Phonological Analysis of Vowels

in

Montana Dialect

Morio Nishikawa and Yasuyo Moriyama

1. Introduction

Phonological varieties in regional dialects are present in all languages. It is a reflection of the history and culture of the people who use it. While traveling, we often encounter a variety of pronunciations for one and the same word. For example, Moriyama, one of the authors of this paper, actually heard in Kentucky the word *time* pronounced not as [taim] but as [taːm]. In Missouri, the word *egg* was pronounced by a farmer not as [eg] but as [jeːg]. In Omaha, Nebraska, the indefinite article *a* was pronounced as [ei] rather than [ə].

American English has a variety of dialects. Among them is the Montana dialect. More than twenty-five different languages used to be heard in Montana and some of them are still alive. Most of them were once brought to Montana by European workers including the Scandinavians and the Germans who were employed in the agricultural fields of the eastern Montana prairies. The Finns, the Jugoslavians, the Cornish, the Irish and the Italians worked in the eastern mining towns, while people from the Netherlands concerned themselves with agriculture in the central part of Montana.

Any full-scale survey of the Montana dialect has not been conducted so far. Immigrants came to the West relatively recently in the scope of language history and they moved so widely from one place to another that informants and particularly more aged Montana speakers were not so easy to find. Thus, we do not yet have a full-scale survey of the Montana dialect conducted by professional linguists in the United States.

This paper constitutes a part of dialectology in terms of the phonological analysis of vowels in Montana dialect. It is based on the data taken from informants of the Montana dialect. We will focus on the variety of vowels in the Montana dialect in comparison with that in what is called General American which is considered to be a standard American English.

First, we will provide a brief overview of the monumental studies of regional dialects in the United States. Second, we will touch upon the experimental procedures to conduct this survey. And lastly, we will discuss the results of this survey based upon the data collected from the informants in Montana.

---

*Tomiai Junior High School

2. Background of this Research

2. 1. Monumental Studies on American Regional Dialects

The monumental project of the study of American regional dialects is *The Linguistic Atlas of the United States* started in 1930s. This project has been very time-consuming because of the big geographic size of the United States and the large distribution of the population. Since then more than sixty years have passed and the project is still under way for completion.

Kurath and his followers were the first linguists to work on this project. They published *The Linguistic Atlas of New England,* employing the methodologies used for compiling the linguistic atlases of Germany and France which were completed at the end of the last century.

After Kurath other linguists continued their research on American regional dialects in other parts of the United States. Some of those which have been published include *The Linguistic Atlas of the Upper Midwest 1973—76* by H. B. Allen and *The Linguistic Atlas of the Middle and South Atlantic States* by R.I. McDavid Jr.. Later some other notable surveys followed in the Gulf States, Texas, California, the Northwest, and Colorado.

Another monumental work of American Regional dialect is *The Dictionary of American Regional English* (DARE for short) completed in 1970. Thanks to those notable works, we are able to continue the long-range studies of regional dialects in the United States.

2. 2. Socio-linguistic Influences to Montana Dialect and Phonological Consequences

According to Coffey (1989), we have to take into account the following three socio-linguistic factors as the major influences on the Montana dialect: the Native American languages, the foreign languages brought by Europeans who settled in Montana, and the languages of the pioneering settlers who came from other parts of the United States. It seems that these three factors, especially the influence of the Native American languages, and of the foreign languages from Europe provide not only phonological but also morphological and syntactic influence with the variety of English in this State.

First, as many as 42,000 native Americans presently live in the seven Indian reservations, constituting the largest minority in Montana. According to Coffey (1989), the seven tribes speak twelve different Native American languages which belong to three major and two minor language families. Among the three big language families are Algonquian, Siouan, and Salish, which are quite different from each other. As a result, speakers of these languages are forced to use English to communicate with each other. English spoken by Native Americans is sometimes considered to be a pidgin English. However, Coffey (1989) claims that this is not the case in Montana tribes; that is, there is "no evidence of the morphological and syntactic simplifications usually associated with a true pidgin" and the English spoken by these tribes at present is more standardized.

The phonological interference between the English spoken by Native Americans and their native languages is twofold. Glottalization is heard very often among Native Americans because the two biggest language families of Algonquian and Siouan are characterized by the phonetic feature of the glottal stop. In addition, the intonation contours of the language of Native Americans are quite different from those of General American.

Second, the influence from the foreign languages of Europe was brought to Montana by migratory workers from many parts of Europe. Thus, for example, Jugoslavian descendants tend to pronounce the final consonant in *king* and *singing* as [ng] rather than [ŋ]. Irish

workers pronounce the final consonant [θ] in *width, depth, length,* and *height,* It seems that this tendency is retained in the English of the offspring even after they no longer speak the language of their ancestors.

The last and biggest dialectal influence came from the pioneering settlers of Montana who brought with them their dialects from other parts of America. The first settlers in Montana were poor whites from Kentucky, Southern Indiana, and West Virginia. They came to Montana after traveling along the Missouri River from St. Louis. They brought their North Midland dialects with Appalachian characteristics. The groups of Scandinavian and German descendents who moved across the Northern Great Plains followed these first settlers. They traveled along the Oregon and Bozeman trails from Wisconsin and Minnesota. Then, in the long run, they brought an Inland Northern dialect. Thus the early settlers caused the dialectal pluralism in Montana, and the speech of the later immigrants assimilated with that of the earlier settlers. As a result, the present day Montana dialect is characterized by a mixture of Northern and Midland speech. For example, *fog* and *log, poor* and *pour* rhyme for some Montanans but not for others. Some may differentiate the vowels in *cat, cot* and *caught* as [æ], [ɑ], and [ɔ] respectively, but others pronounced the vowels in *cot* and *caught* as [ɒ].

3. Methodology

3. 1. Testing Materials

The aim of this paper is to make a phonological analysis of vowels in the Montana dialect. To do this, we used two different testing schemes: an Interview Test and a Questionnaire Test. Our discussion in this paper will focus on the results of the Interview Test. We employed Peter Trudgill's interview test which he used for his socio-linguistic research in Norwich, England. This test consists of three procedural parts; i.e. Word List, Pairs Test, and Reading Passage. Although we followed Trudgill's testing method, our way of dealing with the testing materials including the words used in our research is different from Trudgill's in order to make the interview test more effective in our research.

First, we will deal with three procedural parts as a whole unit in terms of analyzing the variety of vowels in the Montana dialect. The Word List includes forty words, and the Pairs Test twenty-five pairs of words. Each word in both the Word List and the Pairs Test has one of the following eight General American vowels, [ju], [u], and [ɚ], which are pronounced in various ways in the Northern and Southern parts of America, and [æ], [ɪ], [eɪ], [aʊ], and [aɪ] which Southern speakers pronounce uniquely.

The final section of this interview test is divided into two parts, although Trudgill's had only one long reading passage. First, Reading (I) was taken from O. Henry's prose *Two Thanks-giving Day Gentlemen* whose style is rather formal, and Reading (II) from the popular movie, *Back to the Future,* which is written in conversational style and which the informants can read in less formal ways. These two passages were chosen carefully so that all the English vowels would be included. (For the testing forms, see Appendix p.184.)

3. 2. Informants

We set up the following criteria for the reliability of informants in this reseach. First, an informant must have been an inhabitant of Montana since the age of twelve. Second, we conducted this interview test at Montana State University, that is, in the classroom,

dormitories, cafeterias, and so forth on campus. The informants could see the microphone and/or the taperecorder. Some of them preferred to hold the microphone by themselves, although others did not. The total number of informants in this research was thirty.

