure to a second dialect, but rather the lack of exposure to the original dialect.[152] The mechanism for this is not entirely clear, but (as discussed in 8.3.3) it may at least in part involve the asymmetry between perception and production in this age group.

[151] As noted in 7.1, the distinction is completely maintained everywhere that the Waldorf exiles moved (*Phonological atlas of North* America 1997, 1999a, 1999c) except for Knoxville, Tennessee, where the distinction is variably maintained (*Phonological atlas of North America* 1999b), and the mixed-dialect military situations.

[152] Whether this would still be the case for individuals who moved to an area where there was no distinction in perception is an interesting question. If the ability to learn the distinction in perception is actually based entirely on the shock of not being exposed to one's original dialect, then a Waldorfian constantly exposed to a dialect with no productive distinction would still learn to perceive the difference. This might actually be the case — the Waldorfians in this age group do have a difference in production to fall back on and so would not necessarily need to be surrounded by the distinction to learn it — but it is an interesting prediction that should be tested in future research.

8.3.2. Production of /ul/, /owl/, and /uwl/

The production of /ul/, /owl/, and /uwl/ is shown in Table 23 (which shows results for the lifelong Waldorfians) and Table 24 (which shows results for the Waldorf exiles).[153] In this case the results for *pole* and *pool* are relatively uninteresting, because they show essentially the same situation among the two groups — the lifelong Waldorfians maintain a distinction between the vowels in those words with only one exception, and the lifelong Waldorfians all maintain the distinction.[154] The other minimal pairs appear possibly more interesting, but t tests confirm that the distribution of these mergers in production is similar enough to also be statistically the same. In any event, though, it would be difficult to say much of interest regarding these mergers in production, as they occur only sporadically among this age group; the interaction between the production and perception of these mergers discussed below, however, is of more interest.

[153] Table 23 includes a subset of the data in Table 10, and Table 24 is the same as Table 16.
[154] That the groups behave the same can be verified with a t test.

pseudonym	sex	year of birth	pull-pole	pull-pool	pool-pole
Roy	m	1965	distinct	distinct	distinct
Niels	m	1966	distinct	distinct	distinct
Torren	m	1967	merged	distinct	distinct
Blake	f	1969	merged	distinct	distinct
Charles	m	1969	merged	merged	distinct
Capri	f	1971	distinct	distinct	distinct
Dayne	m	1973	distinct	distinct	distinct
Joanne	f	1977	distinct	distinct	distinct
Helen	f	1978	merged	merged	merged
Deanna	f	1979	merged	distinct	distinct
Dawson	m	1980	distinct	distinct	distinct

Table 23: Mergers in production among lifelong Waldorfians born between 1965 and 1980, arranged by year of birth

pseudonym	sex	years away	pull-pole	pull-pool	pole-pool
Tully	m	2	distinct	distinct	distinct
Delsie	f	2	merged	distinct	distinct
Lindsey	f	3	distinct	merged	distinct
Max	m	4	distinct	distinct	distinct
Jacob	m	5	merged	distinct	distinct
Monique	f	7	distinct	distinct	distinct
Khristina	f	9	distinct	distinct	distinct
Miles	m	10	distinct	distinct	distinct
Licia	f	11	distinct	distinct	distinct
Sylvia	f	11	merged	distinct	distinct
Jessica	f	11	merged	distinct	distinct
Jan	m	13	distinct	distinct	distinct
Alec	m	14	distinct	distinct	distinct

Table 24: Mergers in production among Waldorf exiles by subject, arranged by years away from Waldorf

8.3.3. Perception and production of /ul/, /owl/, and /uwl/

The first remark to make regarding production and perception is that, interestingly, despite the reorganization in the perception system of the Waldorf exiles discussed in 8.3.1, mergers in

production do not occur without mergers in perception for these individuals.[155] This makes sense — as discussed in 6.3 and 7.3, it is very rare for a merger in production to occur without a corresponding merger in perception (the one exception in the data being Helen's *pole* and *pool,* discussed in 6.4.1). In a way, however, this reflects a somewhat odd situation, in that mergers in perception are being reversed but mergers in production appear to be inviolate. One might expect that an individual could somehow pick up a distinction in perception (particularly if that person is surrounded by such a distinction), but after that one might expect that the individual could use this perceptual understanding to learn to *produce* the difference. It appears, however, that this sort of restructuring of the perceptual system (in which previously unknown distinctions are learned) is possible, but it cannot be done with the production system.

Of course, underlying all this is an even more puzzling issue: How can an individual know that a distinction to be perceived exists at all without first having been able to perceive the fact that there is a distinction to be made? This problem points to the possibility that some part of the perceptual system is actually the underpinning for (at least much of) the alteration that occurs in one's perception upon constant exposure to a new dialect, but the perception that causes such effects is in this case is not consciously accessible. That is, the perceptual system appears to be able to unconsciously access distinctions that the individual cannot access consciously, and therefore what is actually being done in these cases is that the perceptual system is restructuring itself to allow conscious access of parts of it that were previously not consciously accessible. After (and only after) this reorganization of the perceptual system, the perception system seems

[155] The direct comparison of mergers in perception and production among the Waldorf exiles can be found in Table 17.

somehow to be able to allow conscious access to (at least some of) these distinctions so as to allow consistent distinctions in perception to be made.[156]

This ties in well with Di Paolo's (1992) findings that, when there is a near-merger, even though individuals cannot consciously perceive a produced distinction between the sounds involved in the near-merger, they can still unconsciously perceive the distinction in that they can make social judgments based on it.[157]

8.3.4. Generalizations about perception and production

The main generalization that can be made about the perception and production systems is that they function separately, but that they do occasionally work hand-in-hand. Evidence for the perceptual and production systems working together comes from the fact that there is a mismatch between perception and production in the cases of merger in progress in which mergers in perception lead mergers in production in apparent time (with possibly problematic cases discussed in 6.4.1). On the other hand, evidence that they are separate comes from the fact that mergers in perception are reversible but mergers in production are not. Also, the details of the reversals of mergers in perception among Waldorf exiles support the finding, first mentioned

[156] This is not necessarily extremely surprising, given that the produced distinctions must be cognitively present in some way to allow for their production even if they are not perceived, but it *does* show that a workable theory of perception and production cannot be *radically* modular. In addition, it means that any attempt to develop a cognitive theory of perception and production must recognize that the transmission between the perception and production systems must be set up so that it is asymmetrical.
[157] See footnote 110 for a short description of this study.

in 8.2.9, that changes in progress are more susceptible to change upon exposure to a second dialect than those linguistic features that are not in a state of change.

9. Conclusions and discussion

So now, after 136 pages of discussion, we finally get to the big question implied by the title of this dissertation: Do changes occur in an individual's native dialect when an individual is in constant exposure to another dialect? The question has a simple answer — an unqualified yes. The details behind that simple unqualified yes, however, prove most complicated and interesting.

9.1. Variables affecting changes in speech patterns

Most of the variables affecting the changes individuals make or avoid are discussed in 8.2.9 and 8.3.4, but they should be mentioned again here. The first is that not all linguistic features of any given dialect are equally open to change when its speakers are placed in constant exposure to another dialect. Rather, the features that are generally the most susceptible to change in an individual's linguistic system are those which are undergoing a change in the individual's original dialect, while those features that are stable in the original dialect are resistant to change.[158] This is why the Waldorf exiles' production of, for example, /æ/ was subject to change, but their production of /ʌ/ and /iy/ was not. In addition, it can be said that this applies not only to production, but also to perception — a perceptual variable that is in flux in an individual's native dialect is subject to change upon constant exposure to a new dialect to the same extent that a variable in production that is in flux is subject to change.

[158] It should, however, be stressed that this is a generalization which is not intended to be *perfectly* predictive. As noted in 8.2.9, this is not intended to mean that *all* stable variables are completely immune to change, nor that *all* variables in flux will necessarily be subject to change, but rather that they exhibit a tendency to do so. In addition, the presentation here is somewhat oversimplified, as it omits the possibility that these features may be undergoing changes in the new dialect, as well.

That leads to another complication that this study found, which is that perception and production systems function separately, but relatedly. It has been known for several years — decades, in fact — that perception and production function separately but relatedly in cases of merger in progress (and this study supports that finding), but the specifics of that relationship have not been fully investigated. This study, however, has produced evidence for the nature of the perceptual and production systems. The method of this relationship is discussed at moderate length in 8.3.3, but in general the nature of the system seems to be that perception functions (probably better: is able to function) below the level of conscious accessibility until it is somehow prodded into conscious accessibility, which leads to an apparent reversal of mergers in perception. However, the production system appears to function differently, in that such apparent reversals of merger are impossible, probably because there is no equivalent unconscious level of the production system.[159]

Finally, a peripheral issue that was raised early in this dissertation is the question of whether the Waldorf dialect follows a Southern pattern or not. In general, it seems that the answer to that question has to be that the Waldorf pattern is "sort of" Southern — that is, it contains several Southern features such as centralization of /ey/, but they are mixed with several non-Southern features such as the production of /ɪ/ and /ɛ/ without glides. In addition, it appears that the Waldorf dialect is becoming slowly less Southern over time in some ways, such as the progressive diphthongization of monophthongized /ay/. This lends support to Kretzschmar *et al's* (1993) South-South Midland dialect isogloss, which places Waldorf on the border of the South and South Midland, as opposed to Kurath and McDavid's (1961), which places Waldorf firmly in the

[159] This is, of course, based on the assumption that the Waldorf exiles exhibited certain mergers in perception before they left Waldorf. As noted in 9.4, it is impossible to make this claim with absolute certainty without a longitudinal study.

South.[160] It should be noted, though, that the isogloss may have actually moved since the time that these dialect studies were conducted,[161] and so further research is needed to determine whether one isogloss reflects the reality of the situation when the studies they report on were conducted better than the other.

9.2. Applications in the real world

All of this is of great theoretical interest, but there are also ways that the findings outlined here can be put to applied use.

The first and most obvious application of the results of this study is in dialectological studies. It has long been an open question whether an individual who has moved from one location to another is a valid source for information for information about that individual's original dialect, the dialect of the area the individual moved to, neither, or both. Regarding phonetic/phonological variables, this study finds for the "neither" answer for adult migrants, but not extremely strongly. There are, after all, still some ways in which an individual can be a valid source for information about that individual's native dialect, but only in those features that are not undergoing change. Whether an individual can be relied upon to provide linguistic information about an area an individual has moved to is not directly answered by this study. The implication, though, is that an

[160] See Figure 2 for a map showing the two isoglosses.
[161] It might be better to say that the isogloss almost certainly has moved in that time, given that the situation in Waldorf itself appears to have changed over the past several decades. In addition, Waldorf is a (at least until very recently) rural area surrounded by non-Southern urban areas, and so the partial Southernness of Waldorf may be the result of non-Southern linguistic features spreading from urban centers to rural regions.

individual retains enough of the native dialect and acquires little enough of the new dialect to make such an individual unreliable as a dialect informant for the new dialect.[162]

This study also has related applications in the speech recognition industry. Many speech recognition systems, particularly those systems that are made to recognize speech from any speaker without any previous training from that individual, must, of course, be able to deal with speakers of several different dialects. The results of this study can be used by those developing such systems to help them know, for example, what sort of "hybrid" speech systems would have to be recognized by a successful speech recognition system.

This study also has applications in linguistic anthropology. If a group's linguistic patterns are taken to reflect the group's culture, the extent to which an individual's speech patterns can change upon constant exposure to a second dialect should have implications about the ways that individuals accommodate to surrounding cultures. Linguistic anthropologists can use the results of this study to point them in research directions that they can use to investigate such questions.

9.3. Questions remaining

No study, however, can begin to answer every question related to it, and this study is no exception to that rule. The first and perhaps biggest question that this study raises came up several times in the analysis in chapter 8: Was the cause of the changes seen among the Waldorf exiles exposure

[162] This does not mean that it is necessarily impossible to conduct a dialectological study using emigrants from or immigrants to a particular location to acquire linguistic information about that place — in fact, in some cases (as when an area has been depopulated) it is the only option. In such cases, however, the researcher must take care to keep the dangers of such a study in mind.

to a second dialect or cessation of exposure to their original dialect? This is a rather important question because, if all of the changes are attributed to one cause or the other, the possibilities result in very different predictions. To take a specific example, the reversal of the perceptual merger of *pull* and *pool* occurred for the Waldorf exiles in the face of dialects which maintain at least a partial distinction between the vowel classes those words represent. This result does not shed any light on whether the cause of the reversal of this merger was exposure to the new dialects or a lack of exposure to the Waldorf exiles' native dialect. If the changes were the result of exposure to new dialects, though, one would expect a group of Waldorf exiles who moved to areas with a *pull-pool* merger to keep *pull* and *pool* merged in perception. On the other hand, if the changes were due instead to the cessation of exposure to the native dialect, that group of Waldorf exiles would start to reverse the merger in perception, even in the face of the merger in production.[163] This is a testable scenario, and one that should be tested.

