FAKING IT: A PHONETIC ANALYSIS OF PERFORMED VOWELS

by

Meredith Love

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This thesis was presented

by

Meredith Love

It was defended on

April 18, 2011

and approved by

Scott F. Kiesling, PhD, Associate Professor

Shelome Gooden, PhD, Associate Professor

David Mortensen, PhD, Assistant Professor

Thesis Advisor: Scott F. Kiesling, PhD, Associate Professor

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This study examines three phonemes /æ/, /ɑ/, and /ɔ/ as performed in a dialect instruction tape for actors and compares them to a natives speaking group from a study done by Hawkins and Midgley 2005. Weinreich 1968 argues that when two language groups are similar, learners gloss over close similarities. Based on this, I hypothesize that /ɑ/ will be least on target as it represents a small shift, while /æ/ and /ɔ/ will be faithful representations. The near-opposite proved true, with all of the performed vowels patterning as a statistically different group than the native speaking data. Based on the results of this study, I discuss performance in context of conscious and unconscious speech and the control a human has over his ability to achieve a new phoneme in a scenario where hypercorrection phenomena are quite common. I also argue that the nature of the performer-audience relationship has an impact on the performance, both in terms of the goals of performance and the abilities of the performer.

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1.0 INTRODUCTION

The area of sociophonetics is an up and coming section of linguistic research. It aspires to understand the relationship between phonetic characteristics of a dialect or language and the social functions those features have. Sociophonetic research has increased not only due to advances in phonetic technology and sociolinguistic study, but also has been influenced by increased contact among people as a result of mobility. In previous centuries, it was rare that people came into contact with speakers of other languages or dialects; they likely lived their entire lives within a single region or county. Additionally, increases in national and international media have expanded the reach of varying dialects.

Normally, linguists focus on natural language production. Of course, this is completely logical: it provides insight into human language capacity and how people use their language on a day-to-day basis. However, an area of human behavior that may be overlooked is the area of play. While play is a natural human behavior, in some instances people tend to alter their speech as a means of poking fun or otherwise engaging in entertaining one another. This is non-natural speech, meaning that the speaker is focused exactly on what he is delivering and how it sounds and will be perceived, but it does shed an important light on what human beings focus on in different languages and dialects, and what they are able to produce in accordance with that. For the purposes of this research, I am focused on the latter half of this duo: the ability to produce a different dialect.

Phonetic research has expanded drastically in the last few decades, particularly with the advent of computer technology to aid researchers. Many of the phonetic systems of the world's principal languages have been documented, producing a large database of possible human speech sounds. Traditionally, the ideal subject for phonetic research is a rural, older working-class male. Using this source generally yields the most accurate representation of a dialect's sounds.

Speech sounds are created by air moving through the oral and nasal cavities. Different sounds are produced based on the position of the tongue and various closures and near-closures of the cavities at targeted points along the vocal tract, which can fall anywhere between the glottis to the lips. The nose is also involved, as air may or may not be passed through the nasal cavity.

Vowel sounds also involve the oral and nasal cavities, but different vowels are created based on the positioning of the tongue within the mouth and the positioning of lips. Vowels are described based on tongue height, tongue backing, and lip rounding. Frequently, though not always, rounding is ignored when studying the vowel sounds of a language unless it provides the only contrast between two sounds.

When examining the vowel system of a language, phoneticians create a diagram of the vowel space. The diagrams are based on formant measurements for each vowel. Formants are a group of tones that correspond to a resonant frequency (Ladefoged 2006). The first formant, F1, gives information about vowel height in an inverse fashion: the lower the formant value, the higher the tongue is in the mouth. The second formant, F2, describes vowel backness, where a higher value indicates a front vowel. Finally, though it is not usually included on a vowel chart, the third formant, F3, describes vowel rounding. A low F3 vowel indicates lip rounding. Additionally, an increase in lip rounding will also affect F2, as F3 pushes closer to it.

Phonetic variation is increasingly studied due to various factors including increased mobility that adds new awareness of variation, among other things. Phonetic variation involves the difference in production of a given sound based on the sociolinguistic characteristics of the speaker, among other factors such as physical characteristics, perception, and acquisition. Speakers of different dialects of a given language may produce a sound differently—i.e. the closure may be made at a slightly different place for a consonant, or a vowel height is different —but generally perceive words in the same way.

At this point, it is important to note that no speech sound is produced exactly the same way every time by a speaker. Therefore, the formant values of one vowel produced multiple times by the same speaker will all be slightly different. However, they will all fall within the acceptable range for that vowel within that speaker's dialect. For the purposes of this work I am defining dialect both geographically, as representative of people from a given region, and socially, as representative of a particular social group. A speaker of a different dialect will have the distinct acceptable range for formants for this vowel. The two dialects' vowel spaces may overlap, thought this is not necessarily the case. They will, in all likelihood, be very close in the oral cavity if they do not overlap. For the purposes of this study, I am concerned principally with production vowel sounds, and will focus on that.

In order for distinct dialects to develop, certain phonetic characteristics must become representative of a particular group, be it a socioeconomic group, geographic group, age group, or any other possible subcategory of people. This may or may not be a conscious, observable process; the variables may have different indexicalities. The different variables indexing specific social meaning and function lead to dialect distinctions. Indexicalities are also important for this work as when a variable reaches third order, it becomes available to be performed: members of the speech community are able to use these variables in the area of play, be it a formal or informal context.

Work on second dialect acquisition has shown that there is a predictable pattern to the acquisition of various parts of a dialect. Chambers (1990, 1992) argues that lexical variables are generally acquired first, followed by phonetic and phonological patterns, and finally morphosyntax. However, there are many factors at work when it comes to whether or not certain variables will acquired. Chambers' work primarily focuses on the age of participants in the study, showing not surprisingly that the younger the individual, the easier and more likely it is that they will acquire the second dialect features, supporting many previous second language acquisition studies that have shown easier acquisition during the so-called "critical period," which traditionally ends when the learner hits puberty.

Additionally, research shows that phonological and phonetic features may be randomly acquired, in that some subtle changes may quickly change, while other seemingly obvious differences remain unchanged. Researchers are still working to determine if there are any particular patterns underlying these trends, or if they are truly situation-based. Interestingly, research also shows that even when people acquire a new variable in a second dialect, they may not acquire the social tag attached to it (Tagliamonte and Molfenter 2007).

1.1 PERFORMANCE

Linguistic performance and performed languages are also an increasingly studied area, particularly in sociolinguistics. Generally, the focus has been on speakers who perform a dialect, accurately or not, of their own sociolinguistic group or that of another (eg. Schilling-Estes 1998). This usually occurs in a natural setting, which for this work is outside of a performative theatrical space and may be conscious or unconscious, meaning that the speaker may be aware or unaware that he is performing. Performed languages and dialects are, in my view, languages that are used specifically in theatrical performance. This does not have to be done in a theatre or by an actor, but it is a fully conscious action for entertainment and performative purposes. However, many of the same characteristics apply to both linguistic performance and performed language, in that it may or may not be fully faithful to the target. This idea will be further explored below.

This research combines the subjects of phonetic analysis and performed language by examining a dialect performance recording for linguistic accuracy. The recording in question is a dialect instruction tape for actors designed to teach them Received Pronunciation (RP), a dialect of England traditionally spoken by the upper classes; therefore, this performance presents itself as a model of the dialect, despite being non-native. The question is whether or not the three vowels that I have chosen to analyze, /ɑ/, /æ/, and /ɔ/, are faithful representations of the target, and how consistent they are. I hypothesize that /æ/, which occupies the same vowel space in both dialects, will be statistically the same, as it does not require that the performer change his native production of the vowel. I also hypothesize that /ɔ/ will also be generally accurate, as it is the largest change in vowel space among the three chosen, and therefore is the most noticeable difference. Finally, I predict that /ɑ/ will be the least accurate and consistent of the three, as it is a slight change which may not be as readily noticed.

