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Generational Differences: A Look at Dialectic Formation in Cranston, Rhode Island

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Generational Differences: A Look at Dialect Formation in Cranston, Rhode Island

Objective: To acoustically analyze the sound change of vowels before /r/ in Rhode Island

Abstract:

In most dialects, the pronunciation of the words *bear* and *beer* is different. However, dialects found in Charleston, SC and New Zealand merge the vowel sounds found in these words. In both locations, it appears that there is a sound change in progress, resulting in different pronunciations among generations. Cranston, RI may also have this merger and may be undergoing a sound change as well.

To explore this possibility, acoustic recordings and analyses have been made of 18 participants from Cranston. Each participant produced different pairs of words that contained the vowels heard in *beer* and *bear*. Three different age groups (over 50, 18-26, and 8-12) have been studied to see if there is a difference in the way people of different ages pronounce these vowels. In New Zealand it appears that the merger of these vowel sounds is new. Older adults are more likely to distinguish these vowels than younger generations. In Charleston, the opposite is true; older adults are more likely to merge these two vowel sounds than younger generations. This is indicative that the merger is reversing, going against the theory that mergers cannot be reversed (Garde's Principle).

From the acoustic analysis, it appears that Cranston is following the same pattern as Charleston. The participants over 50 merge these vowel sounds, the young adults either have a complete merger or merge the vowel sounds inconsistently, and children are distinguishing between these vowels. Thus, the merger peculiar to this geographic area is disappearing. A perception study has also been completed to see if the participants consider words containing the vowels in *bear* and *beer* to be the same. Results indicate that the majority of older adults (male and female) and male young adults perceive a merger of these sounds and female young adults and children (male and female) perceive a difference between these vowels.

Dialects vary significantly across the United States. If one were to listen to a speaker from New York and then a speaker from Texas, one would definitely notice a difference in the two speakers' dialects because the speakers are not from the same dialect region, a geographic area that shares similar linguistic features, as determined by dialectologists. In addition to vocabulary, dialectologists also study the different pronunciation of sounds among regions. An area where speakers produce the /r/ at the end of a word such as *car* is considered a different dialect region from an area where speakers do not (Labov, Ash, & Boberg 2005).

Language changes over time and dialects, which are variations of a language, as a result also change (*e.g.*, Labov, Ash, & Boberg, 2005; Wolfram & Schilling-Estes, 2006).

Pronunciation of words or vowels can change within a dialect. These changes take place within a language and, due to these changes, different pronunciations among generations can result. Older generations retain the old pronunciations while younger generations exhibit the change. Language change spreads through the language from one item to another and through the population from one individual to another. Research on change through the population has indicated the importance of gender in language change (Jacewicz, *et al*, 2011; Wolfram & Schilling-Estes, 2006). As will be discussed further in this paper, females tend to be the leaders of language change. Many sound changes within a dialect region pertain to vowel sounds. Pronunciations of vowels, especially vowels pronounced before /r/, have been of great interest to many linguists and researchers.

Much research has been done on the production of vowels before /r/ in the United States. Labov (1994) identified five different systems in the United States based on how vowels before /r/ are produced. He looked at pronunciation of the four vowels found in the words *Mary*, *merry*, *marry*, and *Murray*. In some areas these sounds tend to be merged and the distinction among the vowels is not made and in some areas these vowels are distinguished. The “systems” that Labov found are system I (New York City, the South, and areas of New England) which shows a distinction among the four different vowels; system II (Maine and Northern New Jersey) which has a merger of *Mary* and *merry*; system III (Western United States and the midland states- Ohio, Indiana, Illinois, Missouri, eastern Kansas) which has a merger of *Mary*, *merry*, and *marry*; system IV (a few areas in the West) which has a merger of all four vowels; and lastly, system V

(Philadelphia) which has a merger of *merry* and *Murray* but distinguish *Mary* and *merry* (Labov, 1994).

To differentiate among the different speech sounds produced in language, phoneticians and dialectologists use phonetic transcriptions. The International Phonetic Alphabet is used to transcribe speech sounds heard in a language and is the most widely used transcription system. Each individual speech sound has a corresponding transcription symbol. The transcription of vowels before /r/ has traditionally been a topic of discussion. A variety of names have been used to refer to these vowels such as vowels before intervocalic /r/ (Labov, 1994), rhotic diphthongs (Baumann-Waengler, 2009), and r-colored vowels (Ladefoged, 2006). In addition, in different versions of the International Phonetic Alphabet, the transcription of some vowels before /r/ has undergone revisions. This indeterminacy is also apparent in phonetic textbooks. For example, in the third edition of *Clinical Phonetics* by Shriberg and Kent (2003) the vowel heard in the words *here* and *weird* is transcribed as /ɪ/ (hid) and the vowel heard in *care* and *air* as /ɛ/ (head). In *A Course in Phonetics*, Ladefoged (2006) transcribes the vowel heard in *here* as /ɪ/ and the vowel heard in *hair* as /ɛr/. In *Fundamentals of Phonetics*, Small (2005) appears to use the same transcription system as Ladefoged (2006). Small transcribes the vowel in *beer*, *fear*, and *mere* as /ɪ/ and the vowel heard in *bare*, *fair*, and *mare* as /ɛr/. A more current book, *Introduction to Phonetics and Phonology* by Bauman-Waengler (2009), transcribes the vowel in *beer* and *here* as /ɪ/ and the vowel in *beer* and *hair* as /ɛ/. Based upon the various transcriptions some vowels before /r/ have been assigned, it is clear that there has been much debate regarding these transcriptions.

The production of speech sounds can be objectively measured by acoustic analysis, which provides visual representations of the patterns of energy in speech sounds (formants). Peterson and Barney (1952) were among the first researchers to study the production of vowels via acoustic analysis. They recorded 76 speakers (33 men, 28 women, and 15 children) saying a list of words beginning with /h/ and ending with /d/ with different vowels in between and performed acoustic analysis on these vowels. Another group of 10 participants listened to the recorded lists of the speakers and tried to identify the word they heard. In nearly every instance, the vowel was identified as the intended vowel. Measurements of formants, which are the resonances of the vocal tract and are the result of the shape of the vocal tract during production, were obtained for each vowel. Peterson and Barney (1952) noted a strong relationship between a vowel and the resulting formant frequencies. They used this information to identify the average formant values for the first three formants of ten different American English vowels. Each vowel maps onto a certain range of values for each formant (F_1 , F_2 , and F_3). For example, Peterson and Barney (1952) note that for an adult male, the average F_1 value is 270 Hz for the vowel /i/ (as in the word “feet”) and the average F_2 value is 2290. Thus, if a male speaker produces a vowel that has these measurements for the F_1 and F_2 values, then one can tell the vowel being produced is /i/ (as in the word “feet”) without even listening to the production. Peterson and Barney (1952) noted, however, that range of formant values differs for men, women, and children. Men typically produce lower formant values than females and children typically have the highest formant values. Usually, the first two formants (F_1 and F_2) are sufficient to identify vowels (Peterson and Barney, 1952).

The study by Peterson and Barney (1952) is perhaps one of the most well known acoustic studies of speech. Authors Hillenbrand, Clark, Getty, and Wheeler (1995) stated in their journal article *Acoustic characteristics of American English Vowels* that “The PB measurements have played a central role in the development and testing of theories of vowel recognition” (Hillenbrand *et al.*, 1995, p. 3099). Hillenbrand *et al.* (1995) replicated Peterson and Barney’s study to compare their findings to those of Peterson and Barney. Hillenbrand *et al.* (1995) noted some differences in the production of vowels by speakers in the two studies and attributed these discrepancies to the amount of time that passed between the two studies (roughly 40 years) because “significant changes in speech production can occur over a period of several decades” (Hillenbrand, *et al.*, 1995, p. 3107). Hillenbrand, *et al.*, (1995) also noted that Peterson and Barney did not account for the possibility of differences in acoustic analysis based on variation in the production of vowels regionally (Hillenbrand, *et al.*, 1995).

Clark and Hillenbrand (2003) attempted to clarify a way to transcribe vowels heard before /r/ by examining the way people pronounced words such as *beer* and *bear* and acoustically analyzed the results to see which vowels were being produced. They were looking to see if the vowel in *beer* was produced closer to the vowel found in /i/ (bee) or /ɪ/ (beet) and if *bear* was produced closer to the vowel found in /e/ (hate) or /ɛ/ (head). They studied a group of participants ranging in age from 18 to 28 from Southern Michigan, who were asked to say a series of words that contained front vowels before /r/ and also a series of words that contained the same front vowels; however this set of words was not followed by /r/. Front vowels are produced when the highest portion of the tongue is in the front of the mouth during the production of the vowel. The vowels /i/

(bee), /ɪ/ (bit), /e/ (hate), and /ɛ/ (head) are examples of front vowels. Words that were used in the first set included but were not limited to: *beer*, *be-er*, *hear*, *bear*, *Bayer* and words in the second set included words such as: *bead*, *beet*, *bid*, and *bit*. The authors recorded all of the talkers and acoustically measured the resulting formants of the vowel production of each speaker and plotted their results in formant charts. Clark and Hillenbrand (2003) noted that the way their speakers produced the vowels in words like *beer* and *hear* would fall between the tense-lax pair /i/ (bee) and /ɪ/ (bit) and that words like *bear* and *hair* appeared to be more similar to /e/ (hate) rather than /ɛ/ (head) when produced by this set of speakers (Clark & Hillenbrand, 2003).