Another important question that this study raises but does not completely answer deals with the nature of the relationship between the perception and production systems, as well as the relationship between the consciously accessible parts of the perceptual system and the parts of it that are not consciously accessible. Although some details of these relationships follow from findings in this study, many specifics are left undefined. This needs to be looked into further, as many of the realities of the separate but interrelated nature of the perception and production systems are now well known, but there remains much that is unknown. As the interaction of the perception and production systems on the one hand and the interaction with the perceptual

[163] It might also be the case that the reality lies in between these two extremes — for example, hypothetical Waldorf exiles moving to an area with *pull* and *pool* merged in production might reverse the merger in perception, but not as quickly or as often as Waldorf exiles who move somewhere where *pull* and *pool* are distinct in production.

system with itself on the other has been found to be involved in various sorts of linguistic change, knowing more about these linguistic subsystems is in the interest of anyone studying language change. In particular, neurolinguists and psycholinguists should investigate the relationship between perception and production, so that the psychological reality underlying the separate but interrelated subsystems can be detailed.

One final question is raised not so much by this study itself but by the geography of the area around Waldorf — the issue of what might be called "peninsula effects" (in parallel to the well-known issue of "island effects"). The geography of Southern Maryland is such that the region is a large peninsula (or, possibly, a pair of peninsulas).[164] Crucially, not only is Southern Maryland isolated on all sides except the north by the Chesapeake Bay and the widest section of the Potomac River, but also the only bridge across either body of water crosses the Potomac at Pope's Creek, Maryland, rather close to the northern end of the region. Therefore, nearly any contact between St. Mary's and southern Charles Counties with the rest of Maryland must go through or near Waldorf, and contact between Calvert County and the rest of Maryland must go through or near Upper Marlboro, Maryland. The effects of this semi-isolation on the communities of Calvert, St. Mary's, and southern Charles counties needs to be investigated,[165] as well as the effects on Waldorf and Upper Marlboro as gateway towns. Also, this study of "peninsula effects" should not be confined to Southern Maryland — there are many other areas that could be studied in such a way, from Gaspé, Québec, to Key West, Florida.

[164] Figure 2 is useful as a reference for this discussion of Southern Maryland geography.
[165] This would be all the more interesting in light of the fact that southern St. Mary's and southern Calvert Counties have been identified as locations in which "Tidewater" English is spoken (McCrum *et al* 1986).

9.4. Directions for future research

One of the first things that should be done next was already outlined in 9.3 — set up and conduct an experiment to determine whether changes in individuals' linguistic patterns are the result of exposure to new dialects, lack of exposure to their native dialects, or something in between. This could be done by, first, finding a particular set of changes in progress (a set that can be studied in both perception and production, preferably) in a community. Then, a set of emigrants from that community who have moved to areas where those changes in progress might be reinforced or contradicted by local dialects would need to be found, and the linguistic behavior of the emigrants should be studied. The results of that study should provide evidence to help answer this question.

Another direction for future research to take was also outlined in 9.3 — the issue of "peninsula effects". This could even take the form of a series of ordinary detailed dialectological studies of the peninsular communities and the communities that function as gateways to the peninsula. This would allow insight into a fairly common situation, but one that there has been little discussion of — what happens when a community functions only as a destination. That is, communities at the end of a peninsula[166] are only a destination, and never a pass-through point — travel to or from the community can occur in one direction and one direction only. Whether there are any measurable effects resulting from such a situation and what they might be would be a useful addition to our knowledge of the way language use and change spreads.

[166] Here I mean truly at the end of a peninsula, with no ordinary means of going any further, but whether that restriction on the definition is necessary is not certain. It is not yet possible to say whether communities with a ferry terminal, for example, are actually at the end of a peninsula in the sense of being only a destination or not.

Finally, a clear direction for future research is simply to continue to expand the research program that has been reported in this dissertation. Continuing this research program with larger samples and more variables is one obvious direction to go, but one extension of the study at hand that should definitely be taken is to begin longitudinal studies. Longitudinal studies are necessary because, in the end, this sort of study cannot get to the core of a troubling question of causation: Were the changes in the linguistic patterning of the Waldorf exiles the result of moving away from Waldorf, or were they continuations of linguistic self-marking that they began as children, with those who were more likely to move away marking themselves in one way while those who were more likely to stay marked themselves in another? It seems most likely that the cause of the difference between the Waldorf exiles and the lifelong Waldorfians is actually the result of staying in Waldorf or moving away — after all, despite one's plans, one could end up staying when one expected to move away and vice versa. A longitudinal study, however, would resolve the question completely.

A. Equipment used in conducting the study

Interviews were recorded with either a Radio Shack® 330-1052 Tie Tack Back Electret Condenser Microphone or a Radio Shack® 330-3003 Ultra Miniature Tie Clip Microphone[167] attached to a Sony® TCM-59V Cassette-Corder; this tape recorder was also used for playback during the commutation tests. Utterances that underwent computerized acoustic analysis were digitized by directing the output of the Sony® TCM-95V into the line-in input of a 16-bit Yamaha® OPL3-SAx ISA sound card and saving the resulting input as a 16-bit monophonic Microsoft® Windows® wave file sampled at 22,050 samples per second. First and second formant values were found by using the linear predictive coding component of WinSAL 1.2a by Media Enterprise.[168] The number of points in the analysis window was set to the largest possible size that did not include items other than the nucleus of the vowel being analyzed; otherwise, the default settings were used, with minimal modifications to the default settings made only when necessary to bring out the formant peaks properly.

[167] When two people were being recorded at once both microphones were used, with the input going into the cassette recorder via a Y-connector.

[168] The vocal quality of three of the informants (Alec, Dean, and Torren) was such that formant values had to be obtained using WinSAL's fast Fourier transformation module

B. Symbols used for vowel classes

The list that follows contains the list of vowel classes as they are discussed in the dissertation text. As most of the vowel classes the study outlined in this dissertation are equivalent to underlying phonological forms, those underlying forms are shown in phonemic representation. The one exception is the vowel class (iw), which is described below along with the other vowel classes that are dealt with in this dissertation. A short description of each vowel class is provided, along with a description of the vowel class.

- /iy/ The tense high front diphthong, as in *h<u>ee</u>d, st<u>ea</u>l,* and *m<u>e</u>*.

- (iw) This vowel class can be found, often with a glide, in words such as *t<u>u</u>ne, n<u>ew</u>,* and *n<u>ew</u>t.* (Note that *tune* stands in minimal opposition to *toon,* which contains the vowel class /uw/).

- /ɪ/ The lax high front vowel, as in *h<u>i</u>d, st<u>i</u>ll,* and *<u>i</u>t*.

- /ey/ The tense mid front diphthong, as in *h<u>a</u>yed, st<u>a</u>le,* and *m<u>a</u>y*.

- /ɛ/ The lax mid front vowel, as in *h<u>ea</u>d, sw<u>e</u>ll,* and *<u>e</u>dge*.

- /æ/ The lax low front vowel, as in *h<u>a</u>d, p<u>a</u>l,* and *<u>a</u>t*.

- /ʌ/ The lax central vowel, as in *c<u>u</u>d, d<u>u</u>ll,* and *<u>u</u>p*.

- /a/ The lax low back vowel, as in *cod, doll,* and *odd.*

- /ay/ The low back front upgliding diphthong, as in *hide, mile,* and *my*.

- /aw/ The low back back upgliding diphthong, as in *how, howl,* and *out*.

- /ɔ/ The lax mid back vowel, as in *caught, shawl,* and *ought*.

- /ow/ The tense mid back diphthong, as in *code, foal,* and *toe*.

- /u/ The lax high back vowel, as in *put, full,* and *book*.

- /uw/ The tense high back diphthong, as in *boot, school,* and *who*.

C. Vowel charts

Simplified vowel mean charts for all thirty speakers in the sample of Waldorfians studied who took part in casual interviews are included in this appendix; all means given here are calculated from normalized formant values. The legends of the vowel charts here use the vowel class symbols described in Appendix B, but with a few other symbols to describe vowel environments. These symbols follow the vowel in question, where *C* signifies a word-internal vowel, # indicates a word-final vowel, *N* signifies a pre-nasal vowel, *r* signifies a pre-rhotic vowel, *l* signifies a pre-lateral vowel, and a vowel without a suffix signifies the elsewhere class of vowels. Vowel means were calculated omitting pre-lateral vowels except, of course, for means of pre-lateral vowels. The charts have been placed in alphabetical order by pseudonym.