Every sound, including vowels, produces specific acoustic correlates. These acoustic correlates are essentially the movement and disturbance of air. Based on numerous factors to be discussed, the precise manner of how the air is disturbed creates a different acoustic correlate that we interpret as a different sound, be it a vowel, consonant, or non-speech sound.

The acoustic signal of vowels creates different formants. Formants are a group of tones that correspond to the resonating frequency of air in the vocal tract (Ladefoged 2006). Based on the formant readings, phoneticians can describe the characteristics of a vowel based on the placement of the tongue. Formant 1 (F1) represents the tongue height in a inverse relationship: the higher the tongue, the lower the formant value. Formant 2 (F2) represents tongue backness, where a high formant value indicates a front vowel. By combining the formant readings for a given speech sound, phoneticians can identify which vowel sound is being produced.

1.2 DIALECT INSTRUCTION IN THE THEATRE

The guides for actors published by theatre practitioners provide an interesting contrast to published linguistic work. Dialect and accent guides have been published for many decades, and the majority of recent publications have an accompanying audio recording for reference. The pervasive attitude is that by hearing a representation of the dialect, either by native speakers or by the instructor, and having select changes pointed out, the actor can learn the dialect without trouble. Imitation is the principal method of acquisition. While there is some emphasis on internalizing the changes rather than just learning them (Molin 1984), there seems to be little understanding of what distinguishes one dialect from another, the mechanics of phonetic production, and why certain changes are perhaps more "characteristic" of one dialect or another. To take an example, in order to create the /ɔ/ of RP, learners are instructed to "take the (o) of 'bought' and make it sound only half as long" (Molin 1984). The reader is left wondering what constitutes "half as long," why this is the appropriate change to be made, and, perhaps most importantly, whether he is producing the sound correctly. The linguist reading this passage has not only these questions, but wonders what "(o)" represents, and knows that "bought" may be articulated in a number of different ways given diverse sociolinguistic variables characterizing the learner's speech.

Some guides make use of IPA symbols, though they provide little information about what these symbols mean and how the student should use them. Additionally, some IPA transcriptions of words are questionable in my view, inaccurately representing diphthongs as monophthongs and taking too much of a hint from the spelling of the word rather than the sounds produced. However, the fundamental flaw is that the guides assume that all American English speakers sound the same, that there is no distinction between someone from California and someone from upstate New York.

At this juncture, it is important to argue for the merits of these guides from the perspective of those who write them and those for whom they are written. In many cases, the goal for the actor learning the dialect may not be a perfectly faithful representation of every nuance found in the dialect. First and foremost they are creating a character, and that character has his own unique idiolect. In his book Stage Dialects, Jerry Blunt (1967) makes a useful distinction between dialect and stage dialect. He points out that, while a dialect has more or less the same definition as the one linguists give it, a stage dialect is "altered as needed to fit the requirements of theatrical clarity and dramatic interpretation" (1). The actor's first allegiance is to the character and the performance, not to the dialect. Therefore, the representation of a dialect need not have all changes perfect, but rather should suggest a specific region or sociolinguistic group such that the audience can quickly learn these features of the character they are watching.

The recording produced by David Alan Stern analyzed for this project is also accompanied by a companion manual. While the focus is principally on the sound recording and lessons are guided from there, the manual is a useful reference to students as they do the lessons. In his introduction, like other guides, Stern places emphasis on creation of character over faithfulness to the dialect. The focus is on believability of character rather than believability of dialect. However, Stern also points out that dialects should be performed well. He argues that a dialect should be avoided rather than shabbily performed.

Unlike other authors, Stern acknowledges that few people have the ear to hear a dialect and imitate it accurately. Rather, his focus is on a systematic approach to create authenticity. He is rooted in a philosophy of overarching changes to the speech mechanics rather than specific sound changes. He reasons that points of resonance and a change in muscle impulses, coupled with observation of changes in sounds, will yield a solid representation of the dialect.

In the manual, Stern includes IPA representations of changes. However, there is no discussion whatsoever of what the IPA is or what the symbols mean. It is up to the curious student to investigate this. Additionally, he includes Lessac symbols to denote changes in sounds. The Lessac system, created by Arthur Lessac, assigns each vowel a number that corresponds to the mouth opening, and they are ordered from smallest opening to largest

(Lessac 1967). Lessac tends to focus on the entire body's involvement in the creation of sound, so his vowel system represents a more kinesthetic approach to vowel production.

Stern's lessons are centered around first learning a general change in muscularity that informs the entire dialect, and then moves on specific notes about vowel and consonant changes. On the recording, he models the dialect while teaching and explaining. There are some instances in which he switches to a standard American dialect, as he calls it, in order to demonstrate differences between the two dialects. He also on occasion models extreme representations as examples of how not to perform the dialect.

1.3 METHODS

In order to determine the statistical accuracy of Stern's vowels, a comparison group must be chosen. For this work, I have used data from a 2005 article by Hawkins and Midgley. In their article, they examine RP monophthongs in various age groups of native speakers, observing changes over the generations. What make this particular group of native speakers an apt selection was that they are all men, making comparison to Stern simpler as the need to control for sex of the speaker is removed, and they are representative of a wider variety of RP speakers. Hawkins and Midgley provided the raw data of F1 and F2 for each token as an appendix in their article.

In order to obtain data to compare to that in Hawkins and Midgley, I listened through the entire recording of Stern's lessons and isolated tokens of each of the three vowels using the Praat software package. Only stressed vowels were selected. Once all tokens for each vowel had been isolated, I recorded the vowel performed, the immediate environment of the vowel, and the word it was spoken in. In instances of word-initial or word-final vowels, I also recorded the preceding or following segment if there was no clear break in the waveform between the two sounds. For each token, I measured the values for F1, F2, and F3 at the midpoint of the vowel. I then statistically compared the data from Hawkins and Midgley to the data obtained from Stern's recording, initially without controlling for environment, and then doing a comparative analysis within specific environments.

2.0 RESULTS

2.1 TRAP VOWEL

As stated above, /æ/ was hypothesized to be the vowel produced closest to the Hawkins and Midgley data, given that there is little to no movement of the vowel space between the two dialects. However, when the two groups of tokens are viewed together, as in Figure 1 below, we see that they are occupying different but close vowel spaces. When we examine the statistics, we find out that indeed, the two source dialects have different vowel spaces. Using the SPSS software package, I carried out independent samples t-tests to compare the F1 values for each, the F2 values for each, and a paired samples t-test linking the pairs of F1 and F2 values and comparing them as a unit. Regarding the F1 values, there was a significant difference between Stern's values ($M = 908.82$) and Hawkins and Midgley's values ($M = 737.42$), $t(108.97) = -9.09$, $p < 0.05$. The same distinction was noticed between the F2 values for Stern ($M = 1958.73$) and Hawkins and Midgley ($M = 1576.19$), $t(275) = -24.61$, $p < 0.05$. Not surprisingly, the differences between the formant groups account for the majority of the difference, with an eta squared value for F1 of 0.243 and for F2 of 0.702, showing that, respectively, they account for 24.3% and 70.2% of the difference between the two groups. The paired samples t-test also bore the same findings, concluding that Stern's /æ/ tokens, $t(196) = -100.05$, $p < 0.05$, were different than Hawkins and Midgley's tokens, $t(79) = -33.91$, $p < 0.05$.