Finally, most of our informants were those with whom we had some acquaintance. Otherwise, they might feel nervous or constrained and not provide an authentic example about their pronunciation. However, we also had informants whom we do not know at all. In this case, they were introduced to us by the friends who stayed with us while we conducted a series of tests. Table 1 below shows the informant's sex and age; the number shown in the parenthesis indicates the number of informants. Figure 2 (Beltramo, 1981) below indicates by number the name and location of each informant's hometown. From the wide variety of the distribution of the numbers, we can say that our informants were selected to represent a good cross-section of Montana.

Table 1

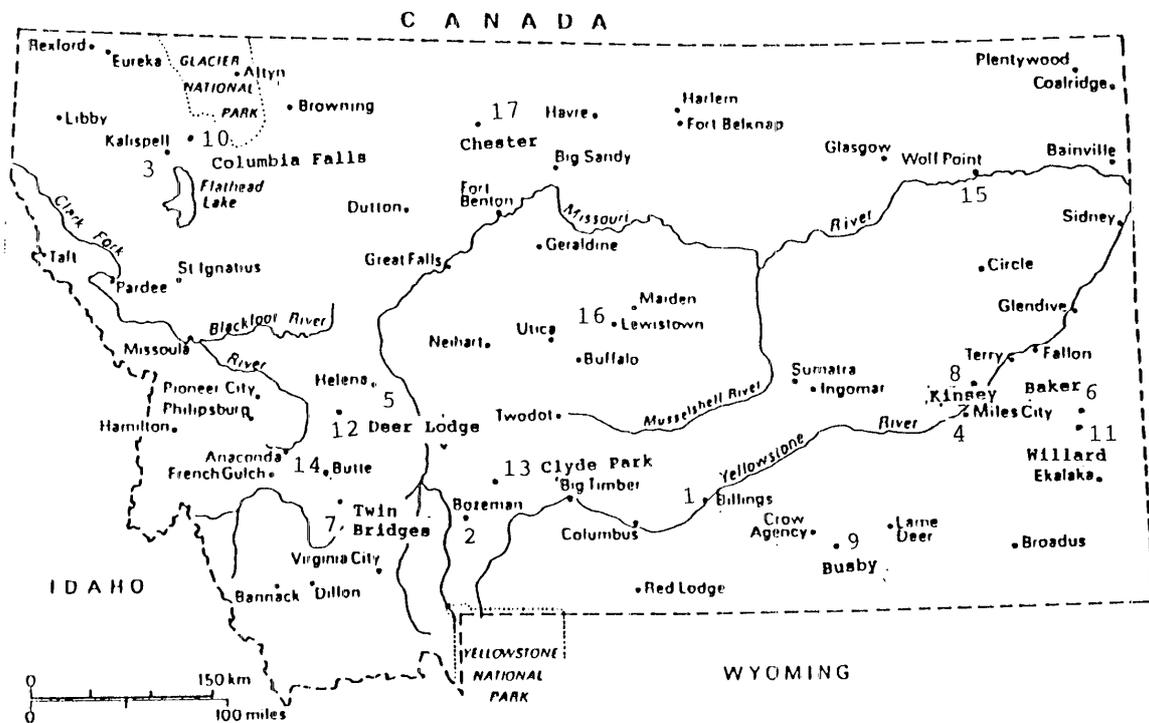| SEX	AGE
MALE	18−20 (0)
	21−30 (13)
	31−40 (1)
FEMALE	18−20 (13)
	21−30 (3)
	31−40 (0)

Figure 1

[1. Billings (4), 2. Bozeman (3), 3. Kalispell (3), 4. Miles City (3), 5. Helena (3), 6. Baker (2), 7. Twin Bridges (1), 8. Kinsey (1), 9. Busby, 10. Columbia Falls (1), 11. Willard (1), 12. Deer Lodge (1), 13. Clyde Park (1), 14. Butte (1), 15. Wolf Point (1), 16. Lewistown (1), 17. Chester (1).]

4. Vowels in Montana Dialect

4. 1. Vowel System in Montana Dialect

Everyone is familiar with at least one kind of diversity in language. It has its own phonological system of vowels. Linguists are likely to transcribe it appropriately. We would like to transcribe the vowel system of the Montana speech according to the IPA (International Phonetic Association) phonetic system. We categorized fourteen vowels for the purpose of the transcription of the data. (see Figure 2):

Among the five front vowels are [i], [ɪ], [e], [ɛ], and [æ]. There are one low central vowel [a] and three mid central vowels, [ʌ], [ə], and [ɚ]. Both stressed and unstressed r-colored vowels are transcribed in the phonetic symbol of [ɚ], which is exemplified in such words as *hurry* and *manner*. There are six back vowels, [u], [ʊ], [o], [ɔ], [ɒ], and [ɑ], three of which are low back vowels. The lower version of the low back round tense vowel [ɔ] is [ɒ]. The low back unrounded tense vowel is transcribed in [ɑ] and is located closer to the low central vowel [a]. This threefold distinction is necessary because the pronunciation of the low back vowels in the Montana dialect is diverse. In each section to come, we will discuss the following monophthongs and diphthongs: [i], [ɪ], [e], [ɛ], [æ], [ɑ], [ʌ], [o], [ʊ], [u], [ju], [ɪu], [ə], r-diphthongs, [ʌ], [ə], [aɪ], [aʊ] and [ɔɪ].
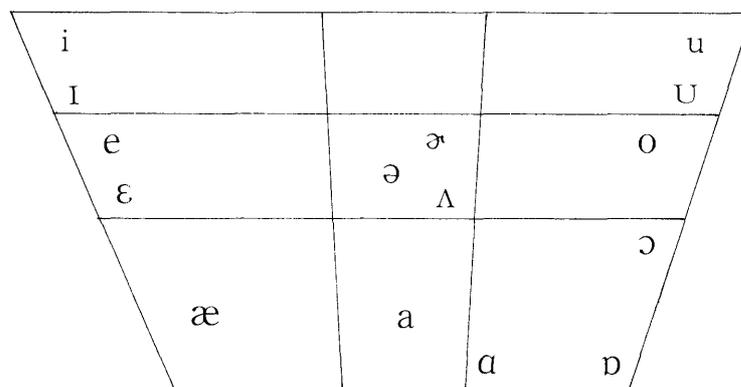

Figure 2

4. 1. 1. [i]

The high front tense vowel [i] was heard in words such as *creek, speak, league, leave,* and *seat* both in the Montana dialect (henceforth MT) and in General American (henceforth GA). However, there are a number of variants of [i] in *creek, speak* and *league*. Three of the informants pronounced [ɪ] in *creek*, and two of them spoke [eɪ] in *speak*. In the

word, *league,* [i], [eə], [ɛ], [ɪə] and [ɪ:] were heard once. The variants of [i] in these five words and the number of informants are shown in the following table:

Table 2. 1

creek	[i:] (27)⋯⋯[ɪ] (3)
speak	[i:] (28)⋯⋯[eɪ] (2)
league	[i:] (24)⋯⋯[i], [eə], [ɛ], [ɪə], [ɪ:] (1 for each)
leave	[i:] (30)
seat	[i:] (30)

In the case of *creek,* both [i] and [ɪ] are heard in the North and North Midland diversities (Shuy, 1967), although [ɪ] is dominant in some Montana informants. Our data suggested that only three informants pronounced [ɪ]. According to Kenyon (1962), the origin of this twofold pronunciation of *creek* dates back to Middle English (ME for short). In ME, there were two words for Modern English (ModE) *creek.* Diachronically, the first was *crike* and was pronounced [krɪkə]. The final schwa in here was lost in ModE and resulted in [krɪk] all over the United States. The second form *crek* arose from the extension of [ɪ] in *crike.* Thus [krik] is retained in GA, although it is spelled *c-r-e-e-k* at present.