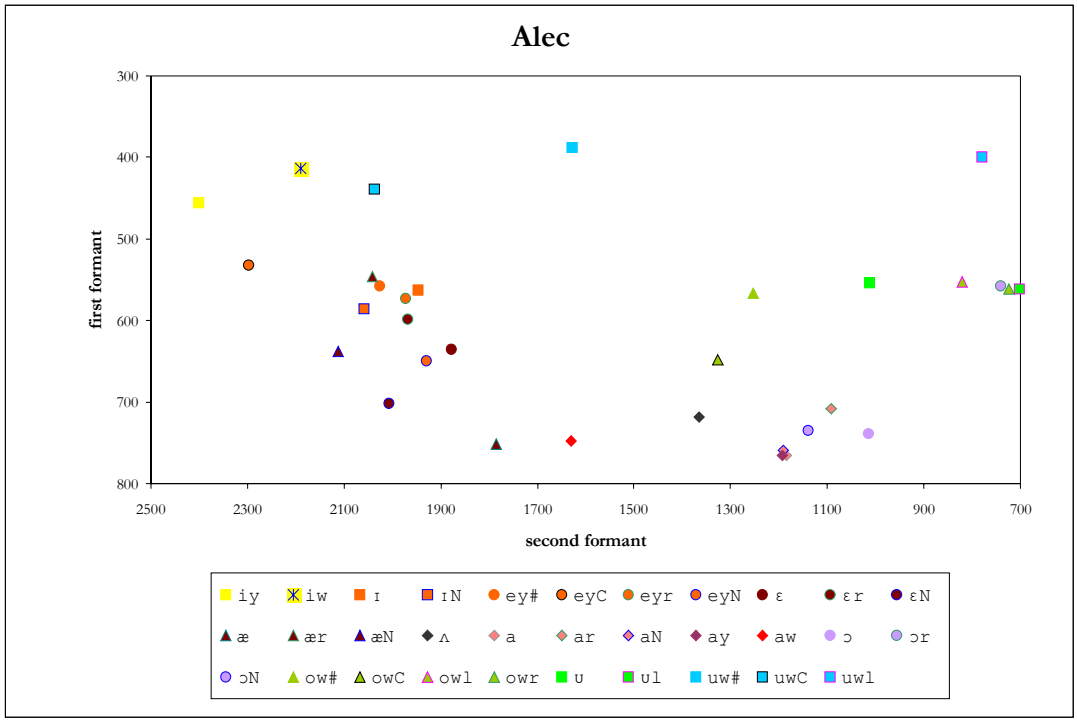

Figure 33: Vowel chart for Alec, male, Waldorf exile, 14 years away from Waldorf

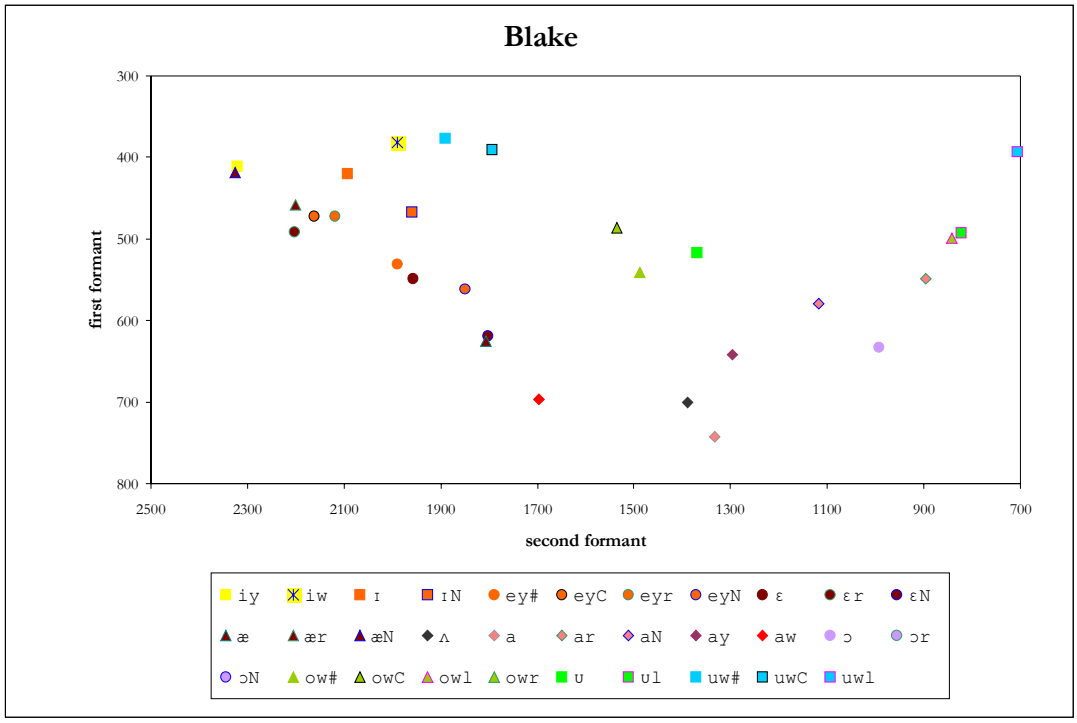

Figure 34: Vowel chart for Blake, female, lifelong Waldorfian, born 1969

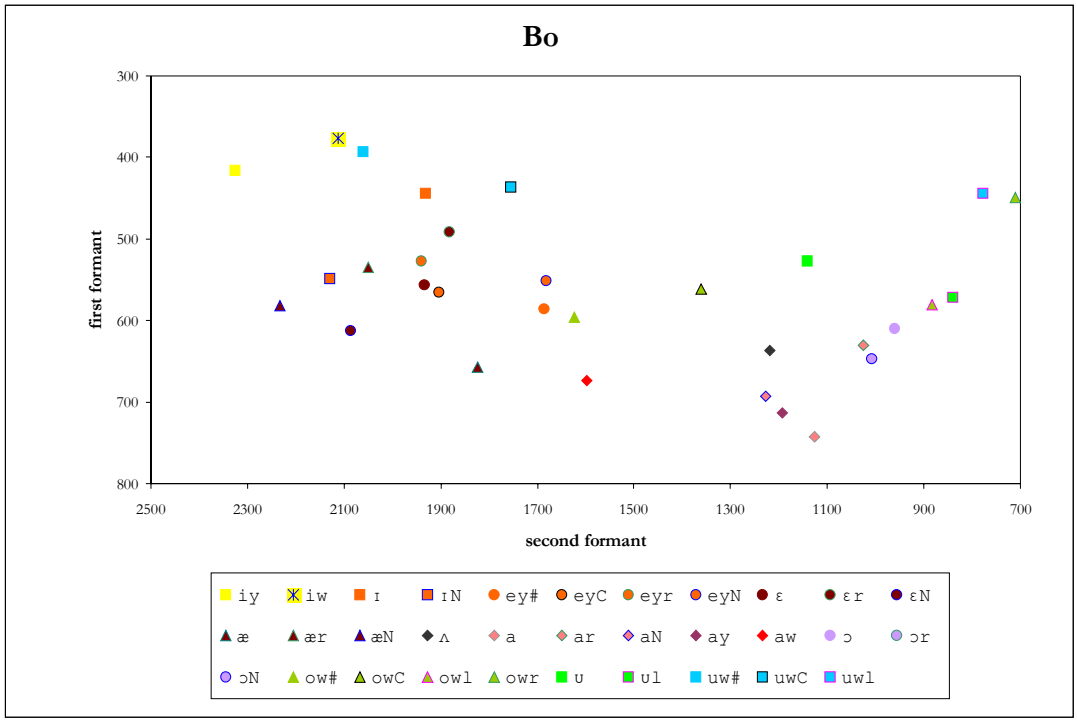

Figure 35: Vowel chart for Bo, male, lifelong Waldorfian, born 1956

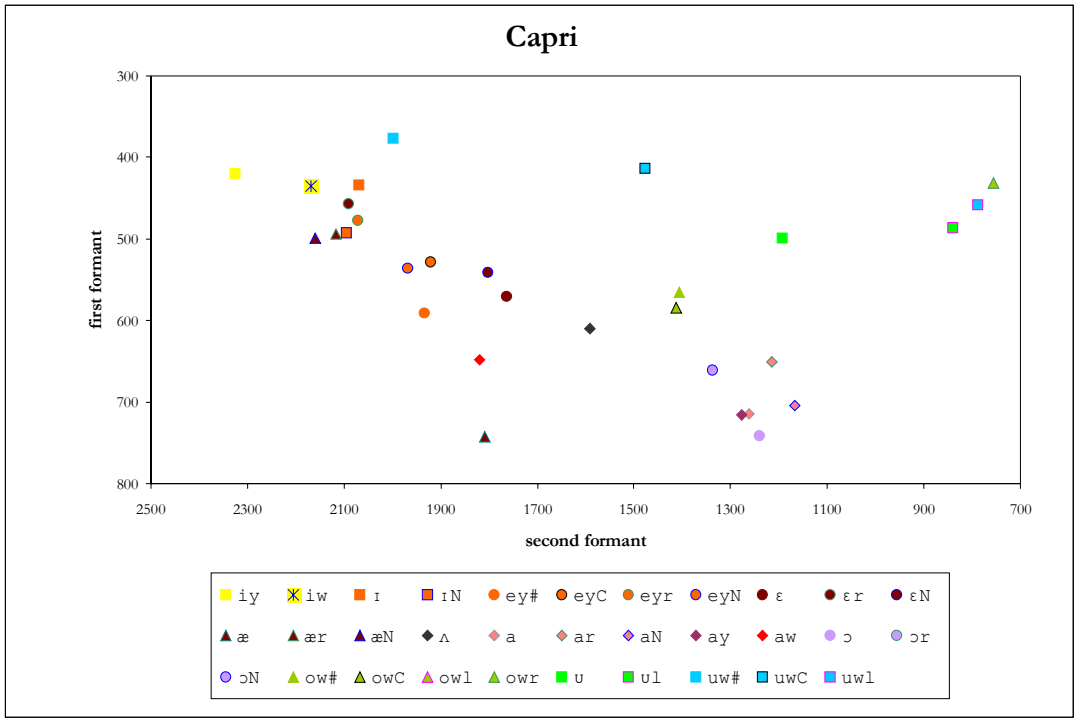

Figure 36: Vowel chart for Capri, female, lifelong Waldorfian, born 1971

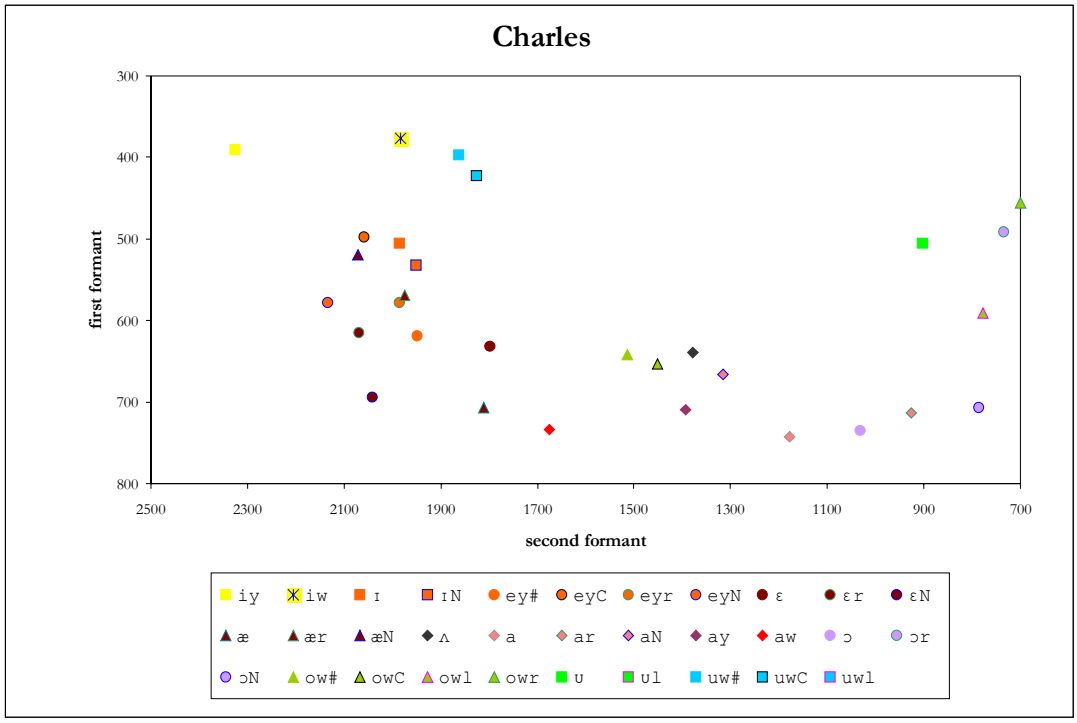