Clark and Hillenbrand's (2003) findings showed that their speakers are definitely distinguishing between the vowels found in *beer* and *bear*. Clark and Hillenbrand (2003), along with other researchers who describe the above-mentioned International Phonetic Alphabet transcriptions (*e.g.*, Ladefoged, 2006; Baumann-Waengler, 2009), did not address the possibility that speakers could pronounce *bear* and *beer* the same. Although this merger is not typically seen in mainstream English and is apparently absent in southern Michigan, it has been found in some English speaking regions across the world, including Charleston, South Carolina, New Zealand, East Anglia, and New Foundland.

Maciej Baranowski (2007) has provided documentation that Charleston has the unique merger of the vowel sounds heard in words like *beer-bear*, *here-hair*, or *fear-fair*. However, Baranowski found that older generations in the area are more likely to have this merger than younger generations. Baranowski analyzed the production of these vowels in 100 participants from Charleston and discovered that all of the participants

above seventy years old had no distinction between the two vowels. People in the age range of fifty to seventy years old had some distinction between the vowels but not enough for them to perceive a difference. Lastly, participants under the age of fifty tended to have a clear distinction between the vowels. Baranowski determined age as the only significant factor relating to this merger (Baranowski, 2007).

The finding that older residents in Charleston have this merger and younger residents do not is a unique one and has had researchers puzzled, since it contradicts Garde's Principle, the idea that mergers cannot be reversed. Baranowski (2007) questions whether Charleston, SC has had a complete merger of these vowel sounds throughout their dialect history. Unfortunately, no one knows for sure if the words *beer* and *bear* were merged 100% of the time in the history of the dialect of Charleston. Baranowski points out "there is not enough evidence to exclude the possibility of a near-merger in the traditional dialect, which has now unmerged" (Baranowski, 2007, p. 122). If this were true, then it would not contradict the Garde's Principle. However, if Charleston has always had a merger of these two vowel sounds and is now moving away from the merger, then it would contradict Garde's Principle.

Charleston, SC is not the only place that this merger is seen. Residents of East Anglia, Newfoundland, and New Zealand also have the words *beer-bear*, *fear-fair*, *hear-here* as homophones (Labov, 2010). However, the merged form sounds different in one region that merges these sounds when compared to another region that merges these sounds. For example, Baranowski notes that people of Charleston, SC pronounce the vowels closer to the typical vowel heard in *bear*, *fair*, and *hair*, /ɛɪ/, whereas speakers of

New Zealand English typically produce the vowels closer to the vowel typically heard in *beer*, *fear*, and *here* /ɪɪ/ (Baranowski, 2007).

Charleston and New Zealand differ in another way with respect to this merger.

As discussed above, Baranowski observed that the merger between *beer* and *bear* is seen mostly in the speech of older adults in Charleston and children are beginning to distinguish the two words. This is not true of New Zealand. Younger generations in New Zealand are the ones who seem to be merging these sounds. It appears that this merger has been slowly developing in New Zealand for many years. Authors Maclagan and Gordon (1996) give readers an example of a poem written from the 1920s in their article *Out of the AIR and into the EAR: Another View of the New Zealand Diphthong Merger*:

Ah, happy halls! and chiefly thou.

O club, particularly **dear!**

(But not thy tariff; I allow

Thy dues were, after all, most **fair.**

(Alpers 1923:32)

This poem provides readers with evidence that *dear* and *fair* must have rhymed at that time, thus supporting the theory that this merger has been occurring for some time.

Maclagan and Gordon (1996) note that New Zealand is undergoing a vowel shift, meaning that vowel production is changing. It seems that the vowel heard in the words *fair* and *bear* is being produced closer to the vowel heard in *fear* and *beer* in dialects that distinguish these sounds. Therefore in New Zealand the word *air* is produced with the same vowel that is typically heard in the word *ear* (Maclagan & Gordon, 1996, p. 146).

In all of these locations, it is the age of the participants that seemed to show the most variability among the speakers (Labov, 2010; Baranowski, 2007; Maclagan & Gordon, 1996). In Charleston, younger speakers distinguished the two vowel sounds while older speakers had a merger. In New Zealand, the opposite is true; older speakers are more likely to have some form of a distinction and the younger speakers merge the two sounds. The production of vowels by younger generations is very important because, when compared to adult's production, it shows sound changes that have taken place.

Because the speech of children can indicate if a sound change is occurring within a region, Jacewicz, Fox, and Salmons (2011) studied regional dialect variation in the vowel systems of children. Their study looked at the production of vowels in ninety-four children ranging in age from eight to twelve and ninety-three adults ranging in age from fifty-one to sixty-five. All of the participants were from one of three regions in the United States: North Carolina, Ohio, or Southeastern Wisconsin, areas chosen because they are believed to differ from one another with respect to vowel production.

Participants were asked to read a series of words including *heed* and *hid*. Each word was repeated three times and the production of the words was acoustically analyzed.

Researchers looked at the first two formants, the trajectory length (reflecting the extent of tongue and jaw movement), and the duration of the vowel. Results showed that children do acquire dialect specific features that are seen in adults. However, it is noted that in all three regions, children did have slightly different acoustic patterns than the adults. For example in the three dialect regions, the trajectory length for vowels /i, ɪ, æ/ (except for NC /i/ and WI /æ/) was reduced. This was not found in any adults and leads to the

conclusion that children are participants in the process of language change (Jacewicz, *et al.*, 2011).

Children's acquisition of language begins with their mother or female caregiver's speech. After a few years, children learn to talk differently from their female caregivers and will begin to adopt the language patterns heard in peer groups. Jacewicz *et al.* (2011) note that "children have the capacity to detect the sound system of their speech community and prefer this system over that which they first acquired from their caretakers" (Jacewicz, *et al.*, 2011 p. 449). Barnaowski (2007) also believes that peer groups have a strong linguistic effect among children. Baranowski (2007) suggests that peer pressure might result in a young adult trying to distinguish the two vowel sounds or substituting their intended word with a synonym, so they are not teased or made fun of by other peers. For example, a young adult might call a *beer* a *brew* so he or she is not teased for saying *beer* and *bear* the same (Baranowski, 2007).

Other possible explanations as to why this merger is not found in the younger speakers of Charleston are the influx of migration to the area, as well as the influence on a child's life from a person who does make the distinction (Baranowski, 2007). A person who might have enough influence on a child's speech would be a teacher, especially an elementary school teacher. If the results from Jacewicz *et al.* (2011) are correct in implying that females lead linguistic change (discussed below) then it is not so unreasonable to assume that a child from Charleston who has had mostly female teachers that do not merge the vowel sounds might acquire this distinction between the vowels, even if his or her parents merge these sounds.

Jacewicz, Fox, and Salmons (2011) not only looked at the differences in

production across the regions but they also looked at the differences with respect to gender within a region. They found positional differences between the vowels produced by males and the vowels produced by females. Authors note from the positional differences that females are making more advanced changes than males, supporting the theory that females are the leaders in language change (Jacewicz, *et al.*, 2011).

Labov (1990) identified three principles regarding gender and language variation (Labov, 1990). Principle II states “In change from below, women are most often the innovators” (Wolfram & Schilling-Estes, 2006 p. 237). Change from below refers to changes made within a language that the speaker is not conscious of, including the production of a vowel (Wolfram & Schilling-Estes, 2006). For instance, a young girl from Charleston, SC might produce the word *beer* differently from her mother, yet she might not be aware of this difference; thus this young girl is exhibiting the sound change that is taking place.

Many theorists believe one’s perception of speech is linked directly to one’s production (*e.g.*, Liberman, 1985). Understanding how speakers perceive the sounds of their language is important in establishing the existence of phonological contrasts. Clark and Hillenbrand (2003) not only noted the way in which speakers produced front vowels before /r/ but also conducted a listening test that demonstrated the ways in which front vowels are perceived. They played the recordings of the high front vowels spoken by their talkers from the first research experiment (discussed above) to a group of 16 listeners, who were all from the same dialect group as the talkers. The authors did not play the entire word (*i.e.*, beer), but only the production of the vowel. All of the participants for this portion of the study were familiar with phonetic transcriptions of

vowels. The listening test was limited to just the words containing the high front vowels such as *beer* or *hear*. The participants were played the vowel and asked to identify the vowel as either /i/ or /ɪ/, although other options were available such as /e/ or /ɛ/ for the participant to choose. The majority of the listeners heard the vowel in *beer* as /i/ and the remaining listeners heard the vowel as /ɪ/ (Clark and Hillenbrand, 2003). Importantly, however, participants did not hear the vowel produced in *beer* as the same vowel produced in *bear*. The speakers from Clark and Hillenbrand's study do not merge these two vowel sounds; instead they show a clear distinction between the vowels in perception as well as production. Thus the participant's perception matched their production.

If Clark and Hillenbrand had speakers from Michigan and listeners from Charleston instead of Michigan, their results would have been different. Older residents of Charleston and younger residents of New Zealand merge the two vowels found in *beer* and *bear*. Therefore, when one is listening to them talk, one must rely on context clues to determine which word they mean. Labov (2010) mentions a 42-year-old female participant from Charleston who believes she distinguish the words *bear* and *beer*. She reports that when she says *bear* sometimes people will ask her if she means *beer* the beverage or *bear* the animal. She discusses her frustration with this because she knows when she is saying *beer* or *bear*, yet others cannot perceive a difference (Labov, 2010). Thus this participant's perception does not match her production because she perceives the two words as different yet produces them the same.