In *speak,* the fronting diphthong [eɪ], appeared twice. We then assume that this diphthong might have something to do with the archaic past tense form of *speak.* The Random House Dictionary (henceforth RHD) describes that the past tense of *speak* used to be spelled *spake* with the phonetic symbol [speɪk]. Therefore, the similarity of the spelling of *speak* and *spake* cause speakers to pronounce [speɪk] in *speak.* Notice the following table:

Table 2. 2

[i]:
(i) GA: [i] ⋯⋯ MT: [i]
(ii) *creek* : { [krik] / [krɪk]
(iii) *creek* : { [spik] / [speɪk]

4. 1. 2. [ɪ]

The high front lax vowel [ɪ] was heard in words such as

   (a) *in, win, gym, lip*
   (b) *himself, Brooklyn, helpless*

The vowel of the words in (a) was pronounced in [ɪ] by all the informants. However, a number of its variants appeared in the words in (b). See Table 3. 1:

Table 3. 1

(a)	*in, win, gym, lip, it's things, minute, spring, little, sit, kidding, filled, hills, lived, giving*	[ɪ] (30)
(b)	*himself* *Brooklyn* *helpless*	[ɪ] (15)······[ə] (15) [ɪ] (14)······[ə] (16) [ɪ] (9)······[ə] (21) [ɪ] (16)······[ə] (14) [ɛ] (25)······[e] (5)
	miracle *believe* *before*	[ɪ] (29)······[ʊ] (1) φ (30) [ɪ] (19)······[ʊ] (10)······[o] (1)
	live	[ɪ] (24)······[aɪ] (6) [ɪ] (28)······[aɪ] (2)
	film *dinner* (Pairs Test) *dinner* (Reading Ⅰ)	[ɪ] (2)······[i] (28) [ɪ] (8)······[i] (22) [ɪ] (30)

The reduction of [ɪ] into [ə] occured in the unstressed syllable position of the words *himself* and *Brooklyn* and also in the one-syllabled word *win*. This phenomenon, which is one of the noticeable characteristics of English, is the vowel reduction in which the unstressed vowel [ɪ] may change into [ə]. In *helpless*, [e] and [ɛ] were heard but [ɪ] was not. Kenyon (1962) claims that the second vowel in *helpless* used to be pronounced [e] or [ɛ] which is predictable from the spelling of the suffix *-less*. We assume that this old pronunciation is still retained because *-ess* in *helpless* can be a good clue to the pronunciation of [e] or [ɛ].

In *film* and *dinner*, [i] was heard when they were read slowly and carefully. And twenty-eight informants pronounced [i] rather than [ɪ] in *film* in our Word List test. In *dinner* in the Pairs Test, 22 informants produced [i] instead of [ɪ], whereas all the informants produced [ɪ] in Reading (Ⅰ). Among the words in Table 3. 1, *lip, gym, live* and *sit* were also included in the Word Test or in the Pairs Test. However, [i] was not heard in these four words. In order to explain adequately why [i] was heard in *film* and *dinner* but not in *lip, gym, live* and *sit*, we would like to refer to Table 4. 1 and 4. 2. The phonological information contained in these tables is based on Wolfram and Johnson (1982).

Among the consonants [l], [n], [t], [p], [m] and [v] in *film, dinner, sit, lip, gym,* and *live*, [l], [n] and [t] are respectively alveolars which are described as $\begin{bmatrix} +\text{ant} \\ +\text{cor} \end{bmatrix}$, while others are described as $\begin{bmatrix} -\text{ant} \\ -\text{cor} \end{bmatrix}$. However, if we do not take the voicelessness of [t] into consideration, we cannot ditinguish [l] and [n] from [t]. The consonant [t] is voiceless while [l] and

Table 4. 1

CONSONANTS	y	w	m	n	ŋ	r	l	p	b	f	v	θ	ð	t	d	s	z	ʃ	ʒ	tʃ	dʒ	k	g	h
syllabic (syl)	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−
sonorant (son)	+	+	+	+	+	+	+	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−
consonantal (cons)	−	−	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
anterior (ant)	−	−	+	+	−	−	+	+	+	+	+	+	+	+	+	+	+	+	−	−	−	−	−	−
coronal (cor)	−	−	−	+	−	+	+	−	−	−	−	−	+	+	+	+	+	+	+	+	+	−	−	−
high (hi)	+	+	−	−	+	−	−	−	−	−	−	−	−	−	−	−	−	+	+	+	+	+	+	−
low (lo)	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	+
back (bk)	−	+	−	−	+	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	+	+	−
continuant (cont)	+	+	−	−	−	+	+	−	−	+	+	+	+	−	−	+	+	+	+	−	−	−	−	+
strident (str)	−	−	−	−	−	−	−	−	−	+	+	−	−	−	−	+	+	+	+	+	+	−	−	−
delayed release (d.r.)	+	+	+	+	+	+	+	−	−	−	+	+	+	+	−	−	−	+	+	+	+	−	−	+
voiced (vd)	+	+	+	+	+	+	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−
nasal (nas)	−	−	+	+	+	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−
lateral (lat)	−	−	−	−	−	−	+	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−
round (rd)	−	+	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−

Table 4. 2

VOWELS	i	ɪ	e	ɛ	æ	u	ʊ	o	ə	a	ɔ
syl	+	+	+	+	+	+	+	+	+	+	+
son	+	+	+	+	+	+	+	+	+	+	+
cons	−	−	−	−	−	−	−	−	−	−	−
hi	+	+	−	−	−	+	+	−	−	−	−
lo	−	−	−	−	+	−	−	−	−	+	+
bk	−	−	−	−	−	+	+	+	+	+	+
tns (tense)	+	−	+	−	−	+	−	+	−	+	+
rd	−	−	−	−	−	+	+	+	−	−	+

[n] are voiced. That is to say, when the high front vowel [ɪ] is followed by a voiced alveolar, the tip and blade of the tongue tend to be retained high. Furthermore, when a word is read slowly, it is easier to pronounce each segment more clearly than it is in faster speech. Consequently, a more tense vowel [i] was heard in *film* and *dinner* in its careful speech context.

The liquid consonants [r] and [l], which are featured by [+son] as all the English vowels are, caused interesting phenomena when they followed [ɪ]. According to Kenyon (1962), Grandgent and Read admitted that [r] has a tendency to become [+rd]. We assume that the speaker who said [ʊ] in *miracle* pronounced the vowel with lip-rounding in order to blend it with [r] which might also be rounded. In *believe,* the first vowel was lost in all

the speech of informants. In English, the vowel with a weak stress is lost when it is followed by a stressed syllable (Fujii, 1987). It seems that the existence of the consonant cluster *bl-* in such words as *blend, blue* and *blouse* enables us to pronunce [bli:v]. On the contrary, the first vowel in *before* was not lost because there is no consonant cluster *bf-* in English. In addition, ten informants pronounced [ʊ] in *before*, and one informant [o] in *before*. These round vowels would be caused by the movement of lips after pronouncing [b], which is very similar to that of [ʊ] and [o].

Finally, as for the word *live* in the Pairs Test, our instruction to the informants was not enough; we did not indicate whether it was a verb or an adjective. Since this word has a twofold pronunciation according to the class of speech, it seems that the informants who took it as a verb pronounced the vowel in *live*, [ɪ], and those who took it as an adjective, [aɪ]. For a summary of this discussion, see Table 3. 2 below:

Table 3. 2

[ɪ] :

(i) GA: [ɪ] ······ MT: [ɪ]

(ii) ɪ ⟶ ə / $\left[\dfrac{\quad\quad}{-\text{stress}} \right]$ (e.g. `himself*)

(iii) *helpless* : $\left[\begin{array}{c} \text{[helplɛs]} \\ \text{[helples]} \end{array} \right]$ (e.g. *film*)

(iv) ɪ ⟶ i / ___ $\left[\begin{array}{c} +\text{ant} \\ +\text{cor} \\ +\text{vd} \end{array} \right]$ (e.g. *film*)

(v) *believe* : [bli:v]

4. 1. 3. [e]

The mid front tense vowel [e] was heard in the following words : *play, Sunday, name, main, rain, strange, changed, made, race, rays, crazy, take, paper, bake,* and *gave*. However, since the clear offglide [ɪ] was heard very often after [e] in our data, we will describe mid front lax vowel [e] in GA as the fronting diphthong [eɪ] in MT. Notice the table next page. The diacritic [~] means nasalization of a segment.