Figure 37: Vowel chart for Charles, male, lifelong Waldorfian, born 1969

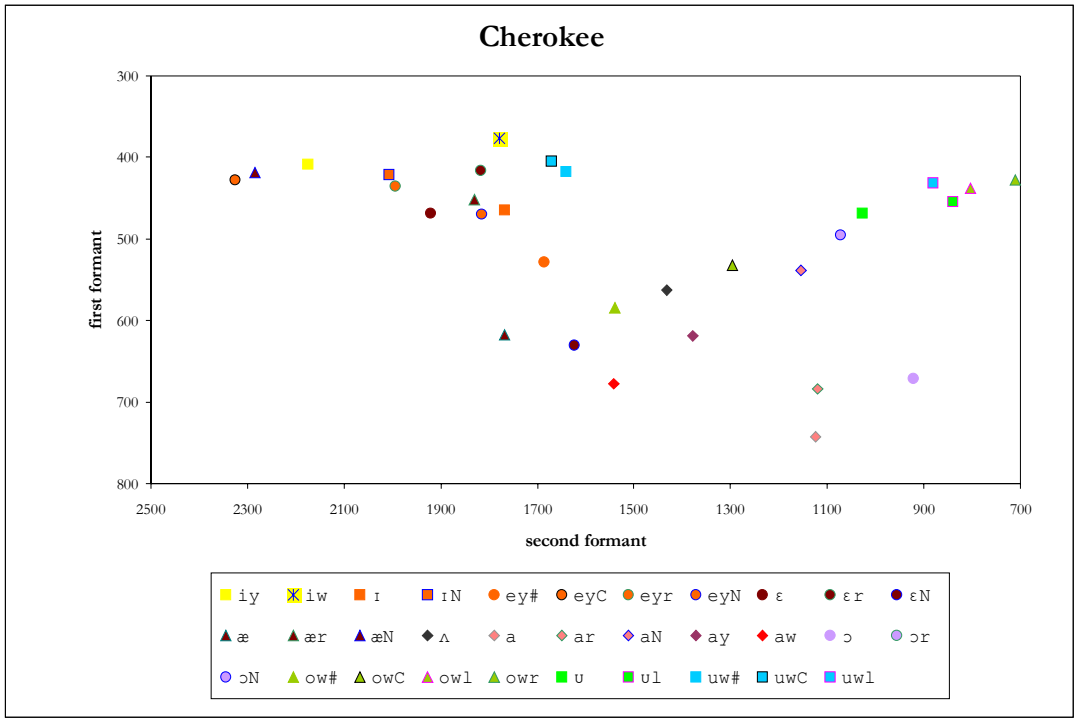

Figure 38: Vowel chart for Cherokee, female, lifelong Waldorfian, born 1988

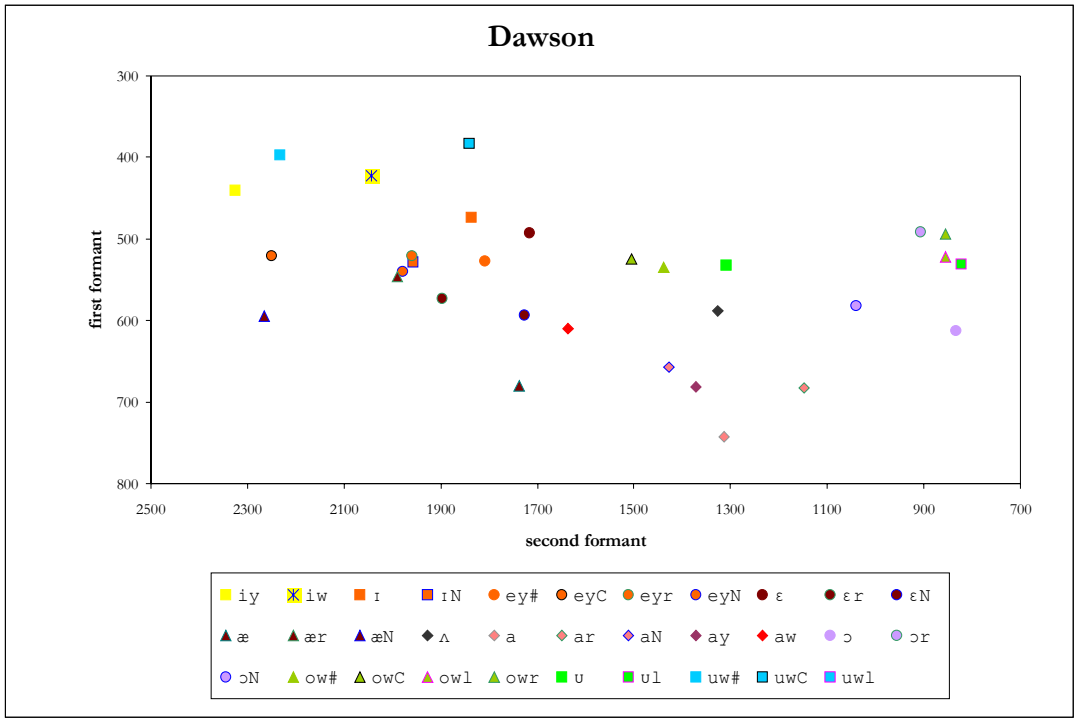

Figure 39: Vowel chart for Dawson, male, lifelong Waldorfian, born 1980

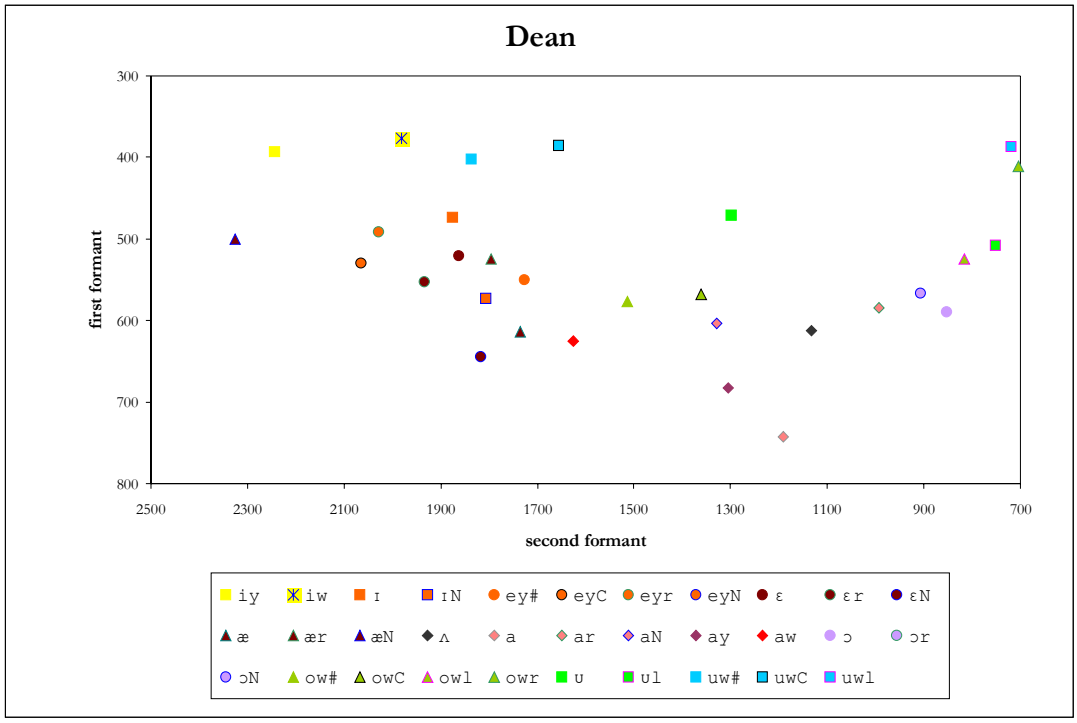

Figure 40: Vowel chart for Dean, male, lifelong Waldorfian, born 1962

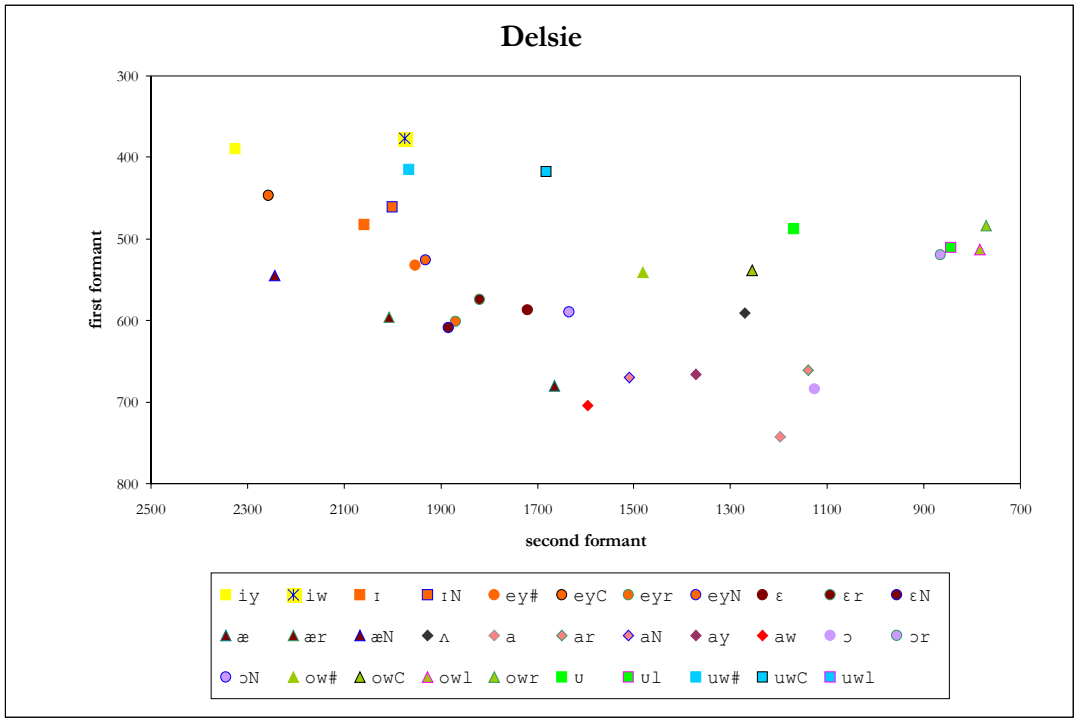

Figure 41: Vowel chart for Delsie, female, Waldorf exile, 2 years away from Waldorf