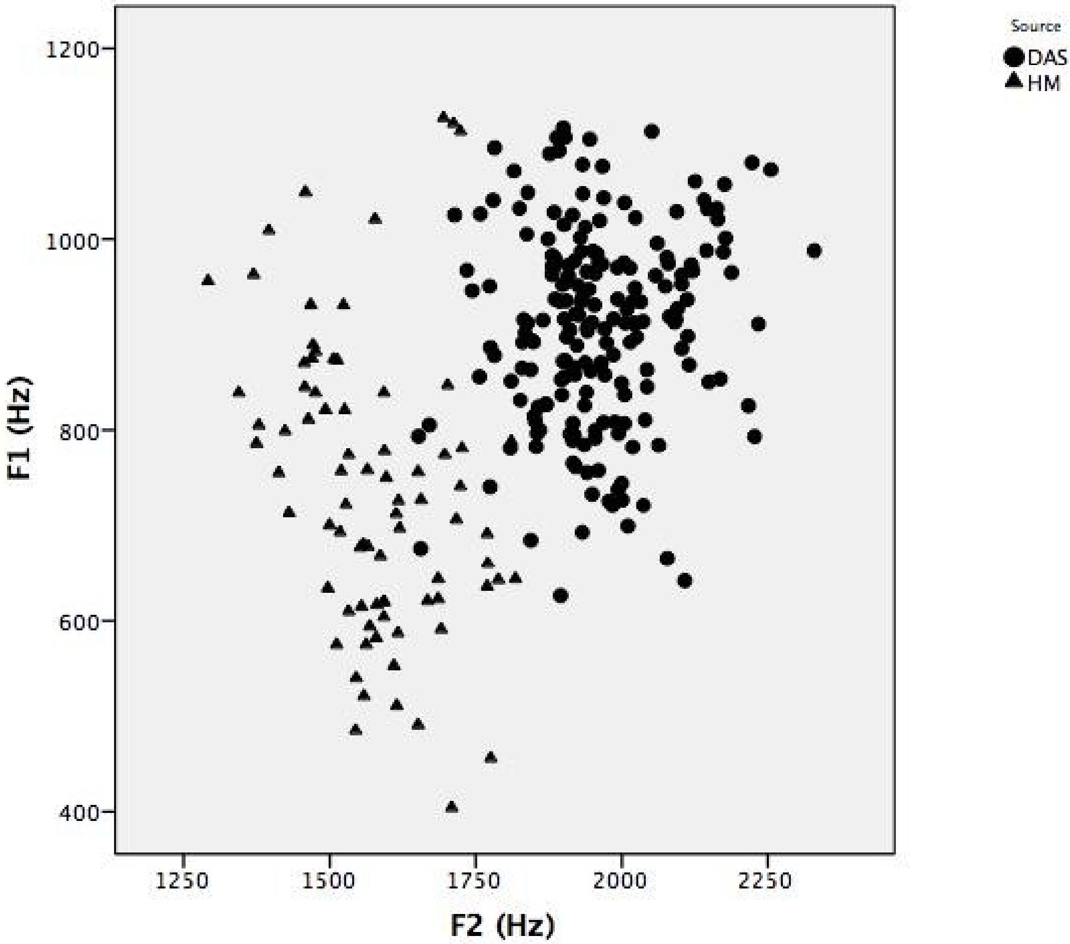

Figure 1: All Tokens of Trap Vowel

2.2 HOT VOWEL

/ɑ/ was hypothesized to be the most difficult vowel to capture accurately as it required a moderate amount of movement. As shown in Figure 2, many of Stern's tokens group with Hawkins and Midgley's data, but there are numerous outliers from Stern, showing a degree of inconsistency in production. When we examine the statistics, we find that the two sources do come from two different dialects. In the independent t-test of F1, Stern ($M = 794.17$) and Hawkins and Midgley ($M = 628.61$) do show a significant difference, $t(250) = 9.54$, $p < 0.05$; the same in true regarding F2, with Stern ($M = 1309.38$) and Hawkins and Midgley ($M = 1057.10$) exhibiting a significant difference, $t(181.57) = 5.65$, $p < 0.05$. Interestingly, the eta squared values were not as extreme as previously seen. F1 did have a large effect of 20.9% on the difference, and F2 had a more moderate 13.3% effect.

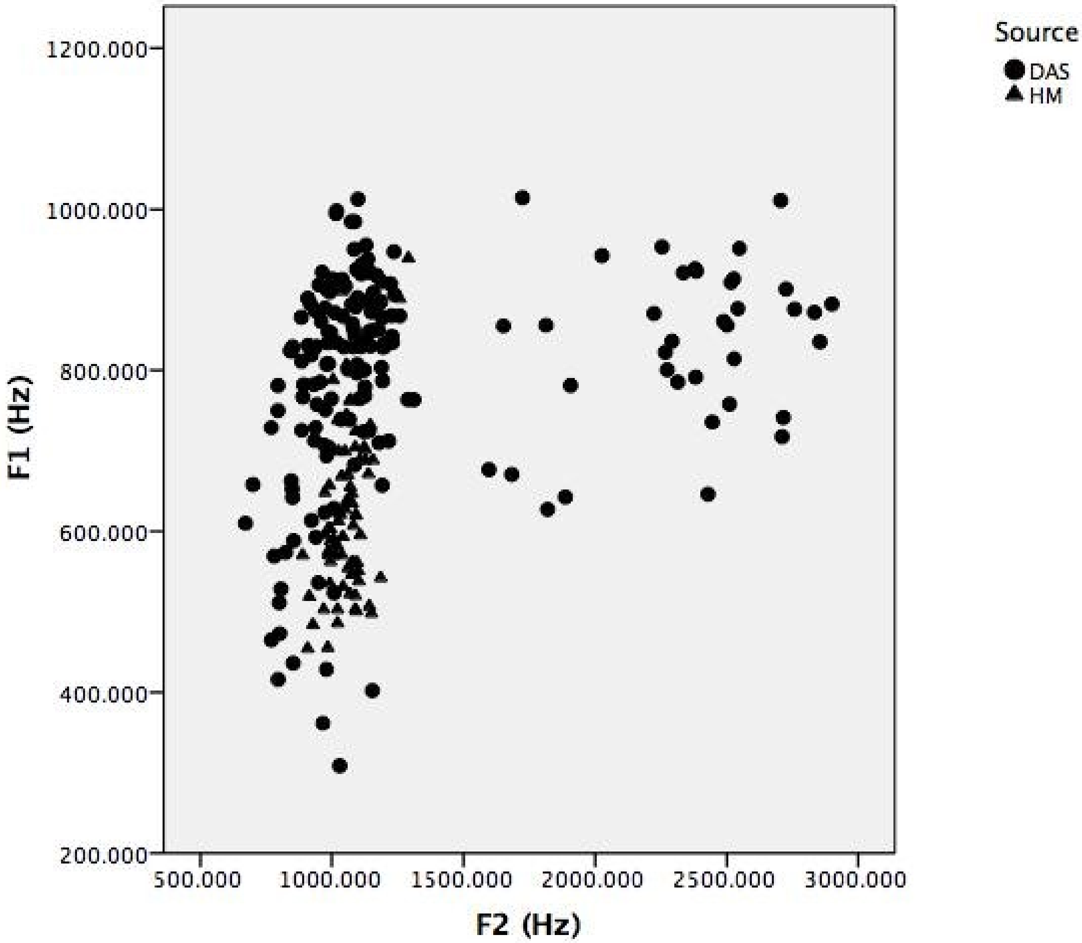

Figure 2: All Tokens of HOT Vowel

2.3 THOUGHT VOWEL

Much like the other studied vowels, Stern's vowels do not match the natives speaker population, as seen in Figure 3. Upon examination of the statistics, the number of outliers causes the conclusion that the two sources pattern as two different dialects. For F1, Stern ($M = 528.56$) and the native speakers ($M = 381.33$) have an independent samples t-test result of $t(298.88) = 15.55$, $p < 0.05$. An evaluation via calculation of eta squared finds that F1 has a large 45.3% effect on the results. F2 has an equally large eta squared value at 50.7%, with Stern ($M = 1792.26$) and the native speakers ($M = 619.54$), $t(225.47) = 17.73$, $p < 0.05$.