Kenyon (1962) claims that the second segment of [eɪ] is not clear in American pronunciation, although it is pronounced clearly when the vowel precedes a voiced consonant or is located in word-final position. However, in MT [eɪ] is equally heard both before voiced and voiceless consonants and in word-final position. On the other hand, [e:] and [e] are also heard in some words. There is a tendency in English to reduce a diphthong into a long vowel, and a long vowel into a short vowel in accordance with the linguistic principle of 'economy'. This tendency is observable in our data; the diphthong [eɪ] was sometimes substituted for the long vowel [e:] or the short vowel [e].

Table 5. 1

play	[eɪ] (27)······[e:](1)······[ẽɪ̃] (2)
Sunday	[eɪ] (30)
name	[eɪ] (18)······[e:] (1)······[ẽɪ̃] (10)
main	[eɪ] (24)······[ẽɪ̃] (6)
rain	[eɪ] (26)······[ẽɪ̃] (4)
rein	[eɪ] (26)······[ẽɪ̃] (4)
strange	[eɪ] (28)······[e] (1)······[e:] (1)
changed	[eɪ] (29)······[eə] (1)
made	[eɪ] (22)······[e] (1) [eə] (4)······[iɪ] (2)······[ɪə] (1)
race	[eɪ] (29)······[iɪ] (1)
rays	[eɪ] (26)······[e:] (2)−[i:] (2)
crazy	[eɪ] (29)······[e:] (1)
take	[eɪ] (29)······[iɪ] (1)
paper	[eɪ] (29)······[iɪ] (1)
bake	[eɪ] (30)
gave	[eɪ] (19)······[eə] (5)······[iɪ] (3)······[i:] (3)
tail	[eɪ] (1)······[eə] (29)

Significantly, the second vowel in *Sunday* was pronounced [eɪ] by all the informants, although Kenyon (1962) claims that this pronunciation sounds artificial. The vowel [ẽɪ̃] occurred followed by the nasal [m] or [n] as in *name, main, rein* and *rain*. This nasalized variant of [eɪ] is derived from the assimilation of the diphthong into the nasals; i.e. the phonetic feature of [−nas] in [eɪ] was changed into [+nas] in order to meet the nasal [m] or [n] (cf. Table 4.1 and 4.2). However, this is not always the case. When a nasal was part of a consonant cluster as in *strange* and *changed,* vowel nasalization did not take place. This is because each segment of the consonant clusters is equally prominent, and the phonetic effect of a nasal on the preceding vowel is less when the nasal is the only consonant following a vowel.

Another type of vowel assimilation appeared in *made, race, rays, crazy, take, paper, bake* and *gave.* In these words, five informants replaced the first segment of [eɪ] with [i]. If the vowel assimilation takes place within a diphthong, the segment without prominence is assimilated into the prominent segment (cf. 4.1.14). The diphthong [eɪ] consists of [e] and [ɪ], and prominence is placed on [ɪ] rather than on [e] because [ɪ] is more stable as a vowel than [e]. Jakobson (1939) discusses that the three basic vowels A−I−U constitute a triangular system which constitutes the minimun vocalism of the language in the world. They are the first three vowels to be acquired by a child and the last ones to be lost by a patient of aphasia. Thus, [e] which is featured by [−hi] is assimilated into [ɪ] and becomes [+hi]. Furthermore, three informants pronounced [i:] in *gave.* In this case, the first segment of [iɪ] was laxed from the phonological principle of 'economy' to derive the long vowel [i:].

In *tail,* 29 out of the thirty informants pronounced [eə] rather than [eɪ]. In this case, the alveolar lateral [l] follows the diphthong. The lateral consonant [l] which is featured

by [+son] causes interesting dialectal phenomena. The form [eə] is accounted for by two processes. First, [l] with the phonological feature of [+son] shifts the prominence of [ɪ] to [e] between the segments of [eɪ]. Second, according to the phonological principle of 'economy', [ə] is employed because [l] in this case is a 'dark' [l]. This velarized alveolar lateral consonant is featured by [+bk], although 'clear' [l] is [−bk]. Therefore, [ə] which is [+bk] is more economical than [ɪ]. See Table 5.2 for a summary of this discussion:

Table 5. 2

[e] :
(i)   GA: [e] ······ MT: $\left\{\begin{array}{l}[eɪ]\\{[e:]}\\{[e]}\end{array}\right\}$
(ii)   *Sunday* : [sʌndeɪ]
(iii)   eɪ ⟶ ẽɪ̃ / ___ $\left[\begin{array}{c}C\\+nas\end{array}\right]$ (one-syllabled word like *main*)
(iv)   eɪ ⟶ iɪ / ___ $\left[\begin{array}{c}C\\+son\end{array}\right]$ (e.g. *race*)
(v)   *tail* : [teəl]

4. 1. 4. [ɛ]

The mid front lax vowel [ɛ] occurred in *getting, Mets, let, bed, then, pennants, men, accepting, every, test, pleasure, fresh, helpless, himself, very, merry* and *Mary*. In general, MT [ɛ] tends to be slightly higher than GA [ɛ]. Therefore, [e], as well as [ɛ], was heard quite often. Notice the following table.

Table 6. 1

every	[ɛ] (1)······[e] (29)
accepting	[ɛ] (27)······[ʌ] (3)
himself	[ɛ] (6)······[e] (23)······[ʌ] (1)
getting	[ɛ] (6)······[e] (19)······[ɪ] (5)
Mets	[ɛ] (15)······[e] (14)······[ɪ] (1), [ɛ] (14)······[e] (15)······[ɪ] (1)
	[ɛ] (1)······[e] (28)······[ɪ] (1)
let	[ɛ] (12)······[e] (18)
bed	[e] (30)
then	[ɛ] (5)······[e] (25)
pennants	[ɛ] (2)······[e] (28)
men	[e] (28)······[eɪ] (1)······[ẽɪ̃] (1)
test	[ɛ] (19)······[e] (10)······[ɛə] (1)
pleasure	[ɛ] (25)······[e] (3)······[ɛə] (2)
fresh	[ɛ] (22)······[e] (7)······[ɛə] (1)
very	[ɛ] (30)
merry	[e] (30)
Mary	[e] (29)······[ʌ] (1)

Interesting variants found in our data are [ɪ] in *getting* and *Mets,* [eɪ] and [ẽɪ] in *men* and [ɛə] in *test, pleasure* and *fresh.* In addition, from among *merry, very* and *Mary,* the vowel in *very* was [ɛ], while that of the other two was [e].

In words such as *getting* and *Mets,* the exchange of [ɛ] for [ɪ] took place. It seems that this occurred because of the consonant [t] which follows the vowel [ɛ] in these two words, and the vowel [ɪ] which appeared in here is featured by [+hi] as well as the alveolar consonant [t]. In our data, the vowel in *let, bed, then, pennants* and *men* are also followed by alveolars [t], [d], and [n], but [ɪ] did not appear in these words. We assume that the exchange of [ɛ] for [ɪ] is more likely when a consonant-vowel (CV) pattern is not stable in a phonological environment. The CV pattern is dominant in English as well as the CCV and CCCV patterns. In addition, these patterns are stable when the V is a long vowel or a diphthong rather than a short vowel. In the case of *getting,* which is a two-syllabled word, the first CV pattern [ge] constitutes a combination of C and V. Since a monophthong is unstable in a CV pattern, the vowel is assimilated into the initial segment of the following syllable. Consequently, [ɛ] with the phonological features of $\begin{bmatrix} -\text{hi} \\ -\text{lo} \\ -\text{bk} \end{bmatrix}$ is replaced by [ɪ] because both [ɪ] and [t] are featured by [+hi]. In *Mets,* the consonant cluster [ts] follows the CV pattern as in words such as *quarts* and *let's.* The combination of monophthong [ɛ] and [ts] are not well-balanced because [ts] is a well-established consonant cluster. So, [ɪ] appears also in this word.