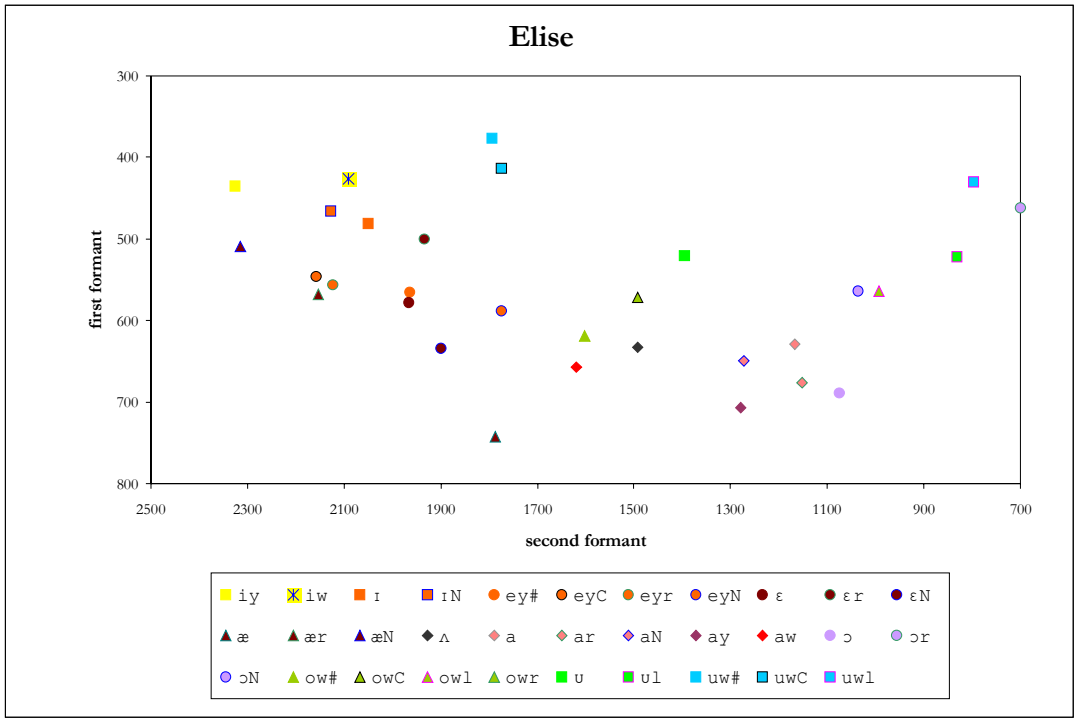

Figure 42: Vowel chart for Elise, female, lifelong Waldorfian, born 1946

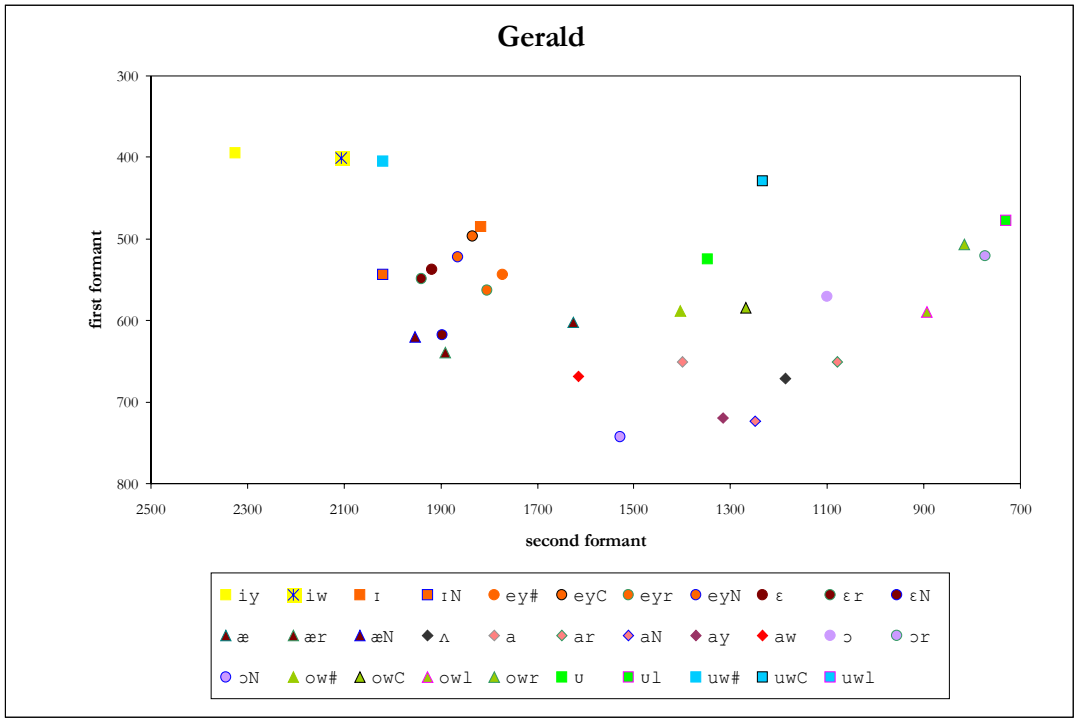

Figure 43: Vowel chart for Gerald, male, lifelong Waldorfian, born 1941

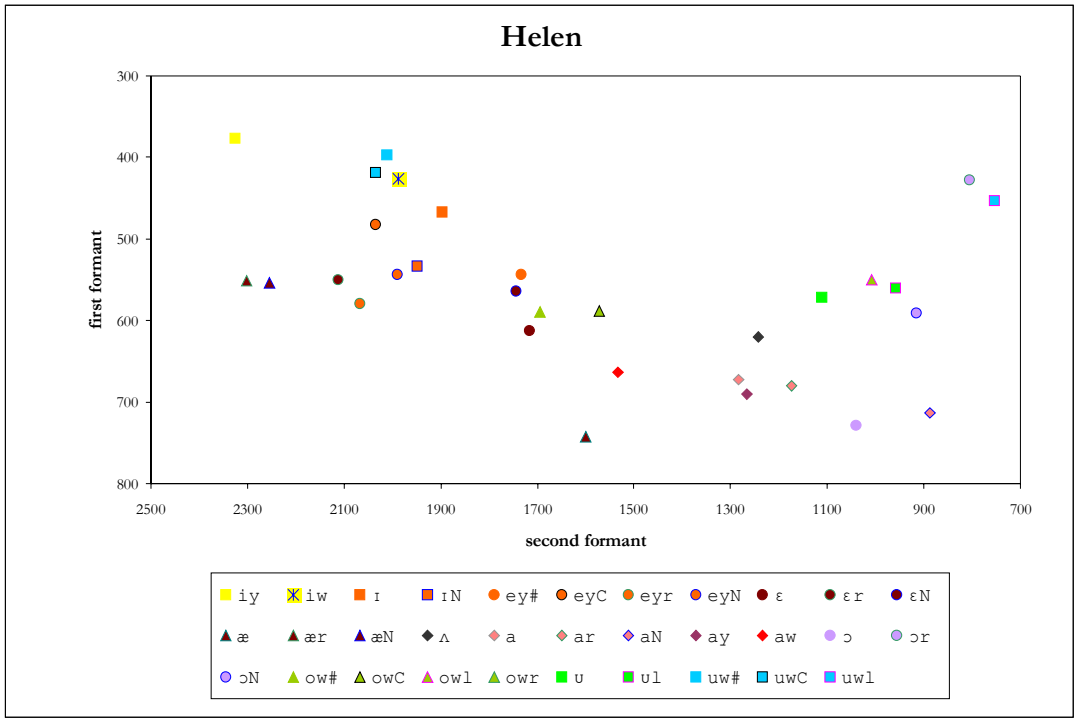

Figure 44: Vowel chart for Helen, female, lifelong Waldorfian, born 1978

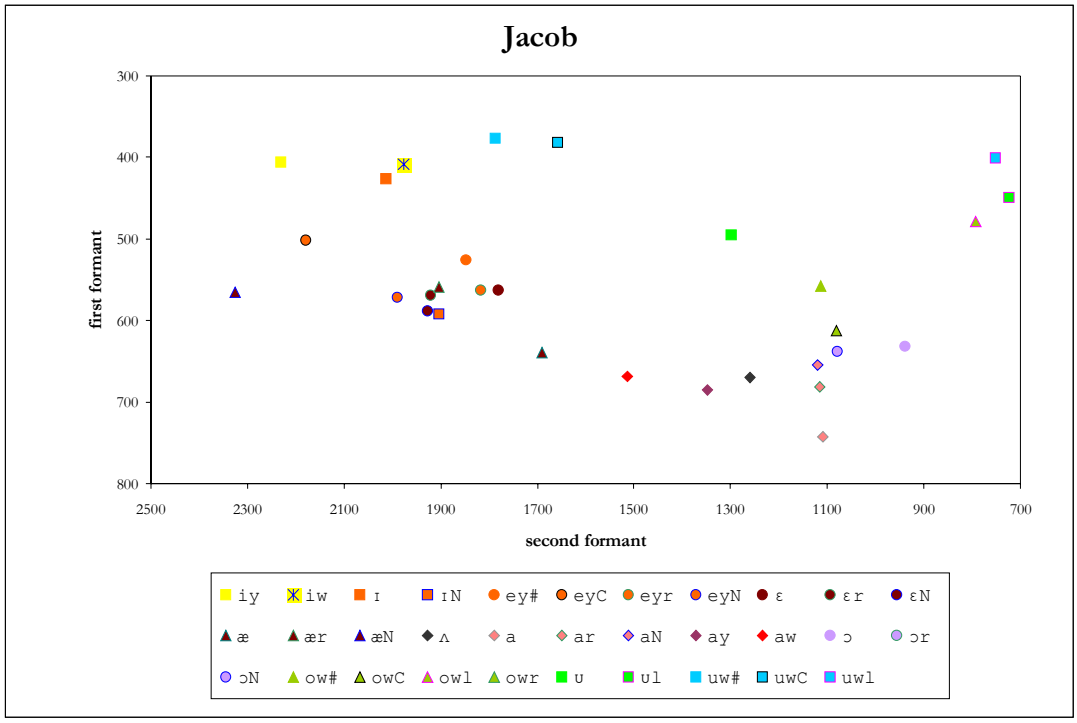

Figure 45: Vowel chart for Jacob, male, Waldorf exile, 5 years away from Waldorf

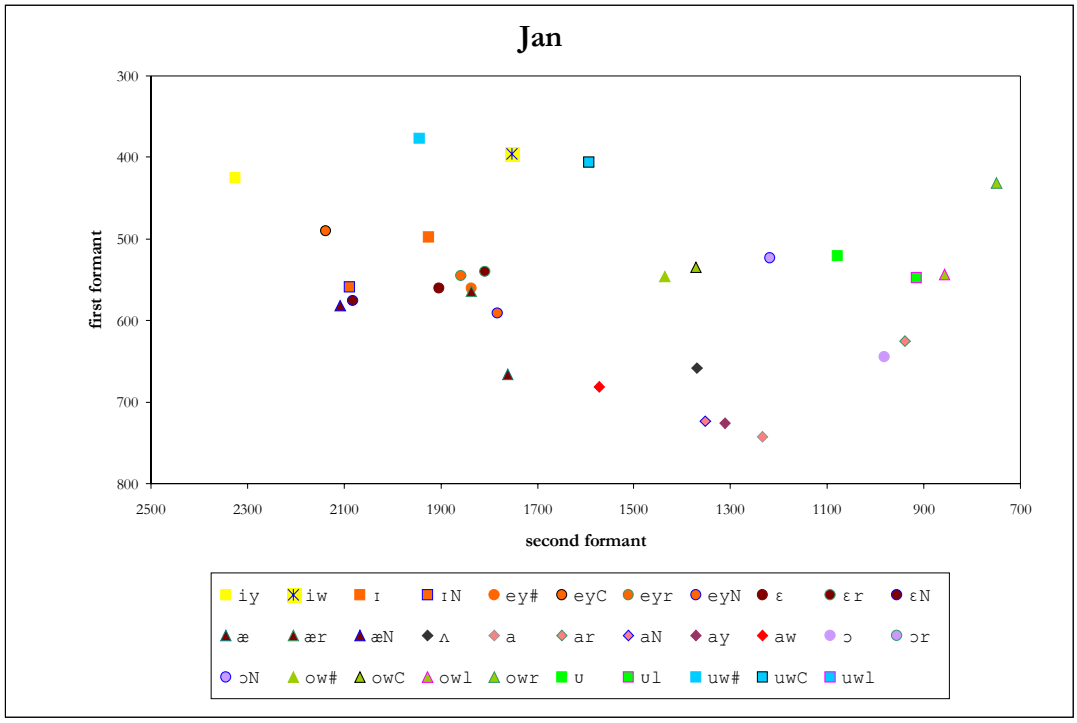

Figure 46: Vowel chart for Jan, male, Waldorf exile, 13 years away from Waldorf

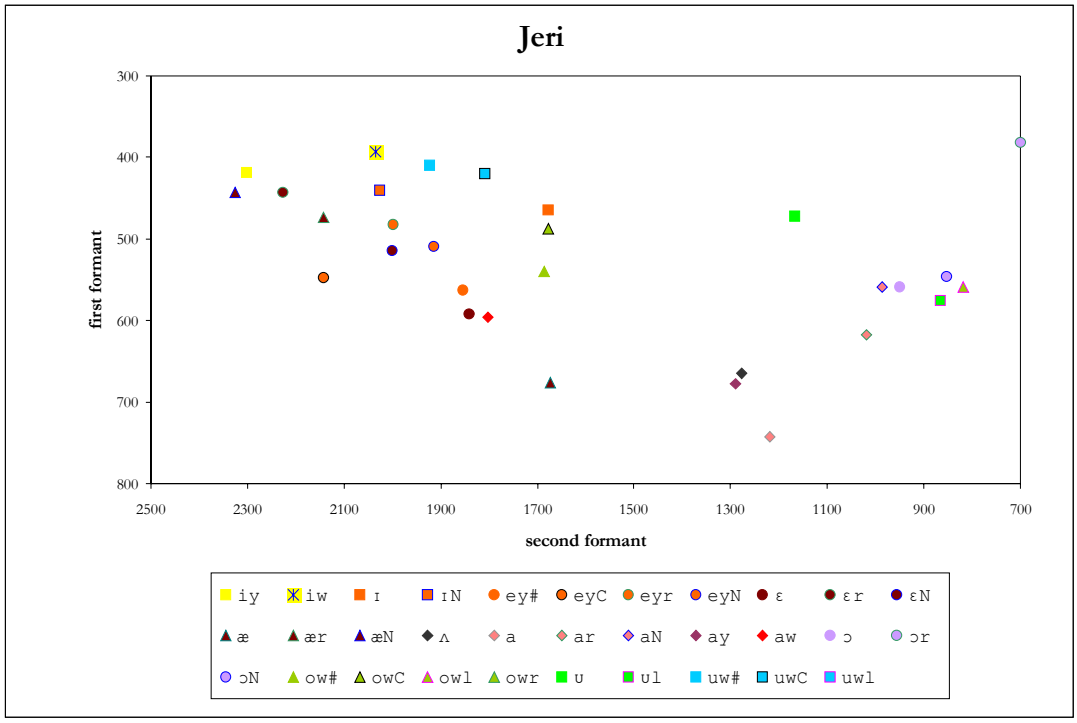

Figure 47: Vowel chart for Jeri, female, lifelong Waldorfian, born 1951

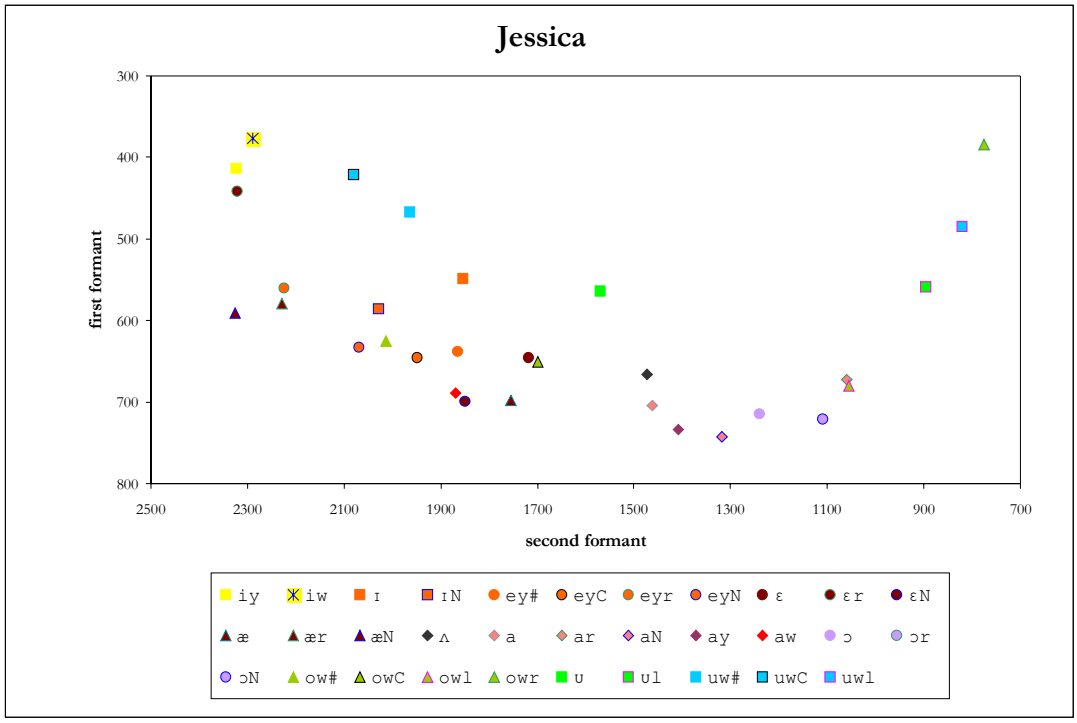

Figure 48: Vowel chart for Jessica, female, Waldorf exile, 11 years away from Waldorf