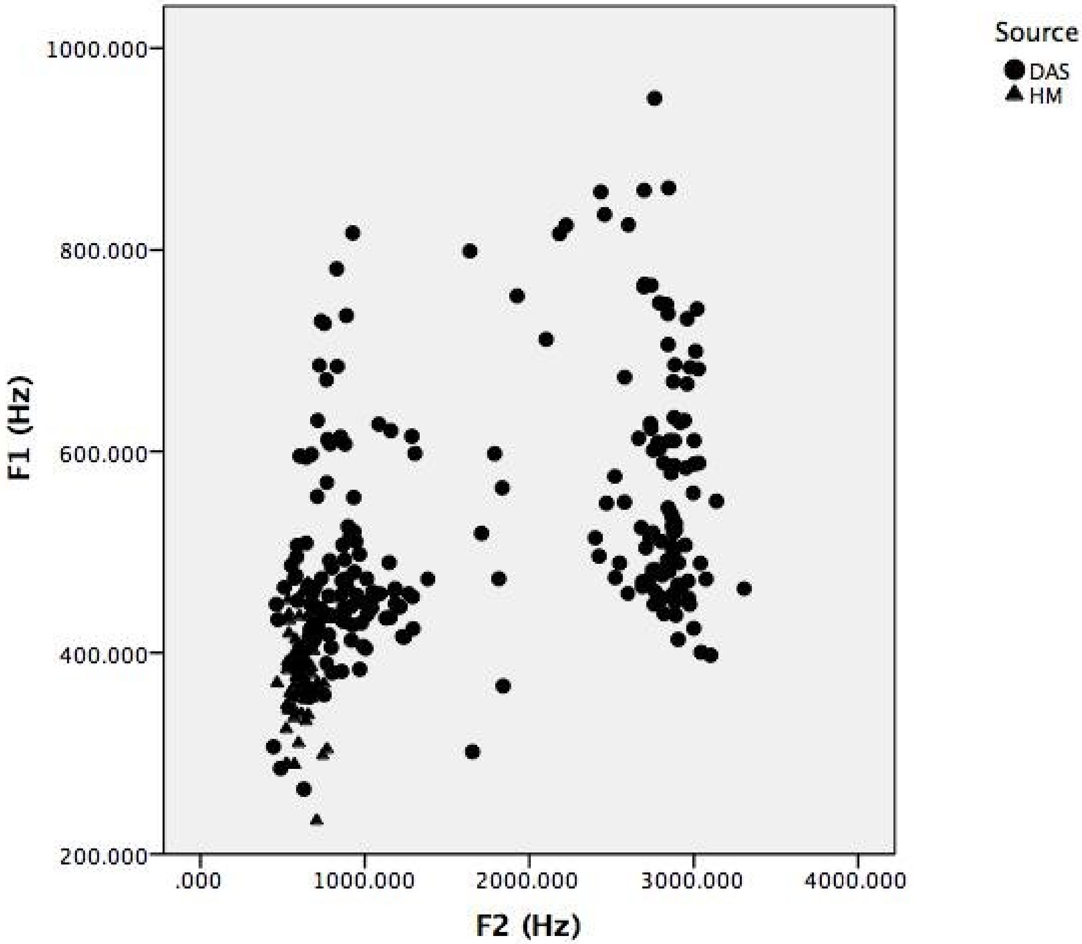

Figure 3: All Tokens of THOUGHT Vowel

2.4 SUMMARY

Statistically, Stern's vowels do not represent the same vowel space as the native speaking comparison group's do. While he patterns closely to them, showing some overlap, they are still distinct vowel spaces. However, we cannot accept these results as conclusive without first considering the effect of the surrounding environment on the vowel segments.

2.5 THE EFFECT OF ENVIRONMENT

As speech is not comprised of neatly spaced individual segments but rather a string of connected sounds, it is important to consider the possible effect of environment on each of these vowels. The vowel tokens taken from Stern's recording have varying environments; Hawkins and Midgley maintained uniformity in their environment, placing all tokens in h_d. In an ideal setting, I would have a large number of tokens from Stern in the same environment, but this is not the case. Therefore, in order to have a large enough comparison group, I have narrowed down the tokens from Stern to include those that only have a fricative preceding and a stop following the vowel. The three vowels are summarized in the figures below.