We can also apply this relationship between a CV pattern and the following segment to the cases of *test, pleasure* and *fresh.* The vowels in these words were pronounced with the centralizing offglide [ə] by several informants. The consonants which follow the vowel [ɛ] in these words are all sibilants, [s], [ʒ] and [ʃ], respectively. It seems that the sibilants which are featured by $\begin{bmatrix} +\text{cor} \\ +\text{cont} \\ +\text{str} \end{bmatrix}$ are effective and strong enough to cause the glide [ə].

Thus, the CV combination such as [tɛ] in *test* is stable due to the glide, [ə].

One informant pronounced the fronting diphthong [eɪ], and another one the nasalized version, [ẽɪ] in *men.* The process of the derivation of these vowels is twofold: First, the vowel, [e], is lengthened because of the alveolar nasal [n], which follows the vowel. Second, [ɪ] was inserted after [e]. Usually, the schwa is inserted as a glide; however, [ɪ] is employed in this case because the placement of articulation of the high front vowel [ɪ] is closer to that of [n] than that of the schwa. Thus, one informant pronounced [eɪ]. The informant who said [eɪ] nasalized the diphthong in accordance with the nasal [n]. Southern dialect speakers often pronounce *man* as [mæin], (cf. Webster Ⅲ), so it should be noted that [eɪ] would be heard in Southern speech. Noticeably, one of these two informants once lived in Houston, Texas and the other in St. Louis, Missouri. Their pronunciation of *men* might come from the influence of Southern accent.

Among the words with [r], *very, merry* and *Mary,* the vowel in *very* was pronounced [ɛ], while [e] was heard in the other two. This could be due to the phonological principle of 'blocking' by *vary;* the informants may distinguish *very* from *vary* by pronouncing them [vɛrɪ] and [verɪ] respectively (Kenyon, 1962). *Merry* and *Mary* were pronounced identically as [merɪ] by all but one informants, but in GA, the pronunciations of these two are [mɛrɪ] and [merɪ]. Kenyon (1962) points out that *merry* and *Mary* are pronounced in various ways

in American English. Many of the young generation, however, pronounce them identically as [mɛrɪ]. A summary of this discussion is shown in Table 6.2 below:

Table 6. 2

[ɛ]:

(i) GA: [ɛ] ⋯⋯ MT: $\left\{ \begin{array}{c} [e] \\ [ɛ] \end{array} \right\}$

(ii) ε ⟶ ɪ / ___ $\left[\begin{array}{c} +\text{cont} \\ +\text{ant} \end{array} \right]$ (e.g. *getting*)

(iii) ε ⟶ εə / ___ $\left[\begin{array}{c} +\text{ant} \\ +\text{cor} \\ +\text{str} \end{array} \right]$ (e.g. *fresh*)

(iv) *men* : $\left\{ \begin{array}{c} [\text{men}] \\ [\text{meɪn}] \\ [\text{meĩn}] \end{array} \right\}$

(v) *merry* : [merɪ] vs. *Mary* : [merɪ]

4. 1. 5. [æ]

The low front lax vowel [æ] and its variant [a] appeared in words such as *manner, family, gal, fan, candle, aunt, bed, had, after, half, laugh, haven't, avenue, ask, fast, lack* and *back*. Notice the following table:

Table 7. 1

manner	[æ] (29)	⋯⋯	[ʌ] (1)			
family	[æ] (29)	⋯⋯	[a] (1)			
gal	[æ] (30)					
fan	[æ] (29)	⋯⋯	[a] (1)			
candle	[æ] (30)					
bad	[æ] (30)					
avenue	[æ] (27)	⋯⋯	[a] (3)			
lack	[æ] (22)	⋯⋯	[a] (8)			
back	[æ] (21)	⋯⋯	[a] (8)	⋯⋯	[ɪ] (1)	
had	[æ] (15)	⋯⋯	[a] (15)			
haven't	[æ] (24)	⋯⋯	[a] (1)	⋯⋯	[ʌ] (5)	
aunt	[æː] (19)	⋯⋯	[ɑː] (11)			
after	[æ] (28)	⋯⋯	[a] (2)			
half	[æ] (28)	⋯⋯	[a] (2)			
laugh	[æ] (23)	⋯⋯	[a] (7)			
fast	[æ] (30)					
ask	[æ] (20)	⋯⋯	[a] (7)	⋯⋯	[æə] (3)	

A variant of [æ], that is [a], was heard in *family, fan, avenue, lack, back, had, haven't, after, half, laugh* and *ask*, although [æ] was dominant. The low central vowel [a] is one of the cardinal vowels in English, while [æ] is not. That is, [a] is more stable than [æ] in English speech. It seems that there are two conditions under which the more stable vowel [a] appears in place of [æ]. First, [a] appears when prominence is not placed on the word in a given context. In *had*, the half of our informants pronounced [a]. *Had* was included in Reading (I) and this word was not prominent in the context. Second, [a] appeared in the words in which the vowel precedes a voiceless consonant, or it is located in a syllable-final position. *After, half* and *laugh* are followed by [f], and *back, lack* and *ask*, by [s]. The first vowels in *family* and *avenue* are located before syllable boundaries and were pronounced [a] by some informans.

The data in *aunt* is worth noting. The vowel was pronounced [æ:] by 19 informants, and [ɑ:] by the rest. According to Kenyon (1962), the exchange of [æ] for [ɑ] appears in about one hundred and fifty common English words, and most of them have a consonant with voiceless fricative features such as [f], [s] and [θ], and the nasal [n] after a vowel. In our data, the vowels in which the [æ]−[ɑ] exchange occurred in GA are *aunt, after, half, laugh, fast* and *ask*. However, [ɑ] appeared only in *aunt*. The vowel in this case is followed by the nasal [n], while the others by [f] and [s]. In order to explain why [ɑ] appeared only in *aunt*, we would like to refer to Takebayashi's (1982) classification of sonority in English vowels and consonants. He gives the degree of sonority in all the English phonemes with regard to the tongue position of the vowels, and voicing and mannar of articulation of the consonants. He defines sonority as the distance a sound reaches when the sound, whether it is a vowel or a consonant, is pronounced with a normal amount of kinetic energy. The degree of the vowels' sonority is higher than that of the consonants'. Voiced sounds have a higher degree of sonority than voiceless ones, and nasals' and laterals' is higher than fricatives'. Stops have the lowest degree of sonority. Semi-vowels have the highest among all kinds of consonants (Takebayashi, 1982). The degree of the sonority of phonemes is classified in Table 8 below:

Table 8

1. voiceless consonants
   a) stops: /p/, /t/, /k/
   b) fricatives: /f/, /θ/, /s/, /ʃ/, /h/
2. voiced stops: /b/, /d/, /g/
3. voiced fricatives: /v/, /ð/, /z/, /ʒ/
4. nasals: /m/, /n/, /ŋ/
5. lateral: /l/
6. semi-vowels: /j/, /w/, /r/
7. high vowels: /iː/, /ɪ/, /uː/, /ʊ/
8. higher-mid vowels: /ə/, /ɚ/, /əː/, /ɝː/
9. lower-mid vowels: /ɛ/, /ɔː/, /ʌ/
10. low vowels: /æ/, /ɑ/, /ɒ/

The listed numbers indicate the degree of sonority; the bigger the number, the higher the sonority. The degree of the sonority of [n] is 4 and that of [f] and [s] is 1. that is, the nasal [n] with the degree of sonority 4 enables the vowel [æ] to be a primary cardinal vowel [ɑ] compared with [f] and [s] with the degree of 1. As a result, [ɑ] appeared only in *aunt* but not in others.