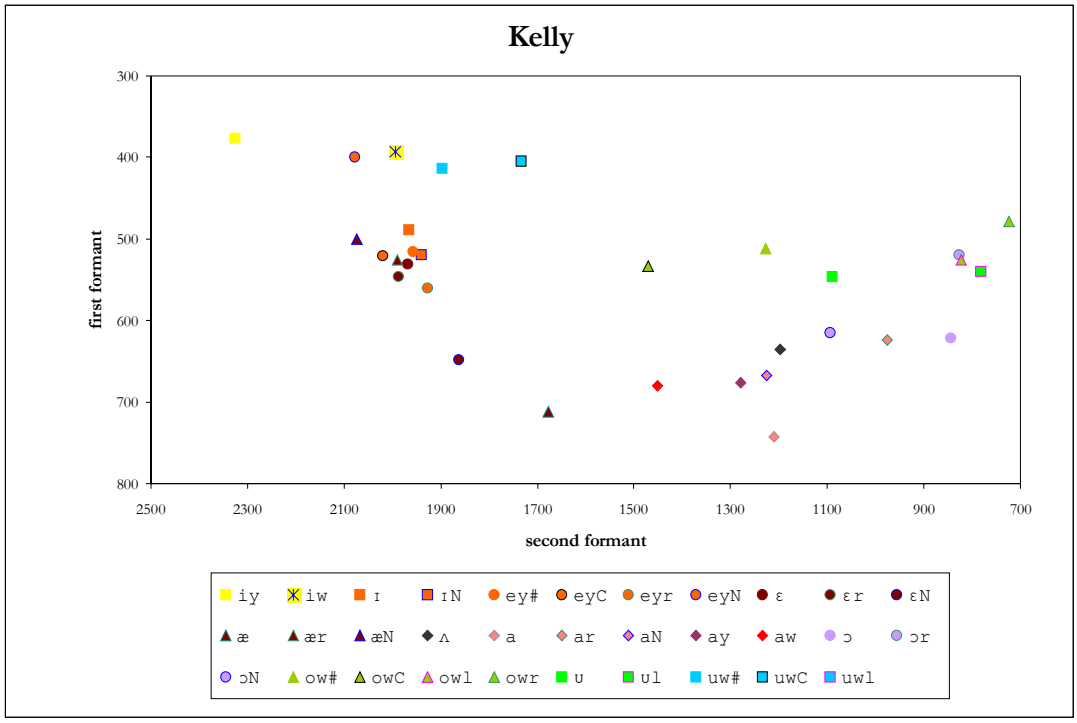

Figure 49: Vowel chart for Kelly, female, lifelong Waldorfian, born 1986

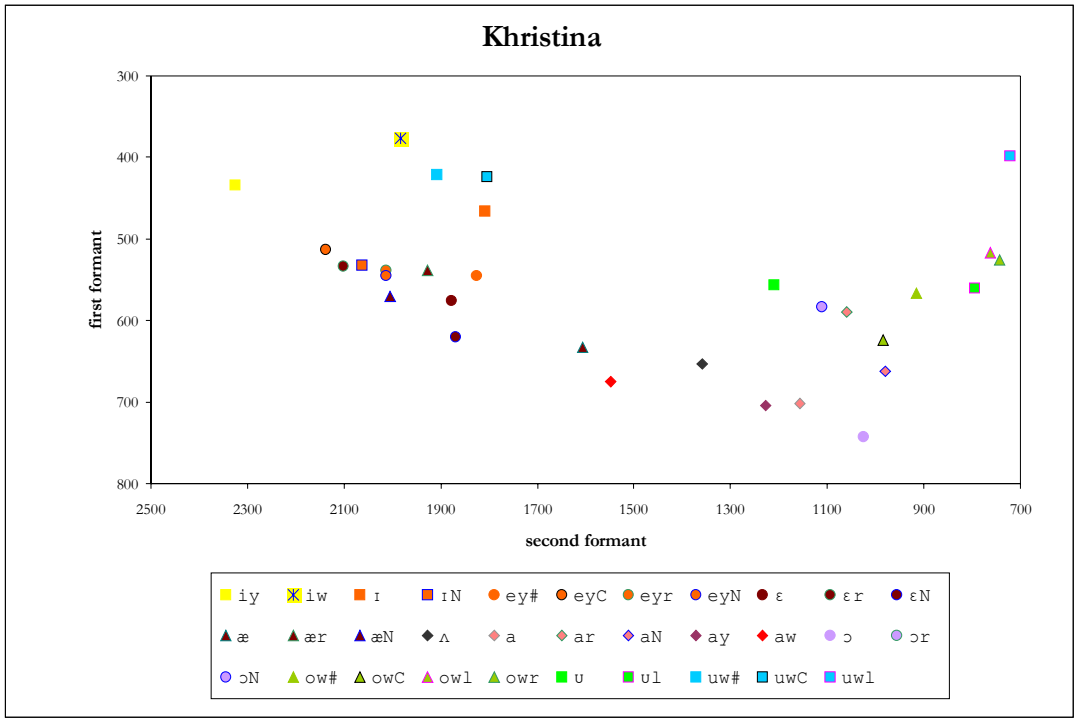

Figure 50: Vowel chart for Khristina, female, Waldorf exile, 9 years away from Waldorf

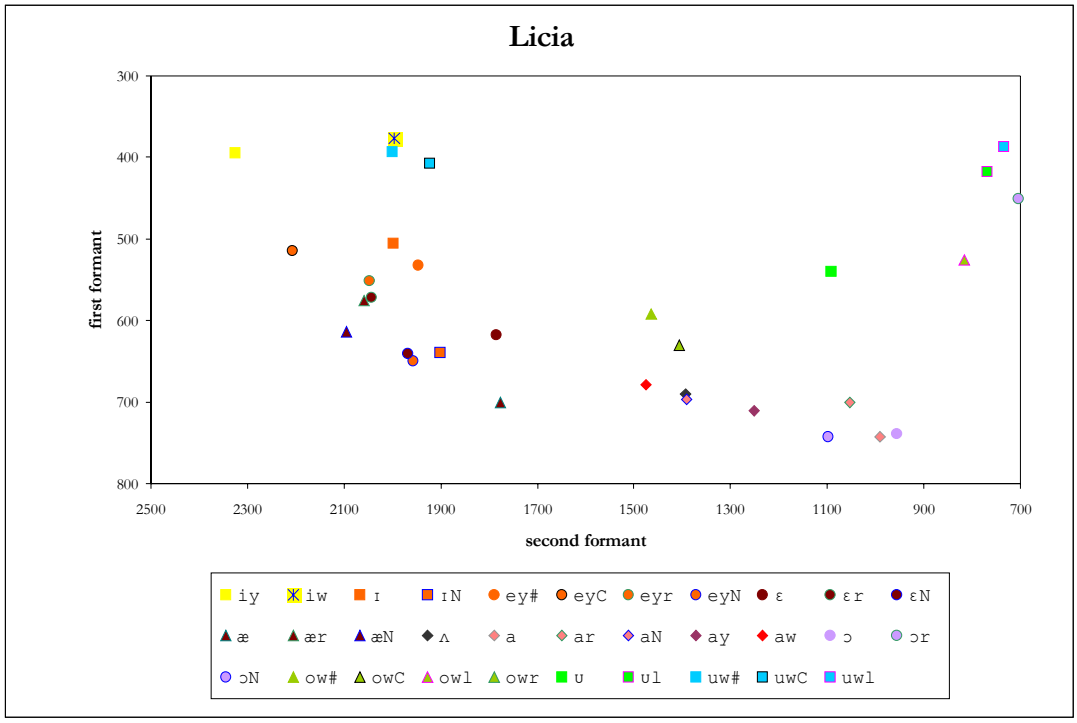

Figure 51: Vowel chart for Licia, female, Waldorf exile, 11 years away from Waldorf

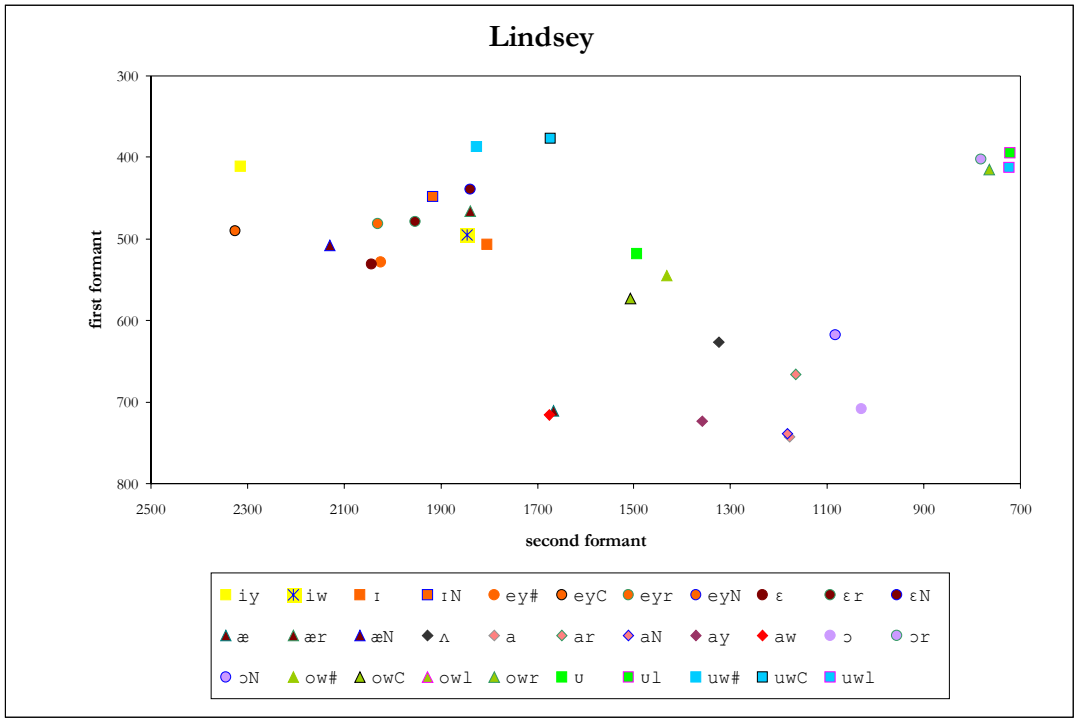

Figure 52: Vowel chart for Lindsey, female, Waldorf exile, 3 years away from Waldorf