This merger of *beer* and *bear* is not often seen in dialects of English. Charleston, SC and New Zealand seem to be the exception to mainstream English dialects. One has to wonder if there are other regions within English speaking dialects that also have this

merger. This author believes she does in fact merge these vowels and has observed that many people from her hometown, Cranston, RI, have this merger as well. The following study takes a close look at the production through acoustic analysis, and perception of these vowels by male and female participants varying in age (8-12 years old, 18-26 years old, and over 50 years old) from Cranston, RI.

Methods

Participants:

6 participants over the age of 50 (3 males, 3 females)

6 participants between the ages 18 and 26 (3 males, 3 females)

6 participants between the ages 8 and 12 (3 males, 3 females)

The study included a total of 18 participants (9 male and 9 female) from Cranston, RI. Participants have lived in Cranston for the majority of their life (the exception being college and service in the Navy). Many of the participants' parents were natives of Cranston, RI.

Materials:

Nine pairs of words were used to determine if the participant merges or distinguish the vowels in *beer* [ɪ] and *bear* [ɛ]. The nine pairs of words were: *bear/beer*, *Claire/clear*, *dare/dear*, *fair/fear*, *hair/here*, *mare/mere*, *Nair/near*, *pear/peer*, and *where'd/weird*. To provide comparison for the r-colored vowels, anchor words containing the front vowels without /r/ in an HvD, FvD, and MvD format were also included. These 15 anchor words included: *feed*, *fid*, *fade*, *fed*, *fad*, *heed*, *hid*, *hayed*,

head, had, mead, mid, made, med, mad. The words were presented in the carrier phrase “Please say _____ again”. (See Appendix A)

Procedure

Production Study:

All participants were given 400 phrases to read (9 pairs of words containing /r/ and 15 anchor words) All words were repeated five times by the participants totaling 165 words of interest per participant. The remaining 235 phrases were used as fillers.

Acoustic Analysis:

All recordings were made on a Handy Recorder H2 Zoom recorder that was placed approximately ten inches in front of the participant. The recordings were acoustically analyzed using the computer program PRAAT, which allows users to edit recordings and isolate each word of interest. The onset and offset of the vowel for each word were marked and measurements were made of the first two formants at four different locations within the vowel: onset, one-third of the way through, midpoint, and offset. Some of the target words can be produced as a diphthong, meaning two vowel sounds are produced for the vowel (Baumann-Waengler, 2009). Therefore, measurements were also made at one-third of the way through the vowel so an accurate measurement could be obtained before the shift to the following vowel sound. This has been found to give accurate readings for vowels for the Rhode Island dialect area (Magen, 2003; Whalen, Magen, Pouplier, Kang & Iskarous, 2004). The researcher computed all formant measurements in an Excel spreadsheet for each participant.

Perception Study:

After the production study of the experiment was completed, participants were asked to fill out a short questionnaire regarding how they produce the vowels found in the pairs of words. The questionnaire very simply asked if they pronounce the pairs of words as the same or different. If they pronounce *beer* and *bear* the same they circled “same”; if they pronounce them differently then they circled “different”. Words that are obviously pronounced the same (*i.e.*, *week* and *weak*) and differently (*i.e.*, *neck* and *noodle*) were also included on the questionnaire to make sure participants understood the task. A copy of the questionnaire used can be found in Appendix B.

Results***Acoustic Analysis***

A summary of the results of all participants’ acoustic analyses can be found in Table 1. The name of the participant relates to the participants age group and gender (M, F). Table 1 summarizes whether word pairs were merged, inconsistently merged, or distinguished. Inconsistently merged refers to instances where the vowel sounds were merged in some of the repetitions of the words but not every repetition. A more detailed description will follow. The general finding that emerged shows older adults are not distinguishing between these vowels and children are. Like older adults, male young adults seem to have a complete merger of the vowels while female young adults seem to merge these vowels inconsistently. Within the older adult age group and the children, there seem to be some exceptions to the general finding.

Table 1. PRODUCTION

Participants	Bear/Beer	Claire/Clear	Dare/Dear	Fair/Fear	Hair/Here	Mare/Mere	Nair/Near	Pear/Peer	Where'd/Weird
Adult M1	3	2	2	2	3	2	3	2	3
Adult M2	1	1	3	3	1	1	1	1	1
Adult M3	1	1	1	1	2	1	1	1	1
Adult F1	1	1	1	1	1	1	1	1	1
Adult F2	1	1	2	1	1	1	1	2	1
Adult F3	1	1	2	1	1	1	2	1	1
Young Adult M1	1	1	1	1	1	1	1	1	2
Young Adult M2	1	1	1	1	1	1	1	1	1
Young Adult M3	1	1	1	1	1	1	1	1	1
Young Adult F1	3	2	3	3	3	2	2	2	2
Young Adult F2	2	3	3	3	3	3	3	3	3
Young Adult F3	2	3	3	3	2	2	3	3	3
Child M1	3	3	3	3	3	3	2	2	3
Child M2	3	3	3	2	3	2	2	2	3
Child M3	3	3	3	3	3	2	2	2	2
Child F1	3	3	3	3	3	3	3	3	3
Child F2	3	3	3	3	3	3	3	3	3
Child F3	3	3	3	3	3	3	3	3	3

1=MERGED

2=MERGED SOMETIMES, NOT EVERY REPETITION

3=DISTINGUISHED

Violet coloring of numbers indicates the word pairs produced by the children that were not studied closely.

In the following figures, one will notice an unusual pattern of the anchor vowels /e/ and /i/. In most figures, the vowel /e/ is further forward and in some cases higher than the vowel /i/. This is unusual because typically /e/ is lower and further back than /i/ (e.g., Peterson and Barney, 1952; Clark & Hillenbrand, 2003) but this unusual pattern has been observed in this dialect region (Magen, 2003).

Older Adult Participants

The acoustic analysis of the older adults (over 50) in Cranston, RI revealed that four of the six adults in this age group have a complete merger for the vowel production of /eə/ and /ɪə/, meaning that the words *bear* and *beer*, as well as the other pairs of words, are produced as homophones for these four participants (Adult M3, Adult F1, Adult F2, Adult F3). Figure 1 shows a graph representing the formant values measured in the vowels produced in *pear* and *peer* by Adult M3 and shows how they relate to the vowels produced in *feed*, *fid*, *fade*, *fed*, and *fad*. The x-axis of the graph displays the measurements recorded for the second formant, roughly corresponding to the horizontal position of the tongue, and the y-axis of the graph displays the measurements recorded for the first formant, roughly corresponding to vertical position of the tongue. As one can tell from looking at the graph, Adult M3 produces the words *pear* and *peer* with the exact same vowel for all productions of these words. The symbols representing the word *pear* overlap with all of the symbols representing the word *peer*. The production of the vowels in both of these words falls between the production of the vowels /e/ *fade* and /ɪ/ *fid* but is somewhat closer to the vowel production of /e/ *fade*.

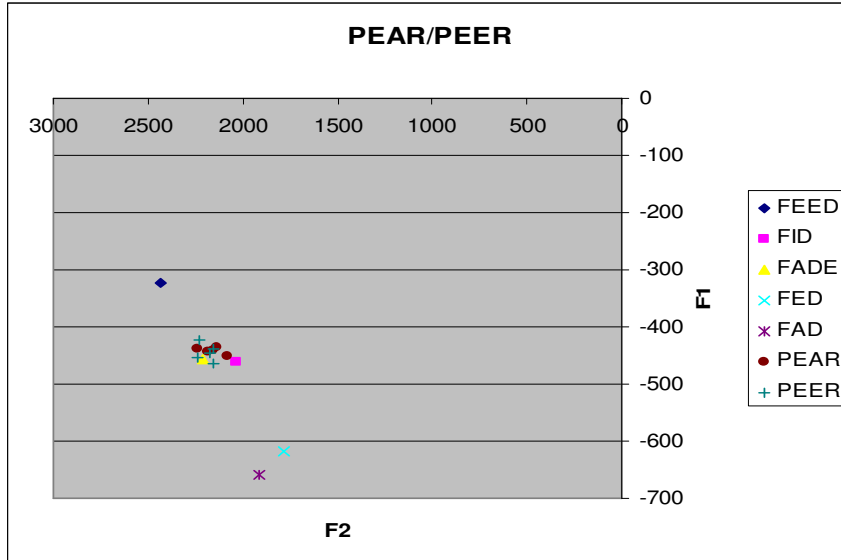


Figure 1. Production of *pear* and *peer* one third of the way through the vowel by Adult M3.

The results recorded from Adult M3 were consistent with the results from the other older adult participants, with the exception of one male. The three older adult female participants have a complete merger of these sounds. Figure 2 displays the formant measurements one third of the way through the vowel in *Nair* and *near* by Adult F2. As with Figure 1, the two target words overlap each other and fall between /e/ (made) and /i/ (mid) but somewhat closer to /e/.