Three informants pronounced the centralizing offglide, [ə], after [æ] in *ask* . This is caused from the imbalance between [æ] and [sk]. *Ask* has a VCC pattern and the vowel is the short vowel [æ]. As we mentioned in 4.1.4, a short vowel is not stable in a phonological environment. Thus [sk] follows this vowel. This consonant cluster is stable because it is a well-established one in English. There are in fact many words with [sk] in the word-initial position such as *skate, sketch,* and *school,* as well as in the word-final position, *mask, task,* and *desk.* Therefore, the glide [ə] was inserted here so that the balance between the vowel and [sk] could be adjusted. As a result, the diphthong [æə] was produced. See Table 7.2 for a summary of this discussion:

Table 7. 2

[æ]:

(i) GA: [æ] ······ MT: $\left\{ \begin{array}{c} [æ] \\ [a] \end{array} \right\}$

(ii) æ ⟶ a/ _____ $\left\{ \begin{array}{c} \# \\ \left[\begin{array}{c} C \\ -vd \end{array} \right] \end{array} \right\}$ (e.g. *half*)

(iii) *aunt* : $\left\{ \begin{array}{c} [æːnt] \\ [ɑːnt] \end{array} \right\}$

(iv) *ask* : $\left\{ \begin{array}{c} [æsk] \\ [ask] \\ [æəsk] \end{array} \right\}$

4. 1. 6. [ɑ]

All the informants produced the low back tense vowel [ɑ] in *ma* and *Padre,* with the exception of one informant who pronounced [mæ]. Notice the following table:

Table 9. 1

Padre	[ɑ] (30)
ma	[ɑː] (29) ······ [æ] (1)

According to Kenyon (1962), *mamma* used to be pronounced [mæmə] and this old pronunciation is retained today in a variant of this word *mammy* with the phonetic symbol of [mæmɪ]. At present, *mamma* is pronounced [mamə] or [məma] in GA, and a shortened variant word of *mamma* is *ma,* which is phonetically [mɑː]. When we take account of the old pronunciation of *mamma* and *mammy,* the informant who said [mæ] would be a speaker who retains the old pronunciation of *mamma,* and says [mæmɪ] and [mæ] for *mammy* and *ma* respectively. A summary of this discussion is as follows:

Table 9. 2

[ɑ] :
(i) GA: [ɑ] ······ MT: [ɑ]
(ii) *ma:* { [mɑː] / [mæ] }

4. 1. 7. [ɑ], [ɔ], and [ɒ]

The low back round vowel [ɔ], its lower variant [ɒ] and the low back unrounded vowel [ɑ] occurred interchangeably in the following words : *all, fall, want, walked, talked, lot* and *doc.* We believe that one of the major characteristics of MT is that the round vowel, [ɒ], which is in between [ɑ] and [ɔ] is dominant in the environment where [ɔ] is expected in GA. It seems that MT speakers tend to substitute [ɔ] for [ɒ]. In *all, fall, want, walked* and *doc,* many informants pronounced the vowel [ɒ], although [ɔ], [ɑ] and even [o] were heard. The unrounded vowel [ɑ] was heard in *talk* and *lot.* See Table 10.1:

Table 10. 1

talked	[ɑ] (27) ······ [ɒ] (3)
lot	[ɑ] (29) ······ [o] (1)
doc	[ɑ] (5) ······ [ɒ] (24) ······ [ɔ] (1)
all	[ɒ] (27) ······ [ɔ] (3), [ɒ] (28) ······ [ɔ] (2)
fall	[ɑ] (1) ······ [ɒ] (22) ······ [ɔ] (7)
walked	[ɑ] (5) ······ [ɒ] (23) ······ [ɔ] (1)
want	[ɒː] (30)

As for [ɔ], [ɒ] and [ɑ], there seems to be a difference between GA and MT in terms of the phonological environment in which these vowels appear. In GA, on the one hand, the round vowel [ɔ] is heard when the liquid [r], the sibilants [f], [s], [θ] or the nasal [ŋ] follow the vowel, or when the glide [w] precedes the vowel. The unrounded vowel [ɑ] occurs when the sibilant [ʃ], the affricate [tʃ], the lateral [l], the nasal [m] and [n] or a stop consonant follows the vowel (Kenyon, 1962). In MT, on the other hand, [ɑ] occurs only when the vowel is followed by a stop (e.g. *talk*), while [ɒ] was dominant elsewhere.

In our data, the words which contain stop consonants are *talked, lot, doc* and *walked.* The unrounded vowel [ɑ] was dominant in *talked* and *lot,* but the vowels in *doc* and *walked*

were pronounced [ɒ] by many informants. As for the dominancy of [ɒ] in *doc*, it comes from the 'blocking' for *dock*. *Dock* has two phonetic transcriptions [dɑk] and [dɔk], and the former is dominant in GA (Kenyon, 1962). Therefore, *dock* which has the same phonetic symbol as *doc*, is prevented from being pronounced [dɑk] to distinguish it from *doc*. In the case of *walk*, the round vowel [ɒ] was caused by the preceding glide [w]. Since [w] is featured by [+rd], it is useful to assimilate the following vowel into [+rd]. This influence of [w] on the following vowel is true of *want*. The vowel here was pronounced [ɒ:] by all the informants.

The unrounded vowel [ɑ] appears in our data when a stop consonant follows the vowel, and the round vowel [ɒ] or [ɔ] when the liquid [l] or the nasal [n] follows. We can explain this phonomenon by employing the concept of the degree of sonority (cf. Table 8). The degree of sonority of voiceless stops [k] and [t] is 1 ; that of [n] and [l] is 4 and 5 respectively. The consonants with a high degree of sonority such as liquids and nasals cause lip-rounding of the preceding vowel, while this is not the case with those consonants with a low degree of sonority of voiceless stops. Thus, in *talk* and *lot*, which have [k] and [t] with the degree of sonority 1, the vowel was [ɑ]. In words such as *want, all* and *fall*, which contain [n] and [l] with the degree of sonority of 4 and 5 respectively, [ɒ] was dominant. The following table is a summary of this discussion:

Table 10. 2

```
┌─────────────────────────────────────────────────────────┐
│  [ɑ], [ɔ] and [ɒ]:                                       │
│                                                          │
│                  ⎧ [ɑ] ⎫            ⎧ [ɑ] ⎫              │
│  (i)   GA:       ⎨     ⎬ ······ MT: ⎨ [ɒ] ⎬              │
│                  ⎩ [ɒ] ⎭            ⎩ [ɔ] ⎭              │
│                                                          │
│  (ii)  ɑ╱ _____ ⎡  C  ⎤ (e.g. *talked*)                 │
│                  ⎣-d.r.⎦                                 │
│                                                          │
│  (iii) *doc*: [dɒk]                                      │
│                                                          │
│  (iv)  ɒ╱ _____ ⎡  C  ⎤ (e.g. *all*)                    │
│                  ⎣+lat ⎦                                 │
│                                                          │
│                  ⎡-syl ⎤                                 │
│  (v)   ɒ╱        ⎢+son ⎥ _____ (e.g. *want*)            │
│                  ⎣+rd  ⎦                                 │
└─────────────────────────────────────────────────────────┘
```

4. 1. 8. [o]

The mid front back round tense vowel [o] appeared in *no, won't, old* and *older*. In *no* and *won't*, the backing diphthong [oʊ] was dominant, while the long vowel [o:] was heard very often in *old* and *older*. See Table 11. 1:

Table 11. 1

no	[oʊ] (29) ······ [o] (1), [oʊ] (29)
won't	[oʊ] (30)
old	[oʊ] (12) ······ [o:] (18), [oʊ] (1) ······ [o:] (28) ······ [o] (1) [oʊ] (4) ······ [o:] (22) ······ [o] (3)
older	[oʊ] (7) ······ [o:] (23)

In *won't*, [oʊ] was pronounced by all the informants. This word was derived from *wol not* in ME, which was phonetically [wʊl nət]. Nowadays, however, this word is pronounced in various ways in American English. Among these variants are [wont], [wʌnt], [wɑnt] and [wɔnt]. However, [wont] is most commonly heard among these variants for the following two reasons. First, the letter *-o-* in here is a clue for speakers to pronounce [o] or the backing diphthong, [oʊ] ; second, the phonological analogy from the word *don't* functions and [oʊ] comes to be pronounced appropriately. (Kenyon, 1962).