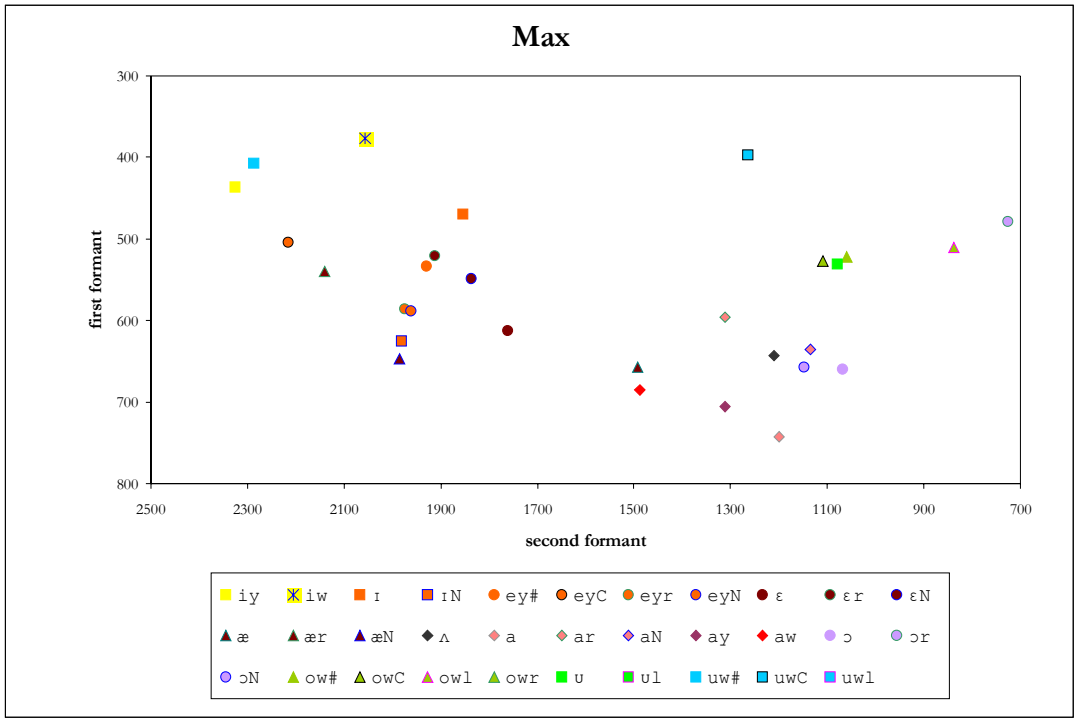

Figure 53: Vowel chart for Max, male, Waldorf exile, 4 years away from Waldorf

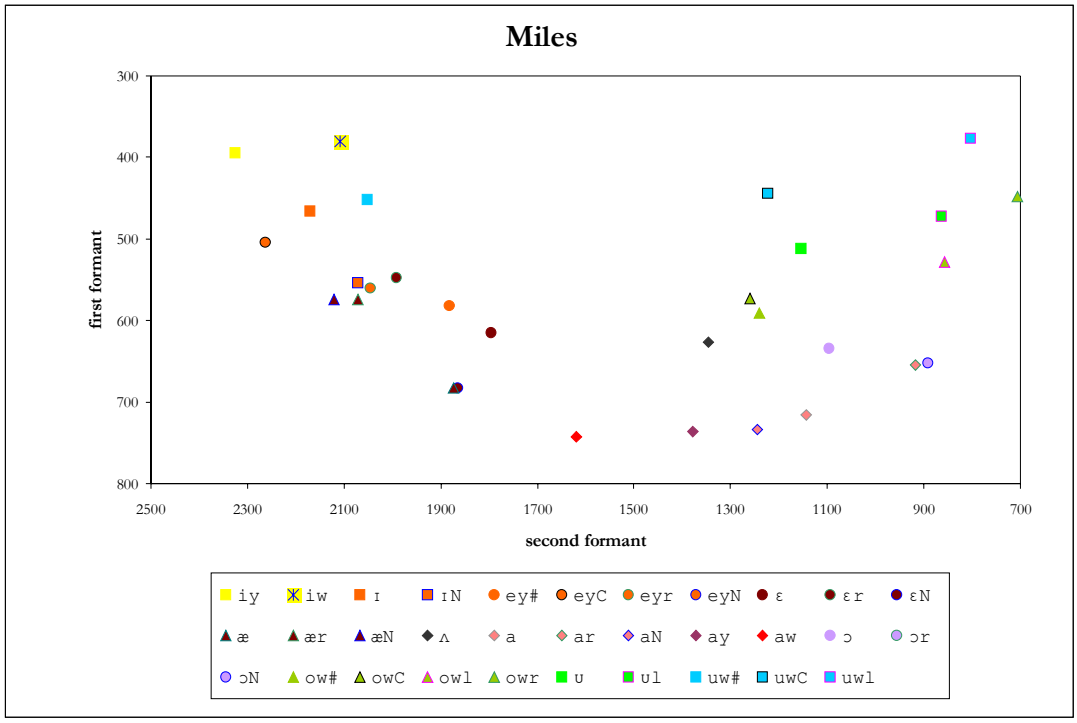

Figure 54: Vowel chart for Miles, male, Waldorf exile, 10 years away from Waldorf

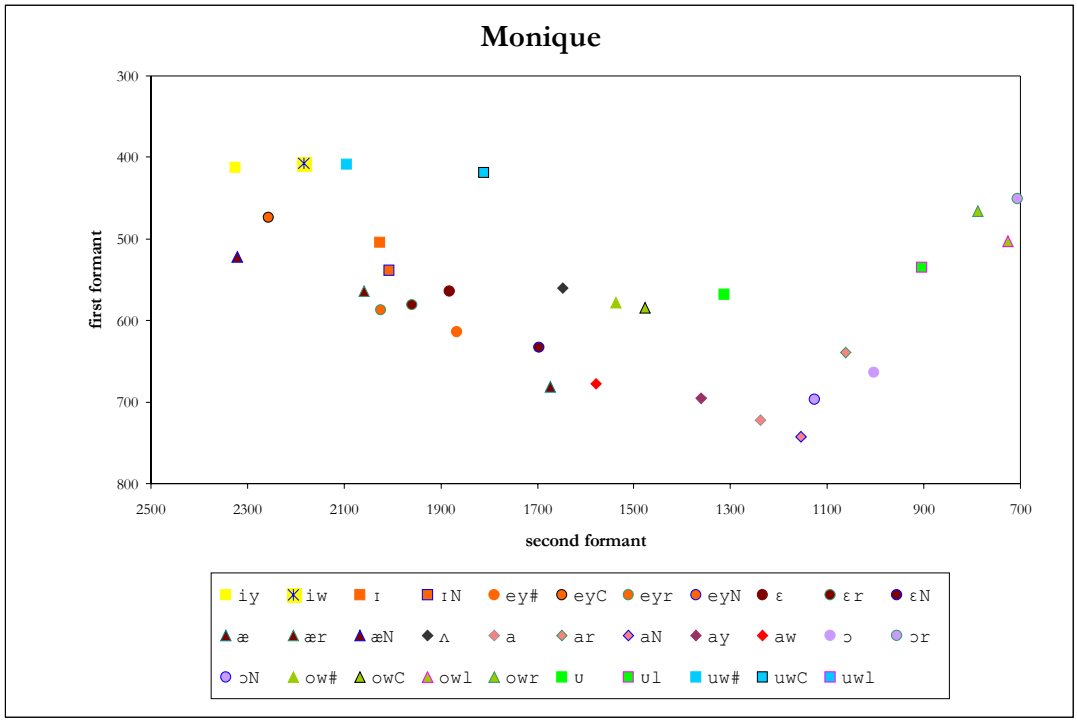

Figure 55: Vowel chart for Monique, female, Waldorf exile, 7 years away from Waldorf