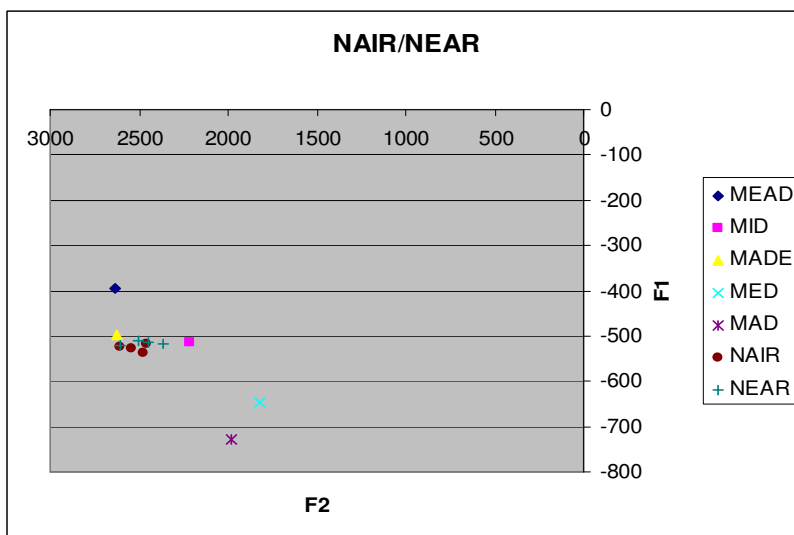


Figure 2. Production of *Nair* and *near* one third of the way through the vowel by Adult F2.

Figures 3 and 4 represent the formant values measured for the oldest adult participant (Adult M1 who is 90 years old) in the production of some words. This participant showed different results from most of the other older adult participants. Figure 3 displays the formant values for the production of the words *where'd* and *weird* by Adult M1. The symbols representing the words *where'd* are not overlapping with symbols representing the words *weird* in Figure 3. This means that the participant distinguishes the two words and does not produce them the same. The vowel heard in *weird* is produced between the vowel /i/ (heed) and /ɪ/ (hid) and the vowel produced in *where'd* is produced closest to /e/ (hayed), thus the words *weird* and *where'd* are produced differently by this speaker. What is perhaps most interesting about Adult M1 is that he does not distinguish these vowel sounds across all word pairs. Figure 4 displays the formant values measured for his production of the words *pear* and *peer*. Although there is not as much overlap noted as with the other adult participants, there is some. The formant values of the vowel in *peer* fall between /i/ (feed) and /ɪ/ (fid) and the formant values of the vowel in *pear* fall around /ɪ/ (fid) and /e/ (fade) with some overlap around /ɪ/ (fid) with the production of both words. The same can be said of his production of the words *mare* and *mere*. As can be seen in Table 1, the words are inconsistently merged in some word pairs but distinguished in others.

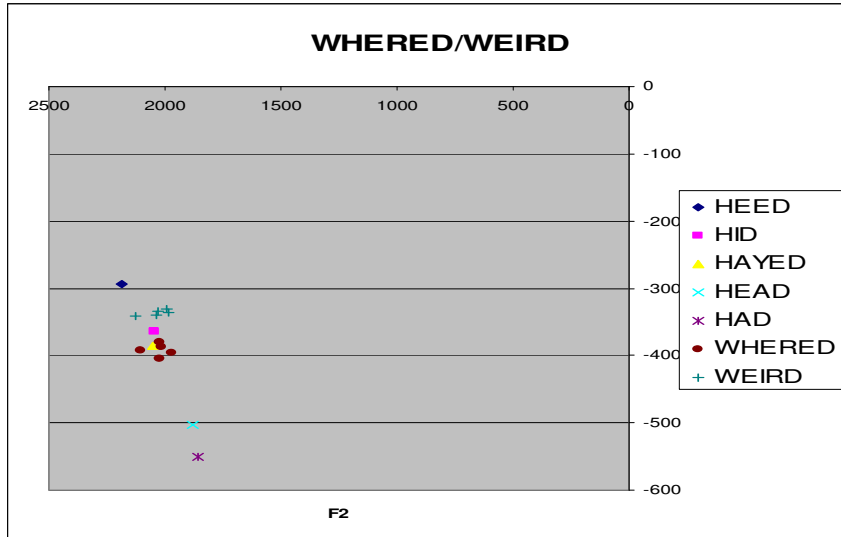


Figure 3. Production of *where'd* and *weird* one third of the way through the vowel by Adult M1. This participant is distinguishing between the two words.

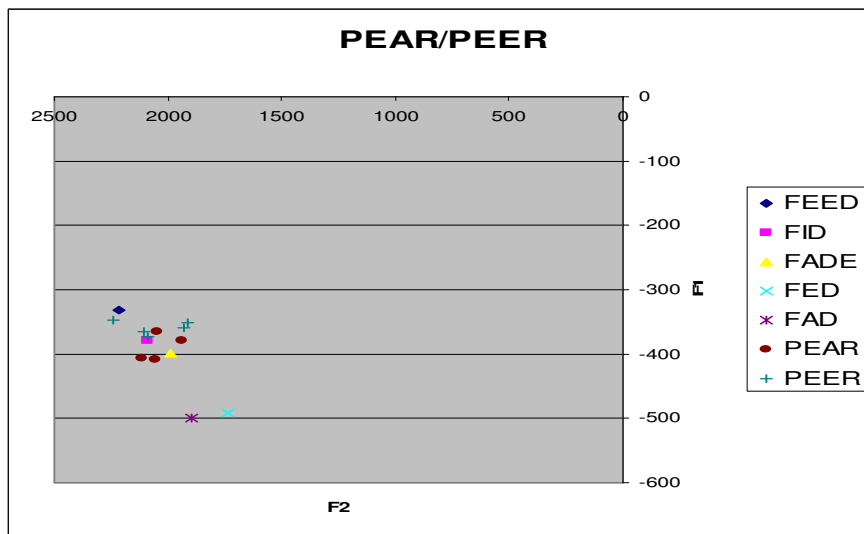


Figure 4. Production of *pear* and *peer* one third of the way through the vowel by Adult M1. There is some overlap of the symbols for *pear* and *peer*.

Adult M2 had a complete merger of all of the pairs of words except for the pairs *fair-fear* and *dare-dear*. Figure 5 shows the graph of the production of *fair-fear* and Figure 6 shows the production of *where'd-weird* by Adult M2. In Figure 5 it is clear that he distinguish these vowel sounds and in Figure 6 it is clear that he merges these vowel

sounds. In all productions of the pairs of words with the exception of *fair-fear* and *dare-dear* he merges the vowel sounds consistently.

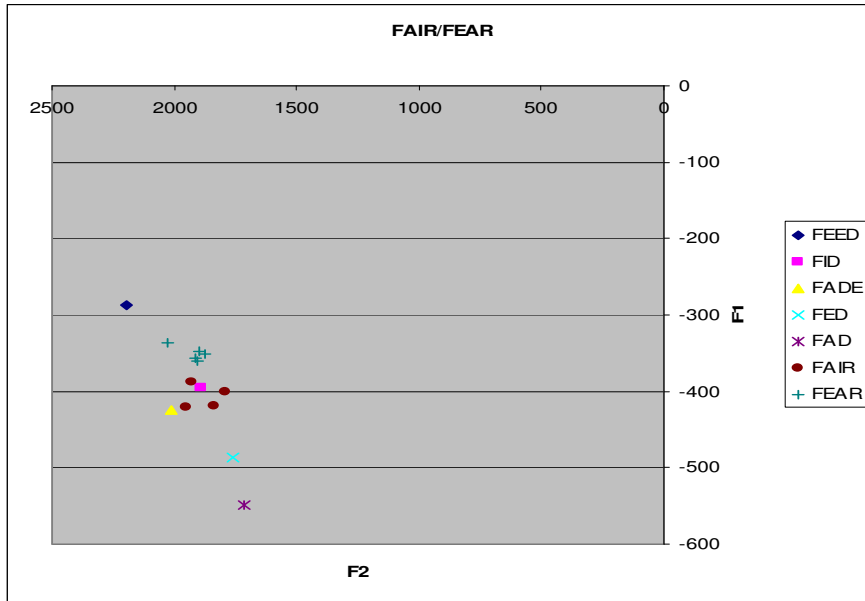


Figure 5. Production of *fair* and *fear* one third of the way through the vowel by Adult M2. This participant is distinguishing between *fair* and *fear*.

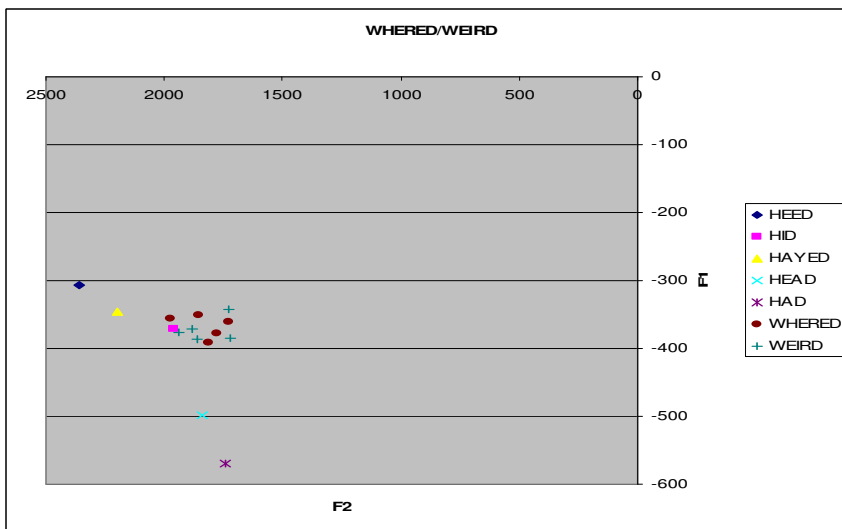


Figure 6. Production of *where'd* and *weird* one third of the way through the vowel by Adult M2. There is overlap between the symbols for *where'd* and *weird*.