In *old* and *older*, [oː] was dominant rather than [oʊ]. The lateral consonant [l] which is featured by [+son] triggers to produce an interesting phonomenon. When we take the phonological features of [o], [ʊ] and [l] into consideration, we can see that the phonological principle of 'economy' functions. The two vowels, [o] and [ʊ], and the 'dark' [l] are featured

by $\begin{bmatrix} -\text{hi} \\ -\text{lo} \\ +\text{bk} \end{bmatrix}$, $\begin{bmatrix} +\text{hi} \\ -\text{lo} \\ +\text{bk} \end{bmatrix}$ and $\begin{bmatrix} -\text{hi} \\ -\text{lo} \\ +\text{bk} \end{bmatrix}$, respectively. That is, [o] and the 'dark' [l] have

the same feature of [−hi], while [ʊ] does not. Consequently, the offglide [ʊ] with the feature of [+hi] is changed into [−hi] to produce the long vowel [oː]. A summary of this discussion can be seen in Table 11.2 below:

Table 11. 2

[o]:
(i) GA: [o] ⋯⋯ MT: $\begin{bmatrix} [oʊ] \\ [o] \end{bmatrix}$
(ii) *won't*: [woʊnt]
(ii) oʊ ⟶ oː / _____ $\begin{bmatrix} C \\ +\text{lat} \end{bmatrix}$ (e.g. *old*)

4. 1. 9. [ʊ]

The high back round lax vowel [ʊ] was heard in *looked* and *understood*. Notice the following table:

Table 12. 1

looked	[ʊ] (30)
understood	[ʊ] (29) ⋯⋯ [ʌ] (1)

In *understood*, which we included in Reading (I), one informant reduced the second vowel of this word to [ʌ], although the primary stress was placed on it. It seems that the phonological principle of 'economy' functions here. Let us take account of the phonological distinctive features of [t], [d], [ʊ] and [ʌ]. The second vowel was positioned between the two consonants

[t] and [d] which are featured by $\begin{bmatrix} -\text{hi} \\ -\text{lo} \\ -\text{bk} \end{bmatrix}$. The two vowels, [ʊ] and [ʌ], which were

heard in this word are $\begin{bmatrix} +hi \\ -lo \\ +bk \end{bmatrix}$ and $\begin{bmatrix} -hi \\ -lo \\ +bk \end{bmatrix}$ respectively. That is, the phonological feature

of [ʌ] is more similar to [t] and [d] than that of [u] ; thus, in general, a sound segment tends to be replaced by another which has more similar phonological features to that of its neighboring segment. We assume that the principle of 'economy' works better in the process of reading a passage than in the process of reading a word list. Consequently, one informant pronounced [ʌ] instead of [ʊ]. The following table is a summary of this discussion:

Table 12. 2

[ʊ] :
(i) GA: [ʊ] ······ MT: [ʊ]
(ii) *understood*: $\left\{ \begin{array}{l} [\text{əndɚstʊd}] \\ [\text{əndɚstʌd}] \end{array} \right\}$

4. 1. 10. [u], [ju], and [ɪu]

The high front back round tense vowel [u], the rising diphthong [ju] and [ɪu] appeared in the following words; *boot, view, few, cute, butte, music, to, do, too, tune, stew, stewardess, dew, duke, new, knew, New York, avenue, nuclear* and *grew*. See Table 13.1 for a breakdown of informants' pronunciation:

Table 13. 1

boot	[u] (28) ······ [ʊ] (2)
view	[ju] (4) ······ [ɪu] (26)
few	[ju] (9) ······ [ɪu] (21)
cute	[juː] (30)
butte	[juː] (23) ······ [ɪu] (7)
music	[juː] (30)
to	[ə] (29) ······ ∅ (1)
do	[uː] (23) ······ [ju] (3) ······ [ɪu] (4), [u] (29) ······ [juː] (1)
too	[u] (26) ······ [ju] (4)
tune	[ju] (19) ······ [uː] (11)
stew	[ju] (12) ······ [uː] (17) ······ [ɪu] (1)
stewardess	[ju] (11) ······ [u] (19)
dew	[juː] (4) ······ [uː] (23) ······ [ɪu] (3)
duke	[juː] (12) ······ [uː] (18)
new	[juː] (5) ······ [uː] (22) ······ [ɪu] (3)
knew	[ju] (27) ······ [uː] (3)
New York	[ju] (27) ······ [u] (3)
avenue	[juː] (12) ······ [uː] (18)
nuclear	[juː] (18) ······ [uː] (12)
grew	[u] (29) ······ [ju] (1)

Among the thirty informants, twenty-seven pronounced [u] and [ju] interchangeably in the environment where both [u] and [ju] are expected in GA (e.g. *new* and *dew*), while only one informant pronounced [ju], and the rest consistently [u]. We claim that [ɪu] is classified as a variant of [ju] in MT because [ɪu] always appeared only where [ju] was expected in GA. The diphthong [ɪu] occurred dominantly only in *view* and *few*; the vowels in these two words must appear in the special environment where [ju] is replaced by [ɪu].

In the case of the words in the first section of Table 13. 1, *boot, view, cute, butte* and *music,* their vowels are all preceded by the consonants which are featured by [−cor]. In addition, the vowel in *boot* is [u] in GA, while the vowel in the others is [ju].

In *boot,* two informants pronounced [ʊ] instead of [u]. It seems that an analogy from other English words which are spelled *−oo−* takes place here. Griesy and Yanoshita (1986) point out that the vowel with the spelling of *−oo−* is pronounced [u] if it is followed by a consonant with the feature of [+cont] (e.g. *school* and *spoon*), and the vowel is pronounced [ʊ] if it is followed by a consonant with the feature of [−cont] (e.g. *good, look* and *root*). The vowel in *boot* is followed by [t] with the feature of [−cont]. Therefore, the informants who pronouced [ʊ] in this word made a phonological analogy from [u] in *boot* to [ʊ] in *good, look, root* and so forth.