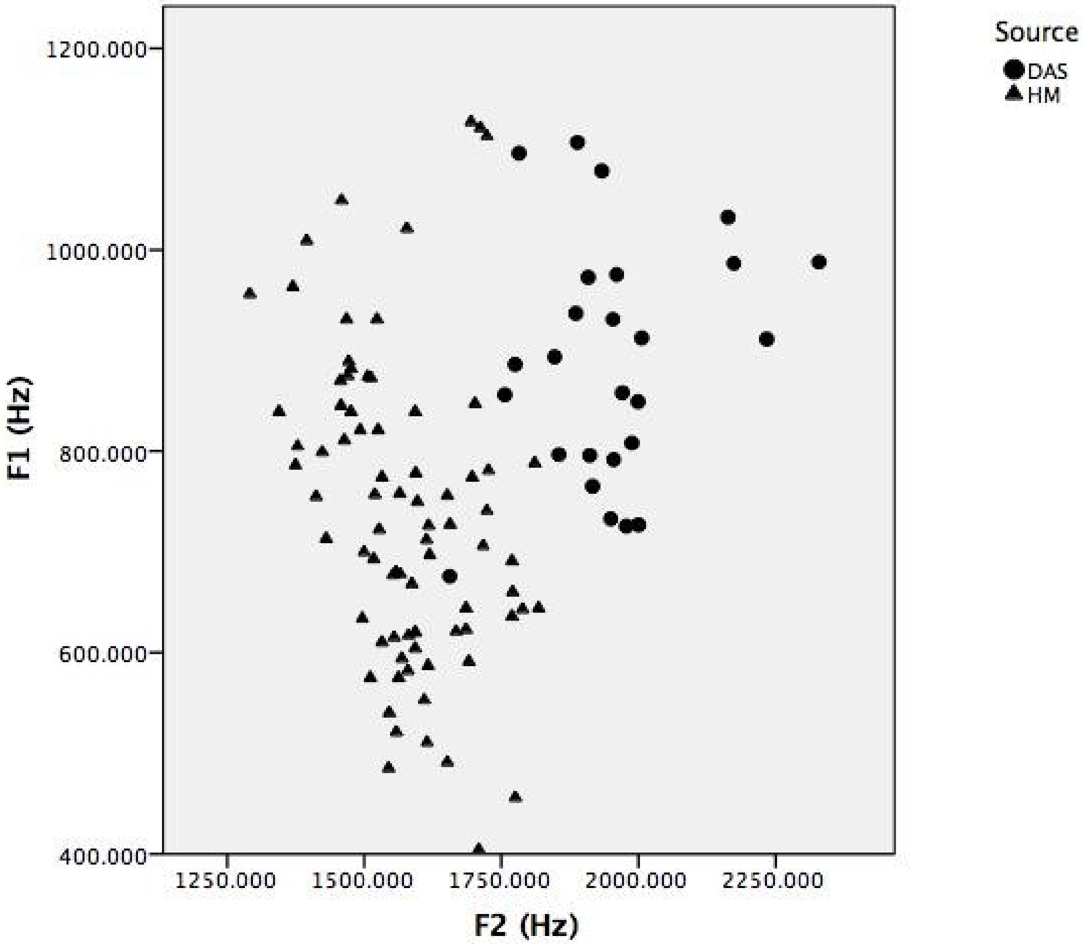

Figure 4: Tokens of TRAP Factoring in Environment

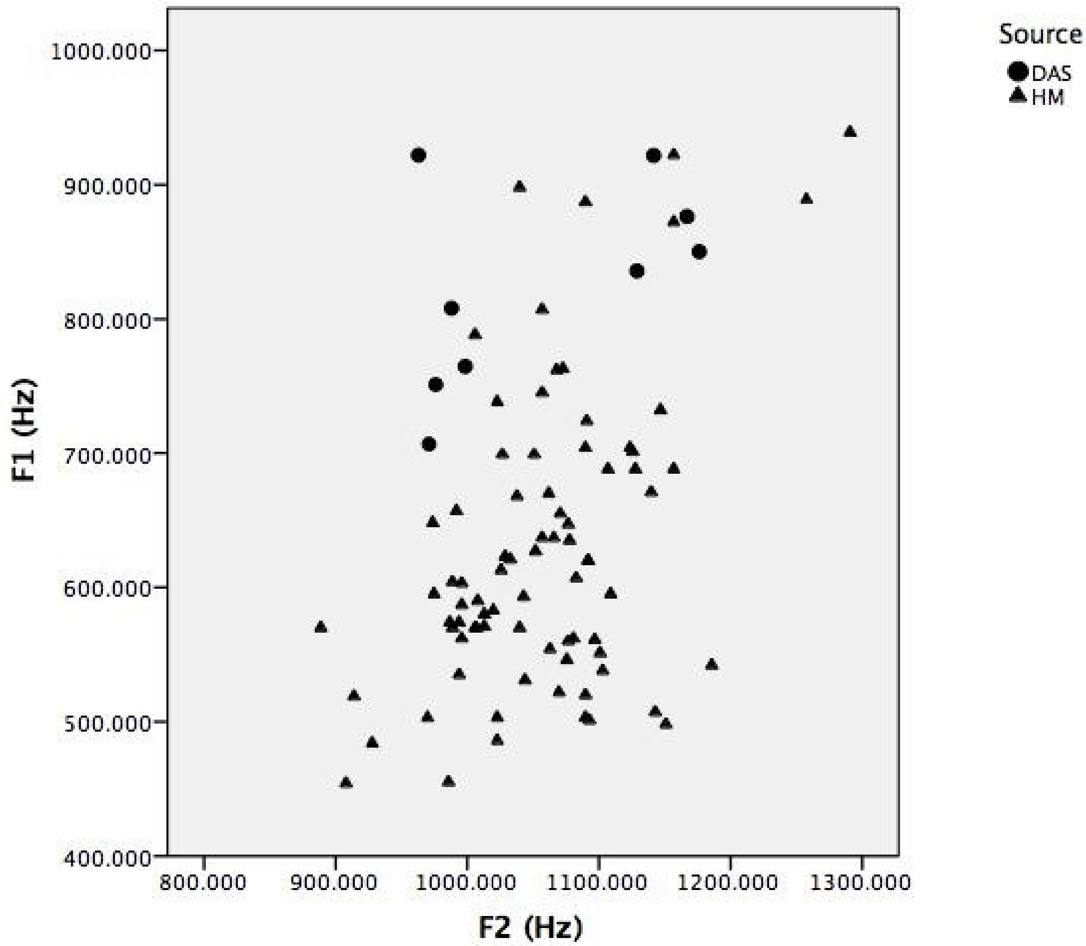

Figure 5: Tokens of HOT Factoring in Environment

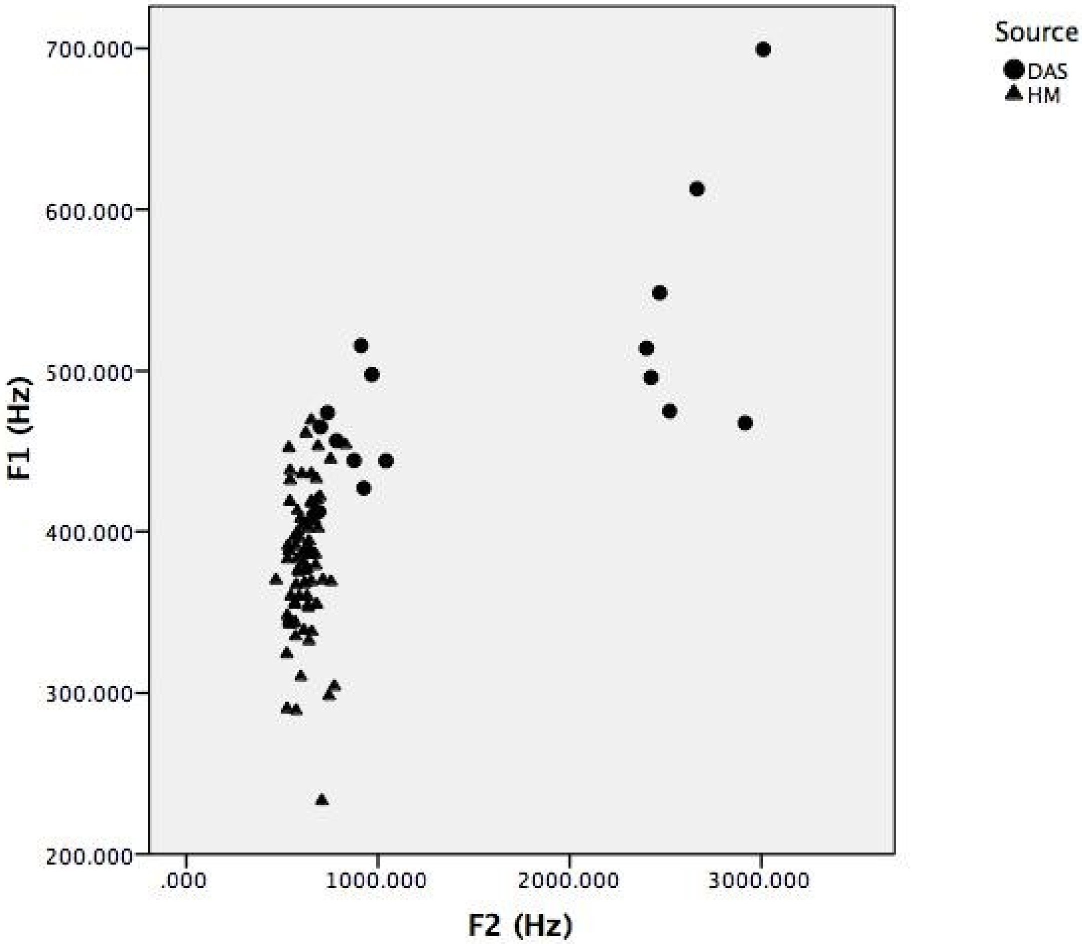

Figure 6: Tokens of THOUGHT Factoring in Environment

As shown in Figure 4, the different sources occupy two different vowel spaces for /æ/. For F1, the statistics show a significant difference between Stern ($M = 887.99$) and the native speakers ($M = 737.43$), $t(104) = 4.52$, $p < 0.05$. The same was true for F2, $t(104) = 13.37$, for Stern ($M = 1952.88$) and Hawkins and Midgley's participants ($M = 1576.19$). Figure 5 also shows different vowel spaces for /ɑ/. For both F1 and F2, the natives (F1 $M = 628.61$, F2 $M = 1057.10$) and Stern (F1 $M = 826.25$, F2 $M = 1056.74$) are statically different, with F1 $t(87) = 5.19$ and F2 $t(87) = -0.01$, $p < 0.05$; both F1 and F2 must be statistically the same in order for the entire vowel phoneme to be considered representative of the same dialect. Finally for /ɔ/, Stern's ($M = 496.83$) and the native speakers' F1 ($M = 381.33$) are statistically different, $t(17.12) = 6.13$, $p < 0.05$; Stern's F2 ($M = 1627.16$) is different than the native speakers ($M = 619.54$), $t(15.03) = 4.33$, $p < 0.05$. Overall, despite a change in the trends for each vowel group, the two sources are still statistically different groups.