Young Adults Participants

The data pertaining to the young adult participants (ages 18-26) produced equally interesting results. All three of the male young adult participants appear to have a complete merger of these two vowel sounds. Figure 7 displays the formant values found in the production of the words *beer* and *bear* by Young Adult M2. As with the majority of the older adult participants, the formant values for *beer* overlap with the formant values for *bear*, thus this participant pronounces the words *beer* and *bear* the same. This pattern was also observed in all of the other word pairs produced by the male young adult participants. As with the older adult participants, the production of the vowel heard in these words is closest to /e/ (fade). This seemed to be the general pattern of all of the male young adult participants except for a few instances where the vowel was produced closer to /i/ (fid) than /e/ (fade). However, the vowel produced in both of the target words was merged. Figure 8, which displays *where'd/weird*, is a representation of this.

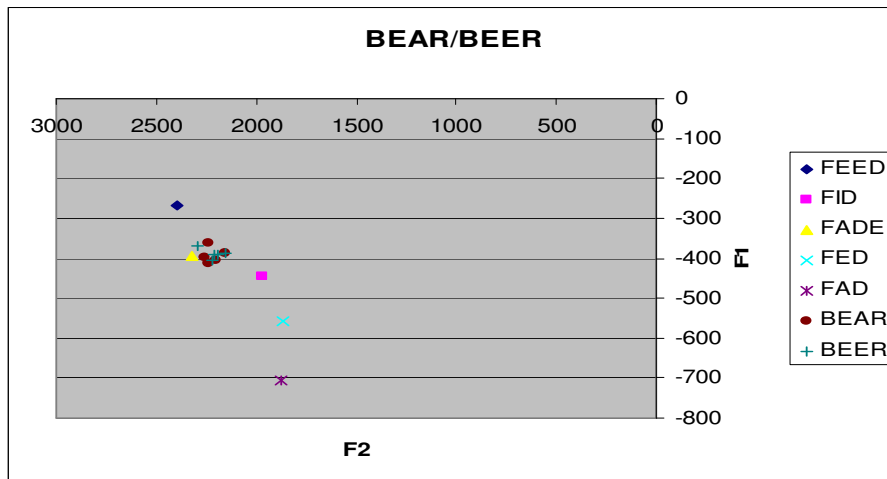


Figure 7. Production of *beer* and *bear* one third of the way through the vowel by Young Adult M2, indicating a merger.

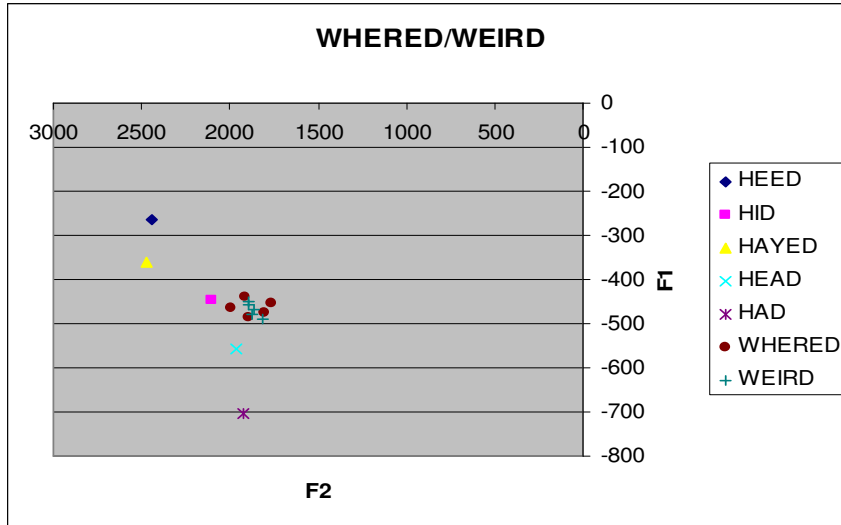


Figure 8. Production of *weird* and *where'd* one third of the way through the vowel by Young Adult M2 indicating a merger.

Whereas it appears the male young adult participants have a complete merger of the two vowels, it appears that the female young adult participants show some evidence of a merger. The production of the vowels in *beer* and *bear* is merged sometimes but not all the time. However, the female young adults are not consistent with the pairs of words they merge sometimes, as can be seen in Table 1. For example Figure 9 shows the formant measurements of the vowel in *fair* and *fear* by Young Adult F3. From the display, it is clear that this female is distinguishing between the two words. The vowel in *fear* is produced close to the production of /i/ (feed) and the vowel in *fair* is produced close to the production of /e/ (fade) and /ɪ/ (fid), as would be expected. Figure 10 shows the production of the words *hair* and *here* by Young Adult F3. The production of the vowels heard in *hair* and *here* fall between the vowels /i/ (feed) and /ɪ/ (fid) with overlap of the two different words. Even though it is the same vowels produced in *fair* and *fear*, she merges the two vowel sounds at times.

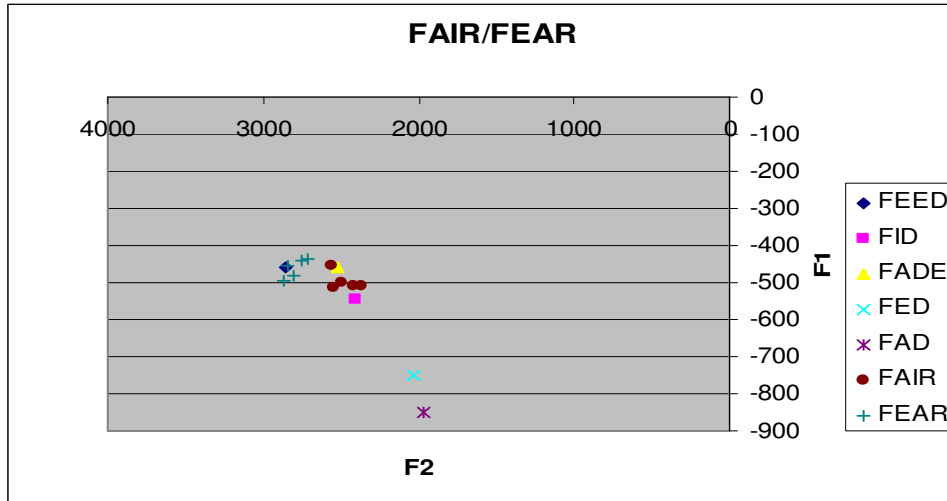


Figure 9. Production of *fair* and *fear* one third of the way through the vowel by Young Adult F3. This participant is distinguishing between the words.

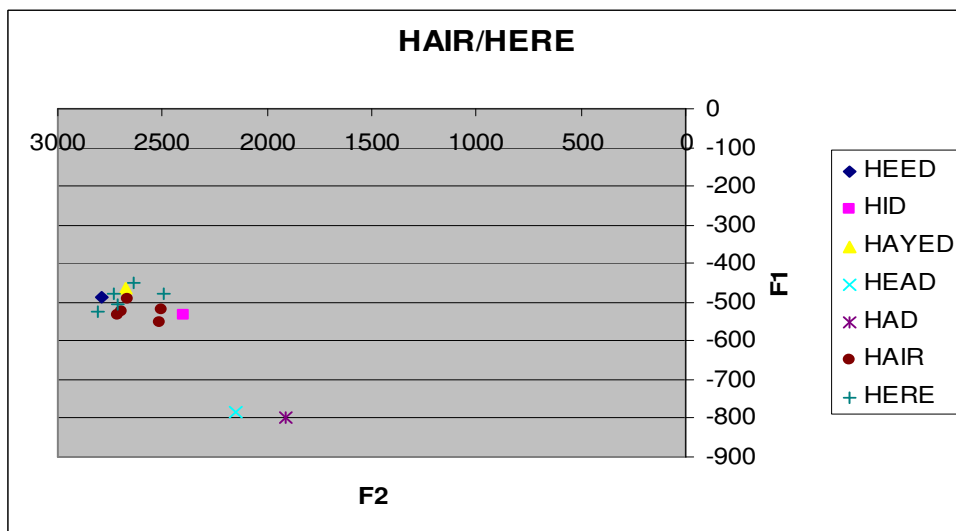


Figure 10. Production of *hair* and *here* one third of the way through the vowel by Young Adult F3. The vowel sounds are inconsistently merged. Note some overlap between the vowels.

Another interesting result from the female young adults is the lack of a pattern among the words that are either distinguished or merged inconsistently. Note that in Table 1 there is not a single word pair where there is an inconsistent merger (indicated with a 2) by the three female young adult participants. Figures 10 and 11 illustrate the variability. Figure 11 shows the production of *hair* and *here* by Young Adult F2.

Whereas Young Adult F3 inconsistently merges the vowels in *hair* and *here* (Figure 10), the female represented in Figure 11 clearly distinguish these two words.