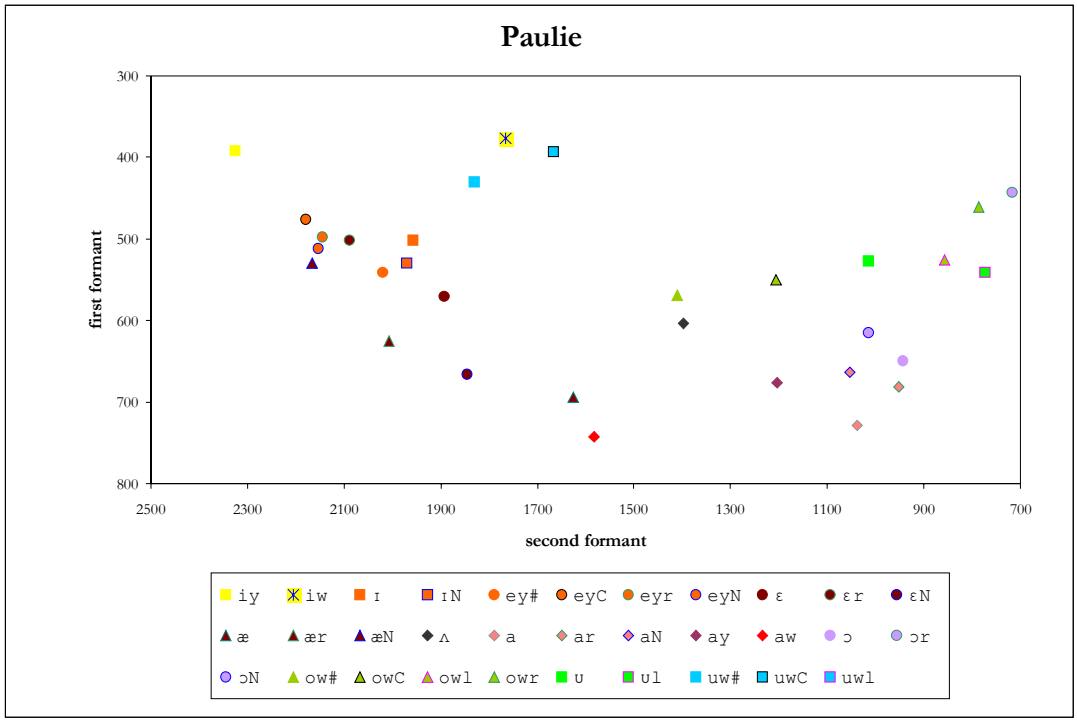

Figure 56: Vowel chart for Paulie, female, lifelong Waldorfian, born 1957

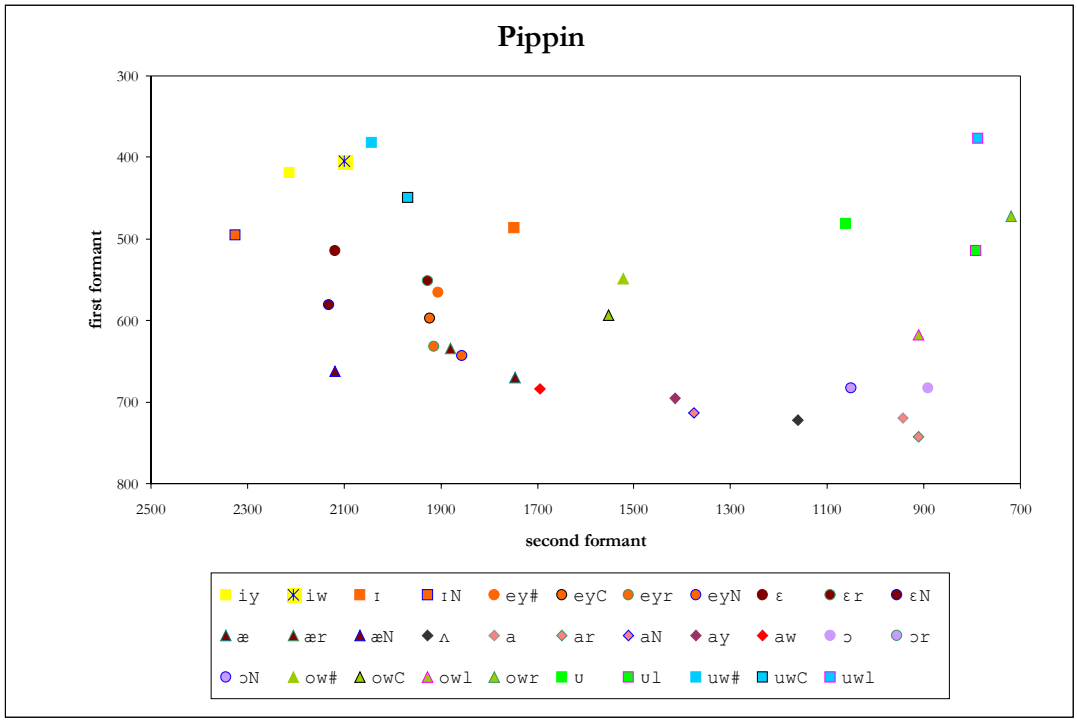

Figure 57: Vowel chart for Pippin, male, lifelong Waldorfian, born 1951

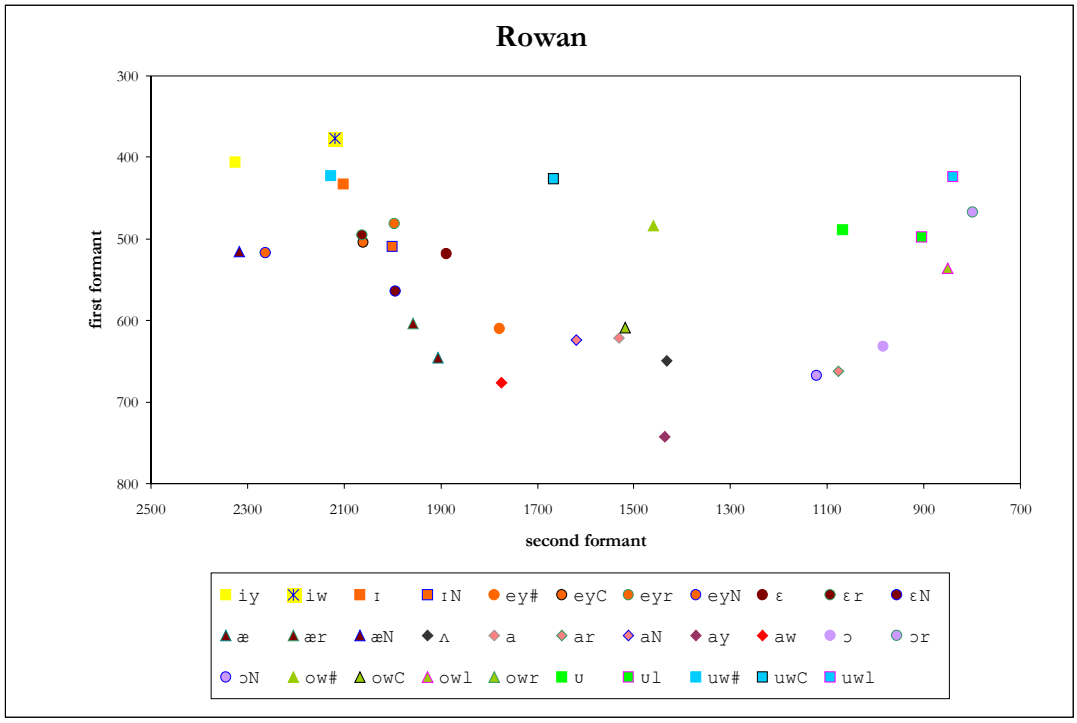

Figure 58: Vowel chart for Rowan, female, lifelong Waldorfian, born 1929

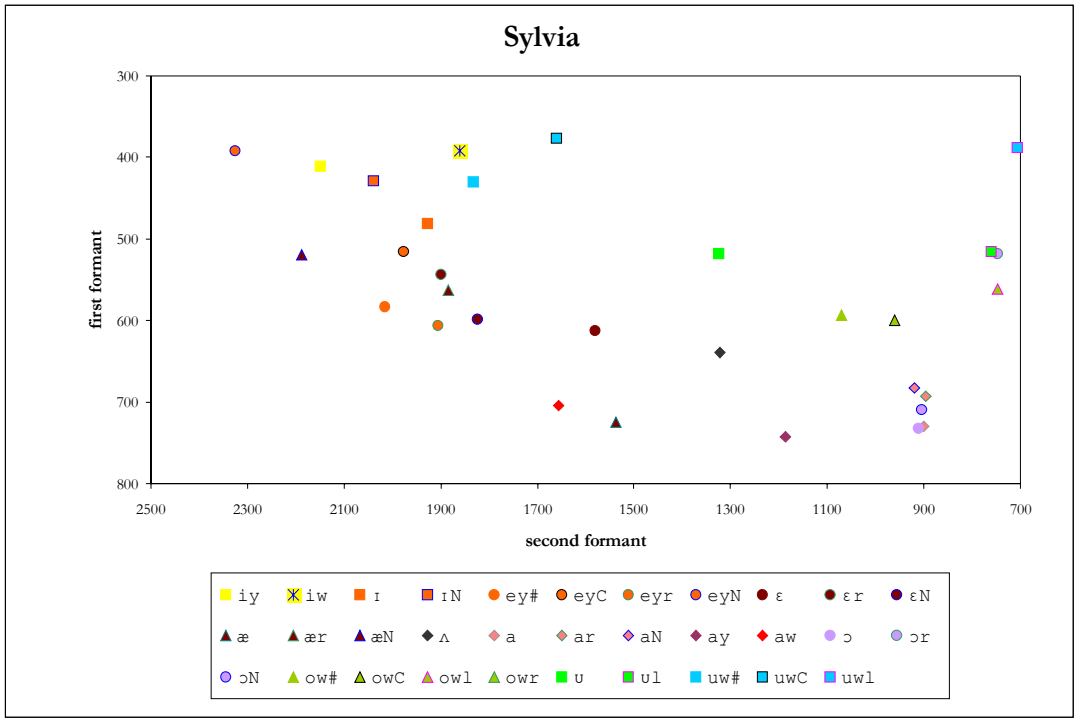

Figure 59: Vowel chart for Sylvia, female, Waldorf exile, 11 years away from Waldorf

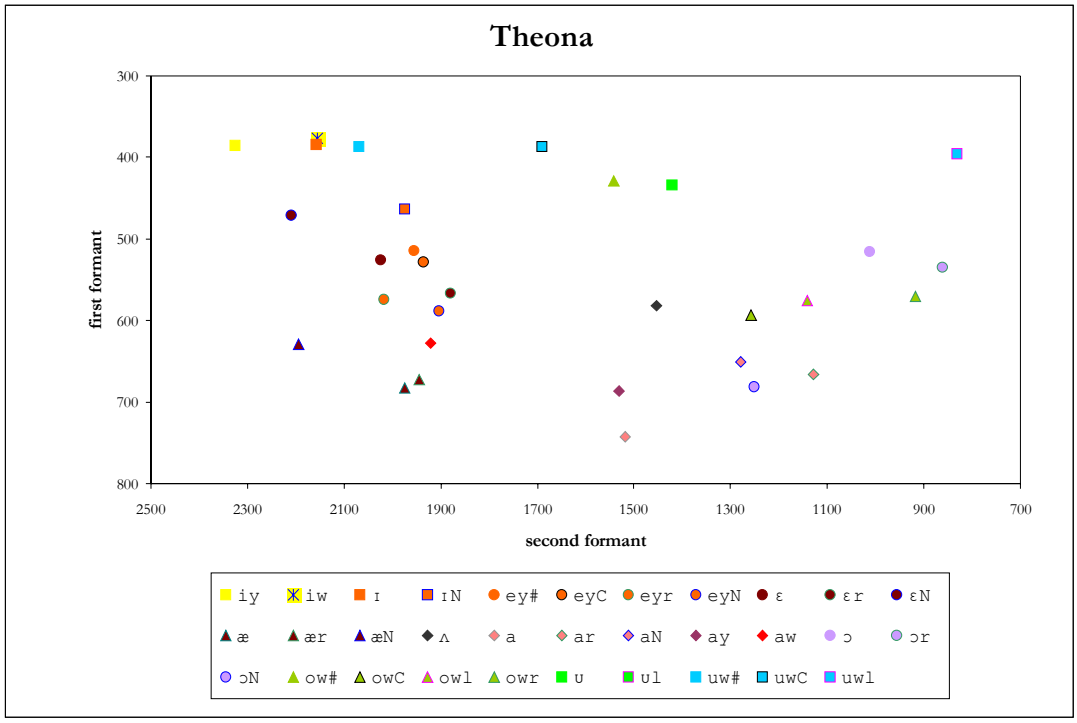

Figure 60: Vowel chart for Theona, female, lifelong Waldorfian, born 1919

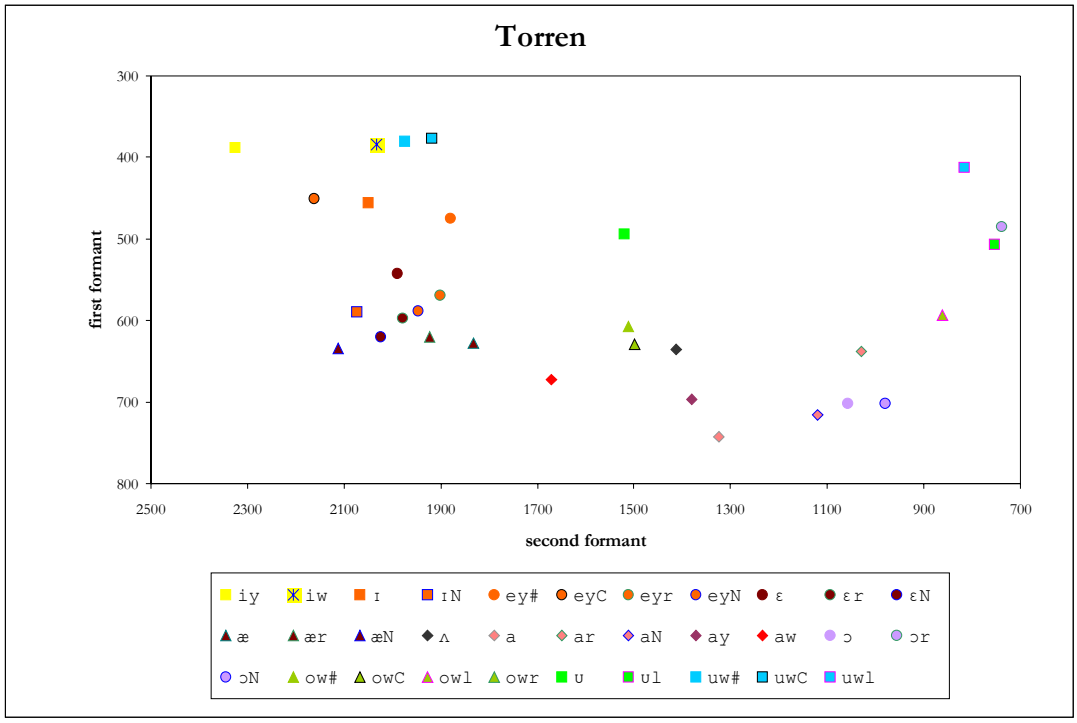

Figure 61: Vowel chart for Torren, male, lifelong Waldorfian, born 1967

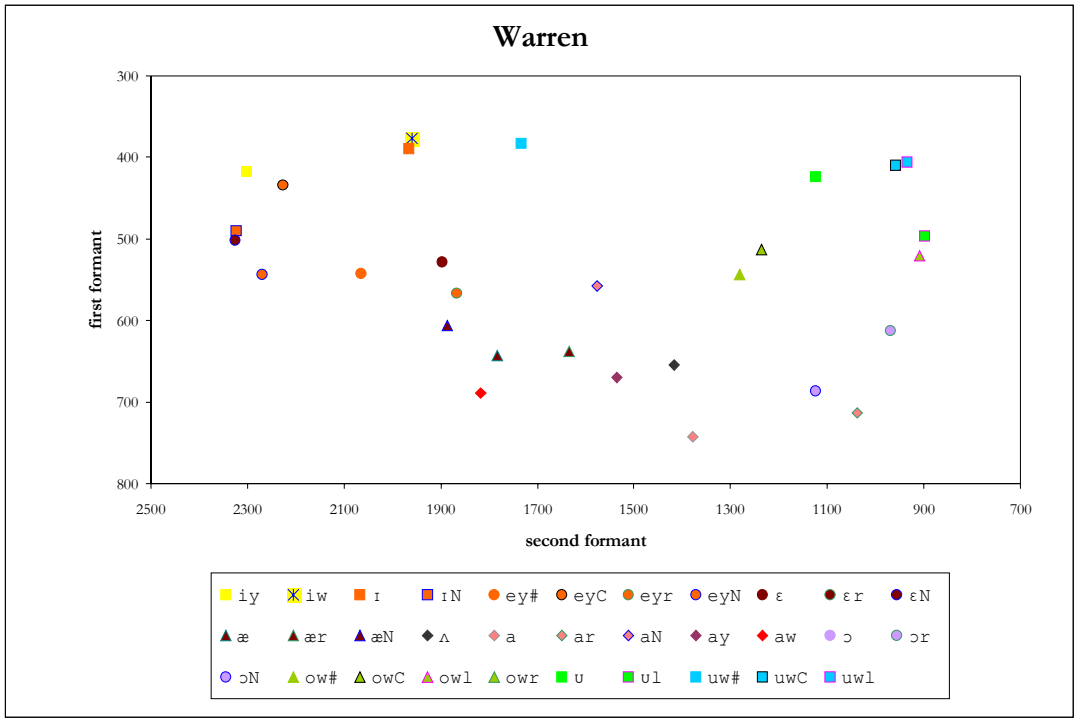

Figure 62: Vowel chart for Warren, male, lifelong Waldorfian, born 1909

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