3.0 CARTESIAN DISTANCE

A useful factor to use in order to compare the success of each vowel production to the others is Cartesian distance. Cartesian distance is the calculation of the distance between two points on a plane; vowels can be plotted on an F1/F2 plane, each point representing a token. As finding the distances between each point to every other point is tedious and ultimately useless, I calculated the distance between the representative mean point for each sources' vowels. In the findings below, points are presented as (F1, F2).

For tokens of /æ/, Stern's mean was plotted at (908.82, 1958.73) and the natives speakers were plotted at (737.42, 1576.19). The distance between these two points was calculated at 419.18. The tokens of /ɑ/ were plotted, for Stern, at (771.63, 1353.21) and, for the native speakers, at (628.61, 1057.10), yielding a distance of 328.84. Finally, tokens of /ɔ/ were plotted at (529.61, 1778.65) for Stern and (381.32, 619.53) for the native speakers. The distance between these two points is 1168.56. For additional clarity, these results are summarized in Figure 7.

When we consider the impact of environment with regard to Cartesian distance, a similar pattern emerges. For tokens of /æ/, Stern's average point was plotted at (887.99, 1952.88); for /ɑ/ at (826.25, 1056.74); and for /ɔ/ at (496.83, 1627,16). The average points for the native speaking group remained the same. Figure 8 summarizes the findings.

The distance between the two points for /æ/ was 405.67. Between the points for /ɑ/ it was 197.64, and for the points of /ɔ/, 1014.22. The only striking difference found is between the two Cartesian distances for /ɑ/. The other two measures show little improvement with the additional factor of environment.