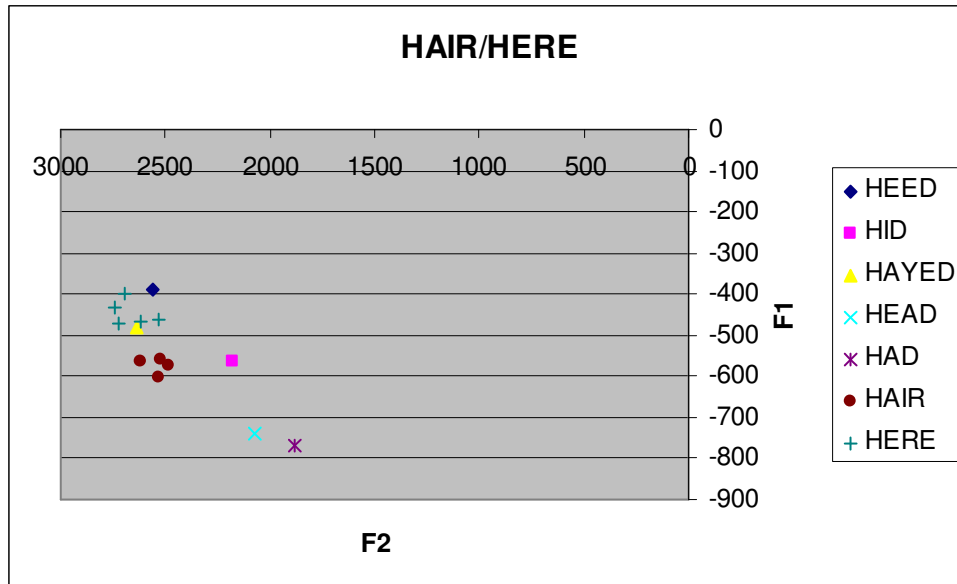


Figure 11. Production of *hair* and *here* one third of the way through the vowel by Young Adult F2. This participant is clearly distinguishing between *hair* and *here*.

Child Participants

The youngest group of participants (ages 8-12) showed less variability than the adult participants, although there was some. The male children distinguished the vowels in most instances. There were a few pairs of words such as *pear-peer*, *Nair-near* and *mare-mere* that showed a lot of overlap between the target words, but this could be because these words are not as likely to appear in a child's daily vocabulary as the other pairs of words. Therefore, this author decided to give more weight to the production of the other pairs of words such as *hair-here* or *dare-dear* because children are more likely to be familiar with them.

Figure 12 displays the formant values of the words *fair* and *fear* of Child M1. The vowel heard in *fear* is produced closer to the vowel /i/ (feed) and the vowel heard in *fair* is produced between the vowels /e/ (fade) and /ɪ/ (fid). Thus it is easy to see that the two words are definitely being produced differently by this male child.

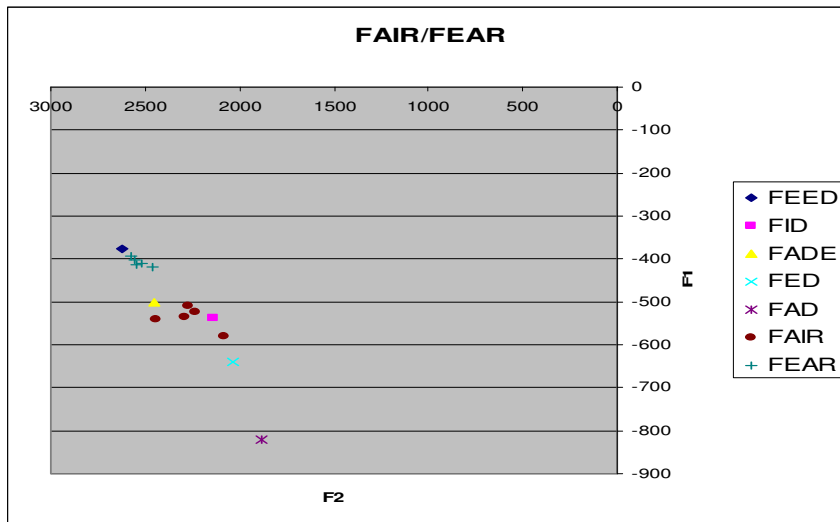


Figure 12. Production *fair* and *fear* third of the way through the vowel by Child M1. This participant is clearly distinguishing between the *fair* and *fear*.

This appears to be the general pattern of the three male children. With the exception of the pairs *Nair-near*, *mare-mere*, and *pear-peer*, and in one instance of *fair-fear*, the vowels produced in the pairs of words were different. Child M2 had some overlap between *fair* and *fear* and Child M3 had some, but not a lot of overlap between *where'd* and *weird*. However, because these children distinguish all of the other pairs of words, it could have just been a reading error.

Due to problems with the computer software, the recordings of the female children could not be acoustically analyzed, most likely because of their higher formant values. Rogue formants appeared between the first two formants during the acoustic analysis, resulting in inaccurate formant values. Recordings were played to two listeners

trained in phonetics who were not participants of this study. The two listeners were able to hear a clear difference between the words produced by the female children. These listeners also listened to words produced by some adult participants who clearly merged the vowels (according to acoustic analysis) and identified these as merged. Based on the judgments made from these two listeners as well as this author, it appears that the female children are distinguishing between the vowels found in all of the pairs of words.

Perceptual Analysis

Each participant was asked to fill out a short questionnaire after the production portion of the study was completed. This questionnaire asked the participants if they say pairs of words such as *bear* and *beer* the same or different (See Appendix B). Tables 2, 3 & 4 display the results from the perception study compared to the production study. Table 2 displays the relationship between production and perception for the individuals who have a complete merger. From looking at this table, one can see that in almost all instances (62 out of 63), people who have a complete merger perceived these words as the same. There was only one exception to this. Young Adult M3, with a complete merger of *fair-fear*, perceived the words as different. Table 3 shows the relationship of production and perception for the individuals who merge these vowel sounds inconsistently. The number of instances where perception matched production is roughly the same as the number of instances where perception and production did not match. In general, it appears that the majority (but not all) of the older adults and male young perceived these sounds as merged. Also, it appears the majority (but not all) of children and female young adults perceived these sounds as different. Table 4 displays the relationship of production and perception for the individuals who distinguish among

these vowels. In most of these instances, the participants perceive and produce a distinction. However, one will notice there are some instances where participants, Child M3 and Child F1, perceive members of word pairs as the same and produce them differently. This is known as a near merger (Labov, 1994). As one can tell from looking at Table 4, Child M3 and Child F1 have a near merger of these vowel sounds in every case.

Table 2. MERGED IN PRODUCTION

Participants	Bear/Beer	Claire/Clear	Dare/Dear	Fair/Fear	Hair/Here	Mare/Mere	Nair/Near	Pear/Peer	Where'd/Weird
Adult M1									
Adult M2	1	1			1	1	1	1	1
Adult M3	1	1	1	1		1	1	1	1
Adult F1	1	1	1	1	1	1	1	1	1
Adult F2	1	1		1	1	1	1		1
Adult F3	1	1		1	1	1		1	1
Young Adult M1	1	1	1	1	1	1	1	1	
Young Adult M2	1	1	1	1	1	1	1	1	1
Young Adult M3	1	1	1	2	1	1	1	1	1
Young Adult F1									
Young Adult F2									
Young Adult F3									
Child M1									
Child M2									
Child M3									
Child F1									
Child F2									
Child F3									

1= PERCEIVED AS MERGED (MATCHES PERCEPTION)

2= PERCEIVED AS DISTINCT (DOESN'T MATCH PERCEPTION)

Table 2 displays the relationship of production and perception for participants with a complete merger.

Table 3. SOMETIMES MERGED IN PRODUCTION

Participants	Bear/Beer	Claire/Clear	Dare/Dear	Fair/Fear	Hair/Here	Mare/Mere	Nair/Near	Pear/Peer	Where'd/Weird
Adult M1		2	2	2		1		2	
Adult M2									
Adult M3					1				
Adult F1									
Adult F2			1					1	
Adult F3			1				1		
Young Adult M1									1
Young Adult M2									
Young Adult M3						1			
Young Adult F1		2				2	2	2	1
Young Adult F2	2								
Young Adult F3	2				2	2			
Child M1							2	2	
Child M2				2		2	2	2	
Child M3						1	1	1	1
Child F1									
Child F2									
Child F3									

1= PERCEIVED AS MERGED
2=PERCEIVED AS DISTINCT

Table 3 displays the relationship of production and perception for the participants with an inconsistent merger.

Table 4. DISTINGUISHES IN PRODUCTION

Participants	Bear/Beer	Claire/Clear	Dare/Dear	Fair/Fear	Hair/Here	Mare/Mere	Nair/Near	Pear/Peer	Where'd/Weird
Adult M1	1				1		2		1
Adult M2			2	2					
Adult M3									
Adult F1									
Adult F2									
Adult F3									
Young Adult M1									
Young Adult M2									
Young Adult M3									
Young Adult F1	1		1	1	1				
Young Adult F2		1	1	1	1	1	1	1	1
Young Adult F3		1	1	1					
Child M1	1	1	1	1	1	1			1
Child M2	1	1	1		1				
Child M3	2	2	2	2	2				
Child F1	2	2	2	2	2	2	2	2	2
Child F2	1	1	1	1	1	1	1	1	1
Child F3	1	1	1	1	1	1	1	1	1

1=PERCEIVED AS DISTINCT (MATCHES PERCEPTION)

2=PERCEIVED AS MERGED (DOESN'T MATCH PERCEPTION)

Table 4 displays the relationship of production and perception for participants who distinguish these vowels.

The five older adults, all except Adult M1, who have a complete merger of these vowels, perceive themselves as saying words such as *bear-beer* or *where'd-weird* the same. Thus their perception matches their production (with the exception of Adult M2 who produced *dare-dear* and *fair-fear* the same). Adult M2, who produces *dare-dear* and *fair-fear* differently and perceives them as the same, is an example of someone with a near merger. Adult M1, who distinguishes most of the pairs of words, had interesting results. On his questionnaire, he responded that he does not say any of the words the

same except for *mare* and *mere* and *Nair* and *near*. Although it is true that he does distinguish the majority of the pairs of words, according to his acoustic analysis, he does merge *pear* and *peer* and *mare* and *mere* sometimes. It is interesting that he perceives *pear* and *peer* as different and *mare* and *mere* the same when he inconsistently merges the vowels for both pairs of words.

The male young adult participants perceived all of the pairs of words to be the same and produce them all the same, with the exception of one pair of words by Young Adult M3, who answered that he perceives *fair* and *fear* as different. This is surprising because he perceived all of the other pairs of words to be the same and his acoustic analysis shows that he does produce these words the same. Figure 13 shows the results from his acoustic analysis regarding the production of these words.

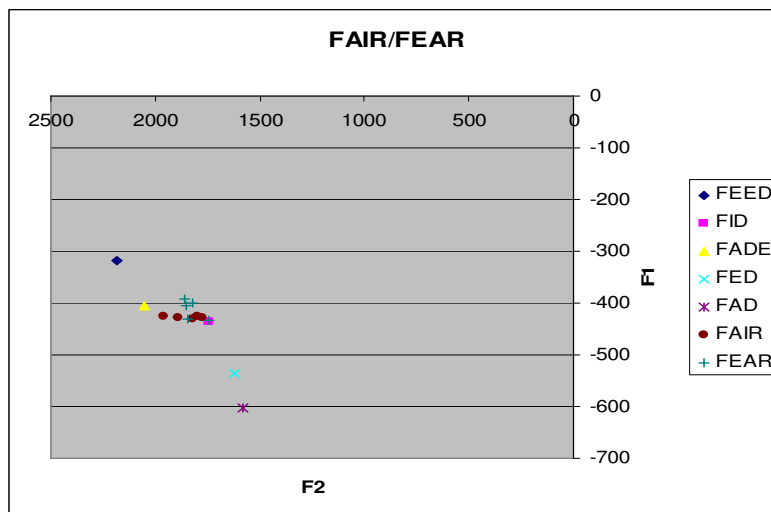


Figure 13. Production *fair* and *fear* one-third of the way through the vowel by Young Adult M3. This participant is merging these vowel sounds.

All three female young adult participants perceive all of the pairs of words as different, with the exception of one female and one pair of words. Young Adult F1 perceives the words *where'd* and *weird* the same; however, acoustic analysis shows that

she distinguish them. Figure 14 shows the graph displaying the acoustic analysis results for the words *where'd* and *weird* by Young Adult F1. This also occurs with the two other young adult female participants. There are instances where the females inconsistently merge the vowels, yet they perceive these words as different.

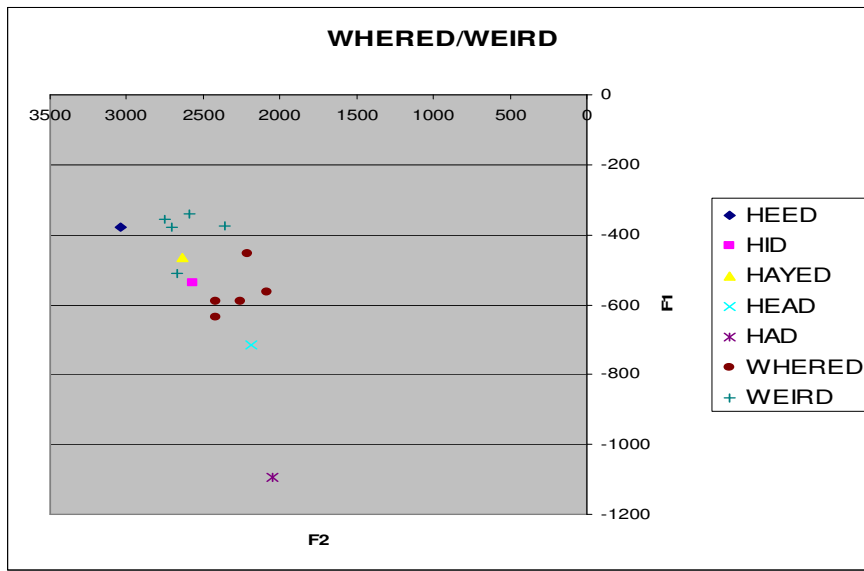


Figure 14 Production of *where'd* and *weird* one third of the way through the vowel by Young Adult F1. This participant distinguish *where'd* and *weird*.

The children filled out the same questionnaire as the adults. Four of the six children perceived all of the pairs of words to be different. For the remaining two children, Child M3 and Child F1, the pairs of words were perceived the same. This is an interesting finding, because according to the acoustic analysis of Child M3, he produces the words differently, thus another example of a near merger. Figure 15 shows the graph displaying the formant values for the vowels in the words *Claire* and *clear* by Child M3. As one can tell from looking at the graph, the two vowels are produced differently. The vowel in *clear* is produced between /i/ (heed) and /e/ (hayed) and the vowel in *Claire* is produced between /i/ (hid) and /ɛ/ (head). Unfortunately, there is no visual representation

of the acoustic analysis of Child F1 who perceives these pairs of words as the same. On the basis of the judgments by the two listeners, however, this author can conclude that her perception and production do not match.

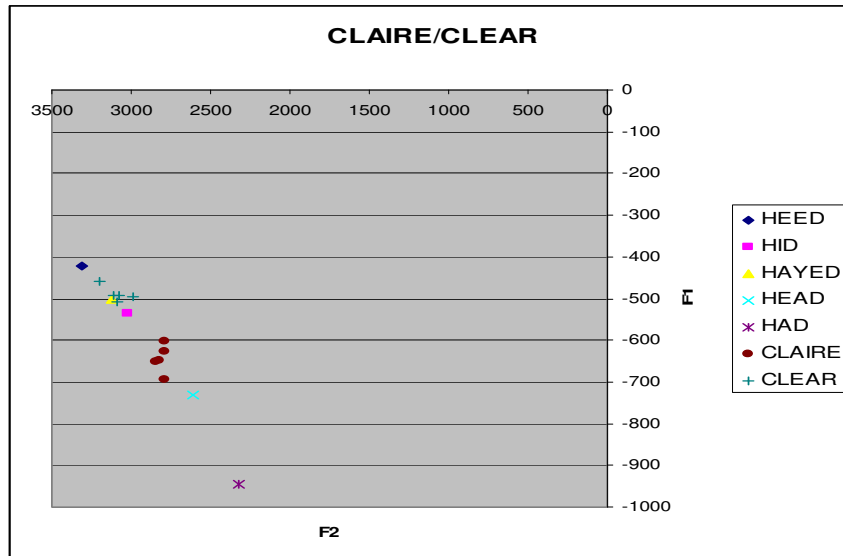


Figure 15. Production of *Claire* and *clear* third of the way through the vowel by Child M3. This participant is clearly distinguishing between *Claire* and *clear*.

Discussion:

This study was undertaken to see if the dialect of Cranston mirrors the dialect of Charleston and to determine if a sound change is emerging. The acoustic analysis of each participant shows that the dialect of Cranston, RI is similar to the dialect of Charleston, SC with respect to the production of vowels before /r/. Within each dialect, older participants had a complete merger of the vowels heard in *bear* and *beer* and younger participants did not. This generational difference was one of the major factors observed in this research. However, there were some exceptions noted within each age group. Differences with respect to gender were the other major factors observed in this research. The males in the young adult age group have a complete merger of the vowel sounds, just

like the older adult participants, whereas the females in the young adult age group distinguish these vowel sounds just like the child participants. This young adult age group supports the theory that females are the innovators of language change (*e.g.*, Jacewicz, *et al*, 2011; Labov, 1990; Wolfram & Schilling-Estes, 2006).

The oldest age group studied in Cranston, RI comprised participants over the age of 50. Four of the six participants had a complete merger of the vowels in question. These four participants also perceived the vowels to be the same except for one instance when Adult F3 perceived *Nair* and *near* as different and produced them the same in most repetitions. With that being the only exception, the production of these four participants matches their perception. The two who did not have a complete merger were the oldest participants in the study and were considerably older than the other participants. They are in their early nineties (Adult M1) or early seventies (Adult M2) while the rest of the adult older participants are in their early fifties. This is a significant age difference and it is possible there are differences in the production of speech between 50 year olds and 90 year olds.

Adult M1 did not completely merge any of the vowel sounds, although there were some instances in which he had some overlap in the production of the vowels. There are a few possible explanations. It may be that because he is nearly forty years older than the participants with a complete merger, another sound change has occurred within that time span. Also, this gentleman lived outside of Cranston during his time with the Navy. He was stationed around the world, so it is possible that he acquired some different styles of speech while away from his hometown. This participant also stated that he does travel a

lot; therefore, another possibility is that throughout his travels, he could have acquired different styles of speech as well.

Perhaps one of the most interesting results obtained from Adult M1 is that he has instances in which his production and perception do not match. For example, based on the acoustic analysis, he is clearly distinguishing between *Nair* and *near*, yet he perceives them as the same. This is known as a near merger, meaning two sounds are produced as different yet perceived as being the same (Labov, 1994). The only other pair of words that he perceives as the same is *mare* and *mere*. According to his acoustic analysis, he does merge these sounds inconsistently. However, he also merges *pear* and *peer* inconsistently, yet perceives those words as different.