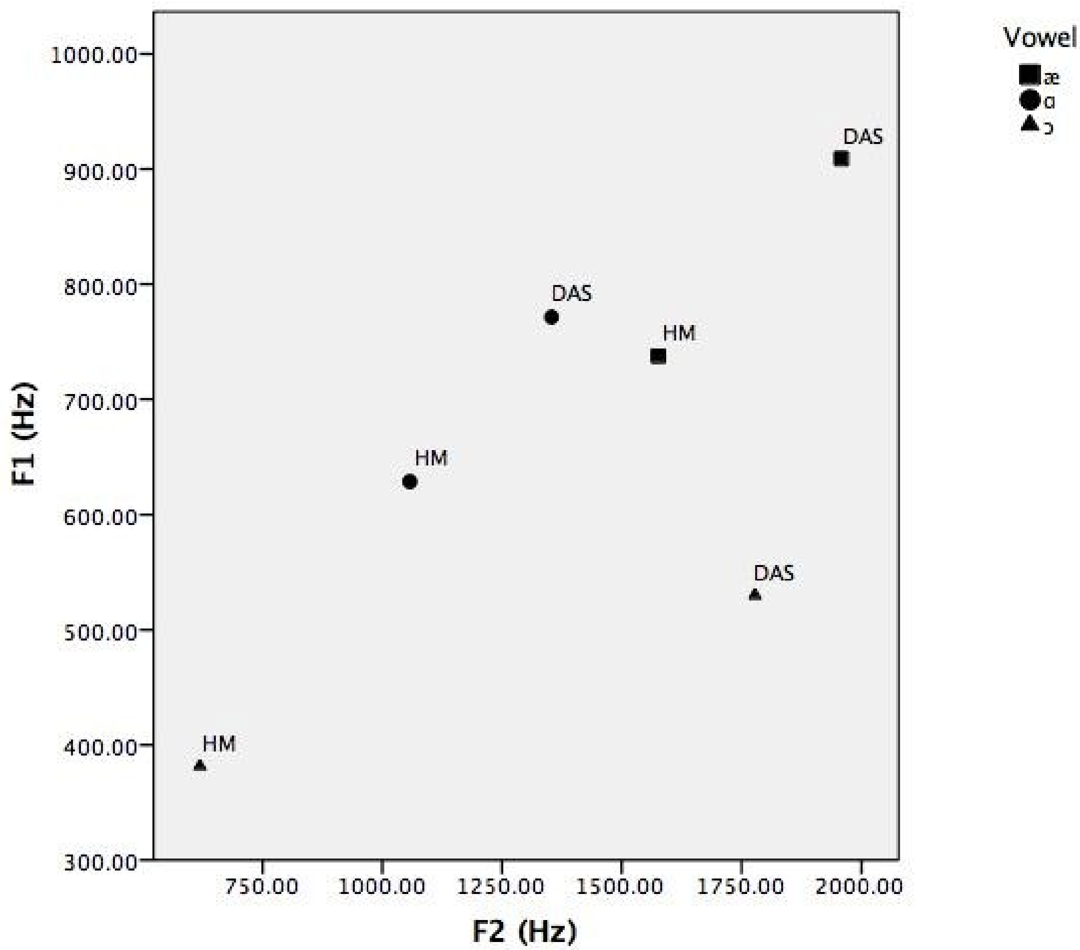

Figure 7: Cartesian Distance

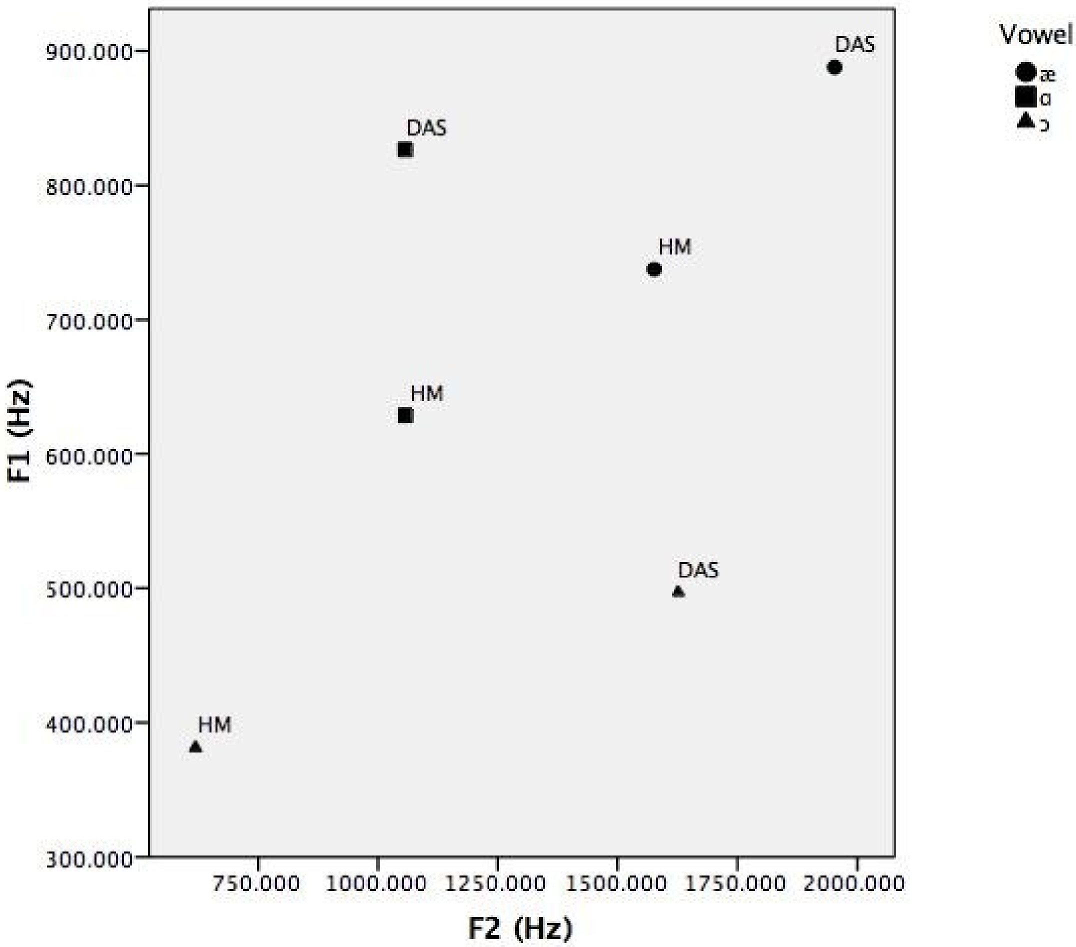

Figure 8: Cartesian Distance Factoring in Environment

4.0 DISCUSSION

The statistics and charts above provide many interesting insights to this project. First off, while the numbers tell us that, on a technical level, the two sources represent two different dialects, when we look at the overall patterns present in the graphs, it is clear that there is a considerable amount of overlap in the data, particularly with regard to the examination of /ɔ/ and /ɑ/. What we see is the impact of the outliers. While there are a relatively large number of outliers present in the data, they represent an inconsistency in the performance, which, one would argue, is to be expected based on previous research into second dialect acquisition. There are just as many, and in fact more, cases where Stern patterns precisely with the native speakers, indicating that he does have the capability to produce the new sound, but subsequently needs to improve consistency.

First, it is important to acknowledge the possibility of error in the raw data. Given the nature of the performance, it is entirely possible that the outliers are genuine representations of inconsistencies present in the performance, but we cannot rule out the possibility of flaws either in the instruments used to record the speech or the technology used to extract formant values. While these technologies have improved drastically the ability of linguists to perform examinations of speech data, they are by no means perfect. In short, while the possibility of technological error is remote, it should not be overlooked as it may have has a small but important influence on the data.

Other factors to consider when examining the data are the manner in which it was elicited from both sources and the environment of the vowels. In all cases for Hawkins and Midgley's study, they elicited via word lists, while the tokens from Stern were isolated from free speech. The environments also are quite different. Hawkins and Midgley maintained their environment as h_d for all the tokens, whereas Stern's vowels, due to the extraction from free speech, have a variety of environments. The distinctions in environment and type of talk may explain some of the demonstrated inconsistency in Stern's production, as surrounding segments are known to have an effect on the formants of a given vowel, and subjects in a study asked to say words on a word list are likely to pay more attention to their speech, perhaps consciously or unconsciously altering the quality of their utterances. Even when we control for environment, as done in the second portion of the results, the data still show that Stern patterns differently than the native speaking population. However, the impact of environment may still be an issue even with this control, as there were not enough tokens from Stern matching the exact environment of Hawkins and Midgley's participants' tokens to be statistically reliable.

The Cartesian distance calculations provide insightful feedback with regard to the hypothesis presented at the outset of this work. These measurements help to assess how different Stern's vowels are from the native speaking population in such a way that we can see which vowels are more successful than others. In the beginning, I hypothesized that /æ/ and /ɔ/ would be the most consistent because /æ/ requires little to no movement and /ɔ/ requires the most movement, thus making it a very noticeable change. In keeping with Weinreich (1968), /ɑ/ was theorized to be quite inconsistent and the farthest from the target, as it is a subtle change that would tend to be overlooked under Weinreich's theory. According to the Cartesian distance results, /ɑ/ is actually the most consistent, patterning closest to the native speaking population. The average token of /æ/ is slightly farther from the native speaking token. The most startling result is the distance between the two average tokens of /ɔ/. This is likely to do the large numbers of outliers which, as discussed above, likely have a significant skewing effect on the overall results. An important element to take away from the data present here is the movement Stern does achieve in his production of these three vowels. While I do not have specific data of Stern speaking in his native dialect, plotting from Ladefoged 2006 of general American English gives an idea of where the vowels may lie in Stern's everyday production. The differences are shown in Figure 9.

Because of the data presented in Figure 9, we can make the argument that Stern is hypercorrecting. This over-performance is easily explained by previous sociolinguistic work (eg. Labov 2006) and indexicality. Performance is a third order indexical item. These variables have achieved a performance level, indicating that the speaker and the speech community in general have a considerable amount of control over the variable, but the performer may over-exaggerate the difference between the variable in his own speech and the target in question. Hypercorrection also shows the "phonetic intention" (Labov 2006:152) of the speaker. That is, the speaker knows that the target is, for example, further forward in the mouth than his own vowel, but his execution lacks the necessary precision. In Figure 9, /æ/ is a perfect example. Stern is in line with the placement of the native RP speakers, but he has just moved too far. Interestingly, the other two phonemes only show hypercorrection in one direction: /ɑ/ is lowered and /ɔ/ is fronted.

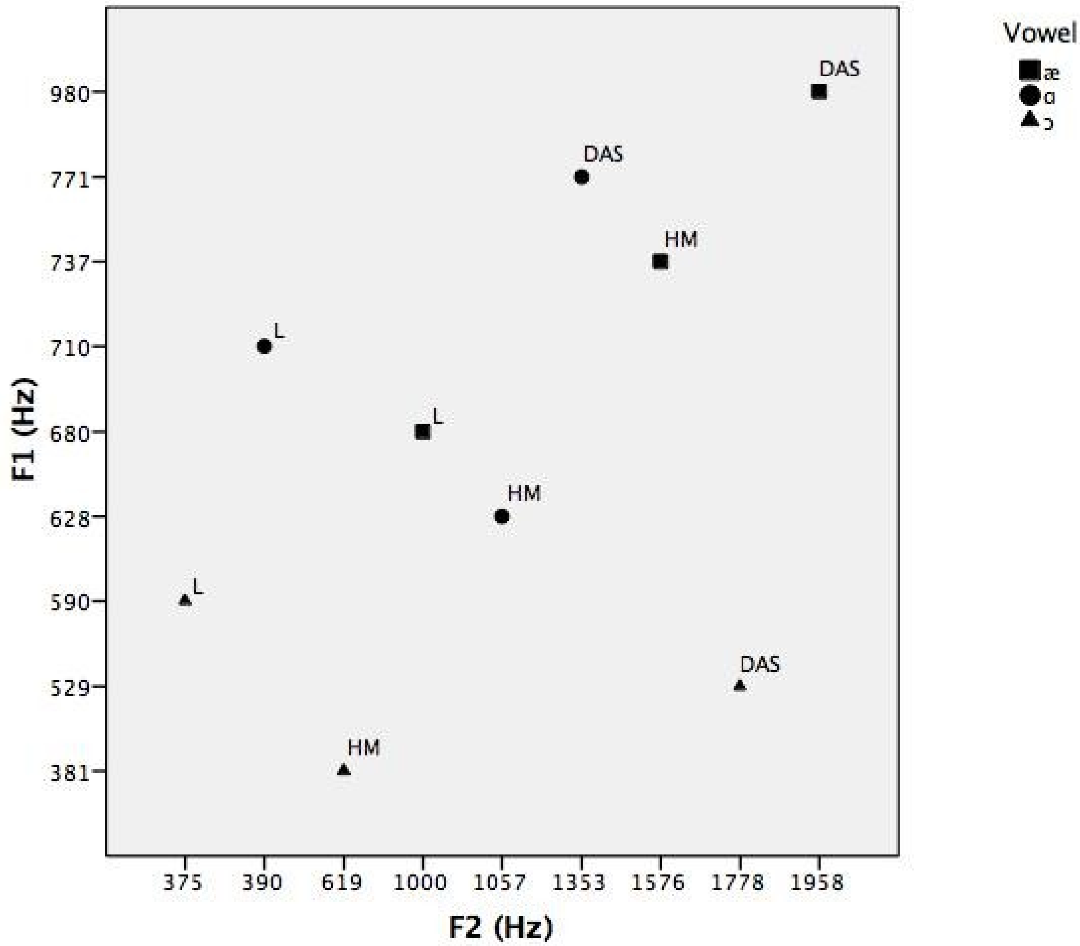

Figure 9: Movement Comparison to Two Native Groups

Another factor to note that pertains to Stern's F2 movement is his technique of performing RP. In his lessons, he teaches the student to move the point of focus, as he calls it, of the dialect forward in the mouth in order to obtain the correct quality and impression of the accent. By doing so, he is likely affecting the positioning of the tongue such that vowels are fronted, perhaps more-so than they should be. This could help explain his hypercorrection in some instances, particularly with regard to /æ/. Initially, I hypothesized that /æ/ would be statistically very accurate in the performance, but as we can see in Figure 9, it is fronted and lowered. While Stern's technique may not explain the lowering, it does provide a possible explanation for the fronting present in the data. The fronting technique may also present an insight into the bimodality of the tokens of /ɔ/. In his lessons, Stern is consistently reminding students to move the sound forward. When he says the word "forward," there is a particular stress on that word, giving it further emphasis above all others. Many of the tokens of /ɔ/ were contained in "forward," and the frequency of this word occurrence, coupled with the possibility of increased fronting based on Stern's instructional technique, may be responsible for the bimodality present in the data for /ɔ/.

One important aspect to consider, especially with regard to the vowels studied here, is the lack of F3 data. While I extracted F3 readings for all of Stern's tokens, Hawkins and Midgley did not report F3 values for the native speakers that they studied, if they were measured. While an additional variable provides another piece that may impact the overall results of a study, it is, in my view, just as important a measure of vowel production as F1 and F2. Particularly with regard to /ɔ/ and /ɑ/, the degree of rounding is important in producing the vowels. In Stern's companion manual with this recording, he instructs students to, the vein of Lessac, round the vowel tightly in order to achieve a correct articulation of /ɔ/. This measure cannot be assessed without F3 data. Also, /ɑ/ and /ɒ/ may be contrastive for some, either those who are trying to learn the performed dialect, or for native speakers. This important distinction is only made in rounding; it would not be apparent in F1 and F2 data alone.

The possibility for change in the dialect is also a factor to be mentioned. In their article, Hawkins and Midgley demonstrate patterns of diachronic change in RP monophthongs. While the timeframe is rather brief, it is possible that changes may have occurred since Stern recorded his lessons in 1987, or that he may be playing to an older form of the dialect that may be more readily recognized on the stage. An additional consideration is not only when Stern made his recording, but also when he originally learned the dialect. To look at this from another perspective, how he learned the dialect—either by modeling recordings of native speakers, being coached in person, or by numerous other possible means—would play a role in the vowels he produces. The original source or sources would also have an impact. Additionally, Stern's perception may be impacting the performance. If he perceives himself to be producing native-like vowels, then he will not make changes to what he is doing.

This brings us to the topic of perception. Perception acts as a complement to production. Without perception, the sounds produced would not be processed and interpreted. It is possible that Stern's vowels may be perceived as native-like, despite the apparent fact that they are not produced quite with native speakers. While this is beyond the scope of this paper, it would be possible to assess the perception aspects of this performance by playing recordings of Stern performing, among other native speakers, and asking native speaking listeners to judge whether or not the recordings they hear are native speakers of RP. Perception is also important to consider because of the adjustments the mind may make for vowels that are slightly outside the normal vowel space of a dialect. Phoneticians have shown numerous times that no vowel is produced exactly the same way every time, hence the idea of a vowel space rather than a pinpointed location in the oral cavity. The brain therefore adjusts the input to gloss over this when we process and parse sounds. Though statistically Stern's vowels pattern as being from a different dialect than the native speakers, they may be within the range that the brain would perceive them as being native vowels.

When we examine the results through the lens of performance, important sociolinguistic factors arise. Performance is frequently tied to indexicality (eg. Johnstone and Kiesling 2008): variables achieve a social meaning and prominence significant enough to allow speakers to perform them. These third order indexicalities are active in the data analyzed here, both from Stern in his performance, and, less obviously, from the participants in Hawkins and Midgley's study.

Hawkins and Midgley were specifically looking at RP speakers. While they may or may not have told their participants what exactly they were examining, they likely gave them a general outline of the study, even something as brief as informing them that they were studying language. This introduction activates a performance. Participants want to represent their own speech and be faithful ambassadors of their dialect to the best of their ability, even though this is an unconscious choice. Therefore, we find a comparable situation to Stern's performance: they are both models. While Stern is a more obvious model in that the explicit purpose of his speech is to teach, Hawkins and Midgley's participants are, in sense, teaching the scholars about their dialect.

Any performance requires an audience. In the case of Hawkins and Midgley's study, they as the researchers are the audience. What is important to this research here is who Stern's audience is. While he is an actor performing a dialect, we also return to his role as a teacher:

this is his primary performance, and students of dialect are the audience. As these students are trying to learn a British accent from an American instructor basing his lessons on changes from American speech patterns. These American acting students are likely to be performing for an American audience, so the larger audience is still American. This is the group that holds the agreed-upon social norms and indexical meanings that are at work in the RP performance. The issue then becomes not how native speakers would potentially perceive this performance, but now the non-native speech community audience would. If they buy it as an authentic RP accent, then the performance is a success. He is giving the audience what they want, which is essentially the point of the performance—it is for other people. This finding ties back to other research on performance speech, particularly Schilling-Estes' work in Ocracoke: the performance is for outsiders who want to hear Ocracoke speech. They are not in a position to judge authenticity.

This study also has implications for the creation of dialect study guides for actors. The general take-away is that there is no substitute for in-person coaching, be it from a native speaker or a seasoned professional. The role of audience should also be prioritized. The actor should be encouraged to think about who he will be performing for, not just the character he is creating. The audience will determine what variables he should concentrate on, as the variables that have second and third order indexical status in that social group will be the ones that will trigger a particular character in the audience's mind.

In this research, I have found that Stern's tokens all statistically pattern outside the acceptable range for the particular phonemes. This implies that they would not be considered representative of RP by native speakers, though this would require further research into the perception side in order to confirm. While he does not pattern with the native speakers, Stern does show his ability to successfully move his own vowel spaces. This has implications for dialect acquisition work as well as phonetic research, pointing out potential limits for adult phonetic acquisition. We also improve our knowledge of performance, as this work shows evidence of hypercorrection, and emphasizes the importance of audience in any performance, be it theatrical or otherwise.

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