Adult M2 of the older adults did have a complete merger of seven of the nine pairs of words, yet he distinguished in production the words *dare-dear* and *fair-fear*. This is interesting, because he perceived these pairs of words as the same. However, it is not that unreasonable to assume that he cannot hear a difference in the way he produces these vowels because they are somewhat close together (see Figure 5). This participant responded on the perception study that he perceives all of the pairs of words to be the same. According to Labov (1994), this participant's productions would constitute a near merger, because he is producing *fair-fear* and *dare-dear* differently yet he perceives them as the same.

The young adult participants show that not only is age a factor in this sound change, but gender is as well. There was one instance in which a male participant's perception did not match his production. Young Adult M3 perceives *fair-fear* as different yet he produces them the same. It could be that when asked if they were the

same or different, he answered with the response he thought was accurate and not necessarily what he actually perceives.

The female young adult participants showed very different results from those of the male young adult participants. None of the three female adult participants had a complete merger of any of the pairs of words. In most instances, the vowels were completely distinct. There were some instances of overlap between the pairs of words, though not as many as with the older adults or the male young adults. There was one instance in which Young Adult F1, who distinguishes between *where'd* and *weird*, perceived them as the same, which constitutes a near merger. However, for the most part, the female young adults are distinguishing between these vowels and do perceive them as different. These results are similar to those of the child participants. Hence, the results of the female young adult participants support the theory that females are the leaders of language change (Jacewicz, *et al*, 2011; Labov, 1990; Wolfram & Schilling-Estes, 2006). The female young adult participants could be introducing this sound change, which is seen in the child participants.

No child participant merges these sounds. However, an overlap of some of the target words was noted on some of the graphs displaying the children's productions. The majority of the overlap was found for the pairs of words *mare-mere*, *Nair-near*, and *pear-peer*, but it may be that children between the ages of 8 and 12 might not be familiar with these words. It is possible that the children were familiar with one of the words in the pair and produced both words the same because they assumed they were similar. For example, a child might be familiar with the word *pear* but not with the word *peer*. Perhaps the children thought *peer* was a spelling error and was supposed to be *pear*. In

the remaining word pairs, results showed that the children are clearly distinguishing between the words in all instances except for two. Child M3 showed some overlap of the words *where'd-weird* and Child M2, some overlap of the words *fair-fear*. However, these words were not completely merged and did not show as much overlap as those of some of the older participants. As noted in the results section, Child M3 perceived all of the pairs of words to be the same and produced them all differently, an example of a near merger.

While the female child participant's recordings could not be acoustically analyzed because of technical difficulties, two phonetically trained listeners who were not participants in this study were able to perceive a difference in the production of the female children's speech for the pairs of words.

The perception study of the female child participants was examined, and any inconsistencies between perception and production were noted. Child F2 and Child F3 perceived all pairs of words as different and Child F1 perceived all pairs of words as the same, indicating that Child F1 has a near merger of these words. However, these perception data may not be reliable because the participant did not fill out the questionnaire in front of a researcher and it is possible that at home one of the child's parents could have filled out the questionnaire with her or read the questions to her. If this was the case and the parent said the words aloud, the child might have responded based on her parent's productions.

Besides the technical difficulty with acoustic analysis for the female children, there were some other problems that could have affected the results. Since participants were aware they were being recorded, it is possible that they were a bit more conscious of

their speech. Participants might have tried to pronounce a word as they think it should be pronounced during some of the repetitions rather than how they actually pronounce it.

This could be the reason that some of the words were merged inconsistently.

The results obtained from this study, as well as results from Charleston, SC, contradict Garde's Principle, which is the theory that mergers cannot be reversed (Baranowski, 2007). Yet based on the results from this study, it appears that the merger of these vowel sounds is indeed reversing in Cranston, RI. However, as Baranowski (2007) states about Charleston, SC, it is a possibility that this dialect region never had a complete merger of these sounds. The data from Adult M1 support this claim because he does not have a complete merger. Another study with more specific adult age groups (*i.e.*, 50-64, 65-80, and over 80) could provide more information regarding this. However, it is also possible that Adult M1 is an exception and Garde's Principle is not entirely accurate. Obviously if this study were to be completed again, more participants within each age group would be desirable.

As discussed above, it appears that the dialect of Cranston, RI is similar to the dialect of Charleston, SC with respect to the production of vowels before /r/. Both dialects show a difference in the production of these vowels by different generations. However, in Charleston, Baranowski (2007) noted that people over seventy had a complete merger and people between fifty and seventy made some distinction but could not perceive a difference between the words. This was not the case in Cranston. The participants in their fifties have the complete merger and the participant (Adult M1) in his nineties distinguishes these vowels. The one participant (Adult M2) distinguishes in production two pairs of words. It is possible he is like the people in the fifty to seventy

age group in Charleston, meaning he distinguishes but cannot perceive a difference. In Charleston, people younger than fifty distinguished completely between the vowels, which is not true of the younger participants from Cranston. The male young adult participants had a complete merger of the vowels whereas the female young adult participants either merged the vowel sounds inconsistently or distinguished them, and the children distinguished the vowels.

Of course, these findings and conclusions in this study are based on a rather small scale research study. Further acoustic analysis of more participants ranging in age from this dialect region would strengthen any arguments that Cranston, RI has had this merger and that it is now reversing. Also, further research and acoustic analysis of participants from this region would help to support the findings from this paper. If another study were to be done, this author suggests the use of more participants, if possible, and another age group. Perhaps 20 participants (10 males and 10 females) in each age group, 8-12, 18-39, 40-59, 60-74, 75 and older, totaling 100 participants, could be used to replicate this study. This number of participants should provide enough evidence to indicate if the merger of *beer* and *bear* is reversing, thus contradicting Garde's Principle.

In addition to another production study, another perception study would be beneficial as well. A more refined perception task for the participants who have the inconsistent merger or cannot perceive a difference would be helpful. Perhaps a study similar to Labov's (1994) Coach Test, a commutation task, would be helpful. In this task, participants were read a narrative and were asked a question at the end which tapped into their assumptions about the identity of the word they heard. Unlike the task used in

the present study, the commutation task would not focus the listener's attention on the contrast in question, likely yielding more reliable results.

Conclusion:

Based on the results of the acoustic analysis, it appears that the dialect of Cranston, RI mirrors the dialect of Charleston, SC. In each dialect region, older generations are more likely than younger generations to pronounce the words *bear* and *beer* the same. Although there can be exceptions found in each age group, this was the general pattern that emerged. The acoustic analysis of the young adult age group (18-26) supports the theory that women are leaders of language change. All three male participants in this age category have a complete merger of these vowels, whereas the female participants distinguish these vowels in the vast majority of instances. Since children also appear to be distinguishing between these vowels, it appears that the female young adult participants are the leaders of this sound change.

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Appendix A

The following is the list of phrases given to the participants for the production portion of the study. All of these phrases were presented in the carrier phrase:

“Please say _____ again”. The list was repeated five times, totaling 165 words of interest per participant. The remaining phrases said by participants were fillers.

Bear	Where'd
Beer	Feed
Claire	Fid
Clear	Fade
Dare	Fed
Dear	Fad
Fair	Heed
Fear	Hid
Hair	Hayed
Here	Head
Mare	Had
Mere	Mead
Nair	Mid
Near	Made
Pear	Med
Peer	Mad
Weird	

Appendix B

(page 1)

The following is the questionnaire given to each participant for the perception portion of the study.

Please answer all of the following questions that you feel comfortable answering:

Your initials: _____

What age range do you fall into? (Please circle one)

8-12 18-26 over 50

As a child in school, were most of your teachers male or female?

Male Female

What ethnicity do you associate most with? (*i.e.* Italian, French, Irish, English, etc)

Have you ever lived outside of Cranston, RI? _____

If so, how long did you live outside of Cranston and where did you live?

_____.

Do you pronounce the following words the same or different?

Bat	Bed	SAME	DIFFERENT
Beer	Bear	SAME	DIFFERENT
Weak	Week	SAME	DIFFERENT
Hair	Here	SAME	DIFFERENT
Cup	Cat	SAME	DIFFERENT
Mare	Mere	SAME	DIFFERENT
Where'd	Weird	SAME	DIFFERENT
Four	For	SAME	DIFFERENT

Appendix B

(page 2)

Pen	Pin	SAME	DIFFERENT
Don	Dawn	SAME	DIFFERENT
Nair	Near	SAME	DIFFERENT
Claire	Clear	SAME	DIFFERENT
Shoo	Shoe	SAME	DIFFERENT
Pear	Peer	SAME	DIFFERENT
Die	Dye	SAME	DIFFERENT
House	Hungry	SAME	DIFFERENT
Caught	Cot	SAME	DIFFERENT
Fair	Fear	SAME	DIFFERENT
Tie	Ty	SAME	DIFFERENT
Might	Mite	SAME	DIFFERENT
Hole	Whole	SAME	DIFFERENT
Neck	Noodle	SAME	DIFFERENT
Dare	Dear	SAME	DIFFERENT
Blue	Blew	SAME	DIFFERENT
Eye	I	SAME	DIFFERENT
Ear	Air	SAME	DIFFERENT
Pig	Pit	SAME	DIFFERENT