From among the words listed in Table 13.1, *view* and *few* are the only cases in which [ɪu] is dominant. Let us explain the reason why [ɪu] is dominant only in *view* and *few*, and not in *cute, butte* and *music.* The CV pattern, as well as the CCV and CCCV patterns, is dominant in English. In a CV pattern, the preceding segment is expected to be consonantal, and the following one vowellike. When we analyze [ju] and its preceding consonant, it is C_2C_1V, with C_1 as the semi-vowel [j], and V as the vowel [u]. The phonological matrix of [j] and [u] is $\begin{bmatrix} -syl \\ +cont \end{bmatrix}$ and $\begin{bmatrix} +syl \\ +cont \end{bmatrix}$ respectively. That is, [j] functions as a semi-vowel in relation to the vowel [u], because [j] is featured by [−syl] as are all the other English consonants. If this relationship works in the combination of the two neighboring segments, the C_1V pattern (i.e. the combination of [j] to [u] in this discussion) is stable. As for the relationship between C_2 and C_1, the former has to be a consonant which is featured by $\begin{bmatrix} -syl \\ -cont \end{bmatrix}$ so that the C_2C_1 sequence can be stable. As a whole, if both C_1 and V, and C_2 and C_1 are well-balanced, then the sequence C_2C_1V will be stable. In cases such as *cute, butte* and *music,* the C_2C_1V pattern applies; in these three words, the consonants which occupy the position of C_2 are [k], [b], and [m], which are all featured by $\begin{bmatrix} -syl \\ -cont \end{bmatrix}$. That is, C_2 and C_1 are featured by $\begin{bmatrix} -syl \\ -cont \end{bmatrix}$ and $\begin{bmatrix} -syl \\ +cont \end{bmatrix}$, so they retain the feature difference of [±cont], and [ju] was dominant in these words. What about the cases of *view* and *few* ? Why was [ɪu] dominant in these two words ? C_2 in this case is [v] or [f], which is featured by $\begin{bmatrix} -syl \\ +cont \end{bmatrix}$. That is, C_2 and C_1 have the same feature in so far as we can see the contrast between these two features. Consequently, the semi-vowel [j] (i.e. C_1) is replaced by the vowel [ɪ] in order to create a CVV pattern. In this process, [ɪ] is selected because the only contrastive feature between [j] and [ɪ] is [±son]. The high front vowel [ɪ] with the feature matrix of $\begin{bmatrix} +syl \\ +cont \end{bmatrix}$ constitutes the diphthong [ɪu]. Thus, [ɪu] appears

dominantly in *view* and *few*. Note Figure 3 for a breakdown of the words under discussion:
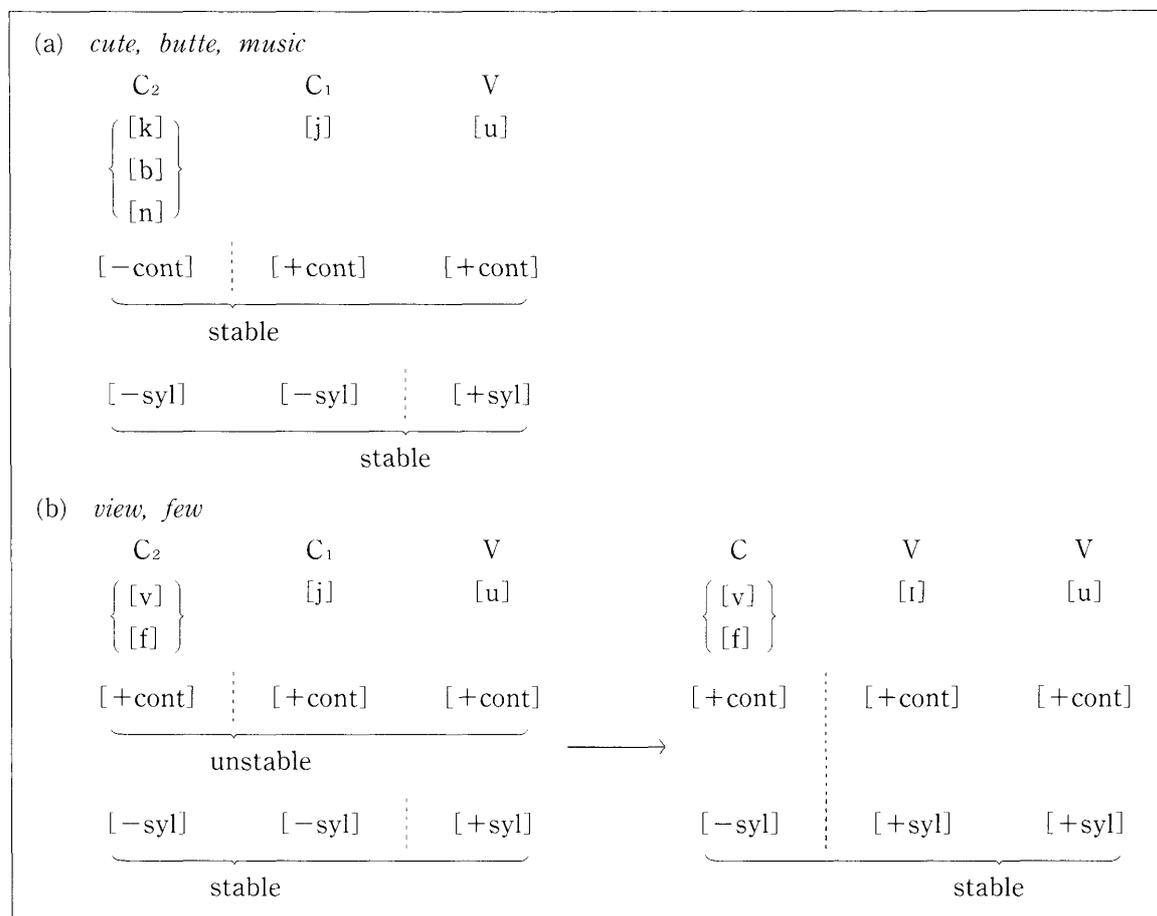

Figure 3

Turning our attention to the other words in Table 13.1, among which are *to, do, too, tune, stew, stewardess, dew, duke, new, knew, New York, avenue, nuclear* and *grew*. We note that the vowel in these words are all featured by [+cor]. These consonants prevent the semi-vowel [j] from being pronounced because the consonants and [j] are all articulated with the front of the tongue raised from a neutral position. According to Kenyon (1962), [u] is becoming more dominant than [ju] in these words. As far as our data are concerned, [ju] and [u] compete in *tune, stew, stewardess, duke, avenue* and *nuclear* in MT.

Twenty-nine informants pronounced the vowel in *to*, [ə], and only one informant eliminated the vowel. *To* is a function word and the phonetic symbol [ə] is described as a vowel with a weak form in dictionaries. This word was pronounced [tə] rather than [tu] because it is not prominent in a context. The diphthongs [ju] and [ɪu] were heard in *too, do* and

grew, while GA pronunciation of the vowel in these words are [u]. According to RHD, the belief that [ju] is more prestigeous than [u] sometimes leads speakers to hypercorrection. Consequently, the semi-vowel [j] appears where it is not expected (cf. *noon* [njuːn]). We assume that [ju] in *too, do* and *grew* came from the above-mentioned hypercorrection. As for another possibility, the informants who pronounced [ju] in these words might be influenced by New England pronunciation because [ɪu] is heard in such words as *two, do* and *smooth* in some varieties of this pronunciation (Kenyon, 1962).

Finally, [uː] was heard in *new* more often than [ju], while [ju] was dominant in *knew*. We assume that this twofold distinction between these two words occurred due to 'blocking'. In authorized dictionaries, both *new* and *knew* are represented by the phonetic symbols [nju] and [nu], but they are distinguished from each other by the pronunciation of their vowels. *Do* and *dew* may be confused if *dew*, which has the two phonetic symbols [du] and [dju] in GA, is pronounced [du]. However, what is interesting is that only two informants distinguished between the vowels in these two words: all the others pronounced them identically as [u], [ju] or [ɪu]. See Table 13.2 below:

Table 13. 2

[u], [ju], [ɪu] :

(i) GA: $\begin{Bmatrix} [u] \\ [ju] \\ [ɪu] \end{Bmatrix}$ ······ MT: $\begin{Bmatrix} [u] \\ [ju] \\ [ɪu] \end{Bmatrix}$

(ii) *boot*: $\begin{Bmatrix} [but] \\ [bʊt] \end{Bmatrix}$

(iii) ju ⟶ u/ $\begin{bmatrix} C \\ +cont \end{bmatrix}$ _____ (e.g. *view, few*)

(iv) hypercorrection: [ju] in *too, do, grew*

(v) *new*: [nu] vs. *knew* : [nju]

(vi) *do*: $\begin{Bmatrix} [du] \\ [dju] \\ [dɪu] \end{Bmatrix}$ vs. $\begin{Bmatrix} [du] \\ [dju] \\ [dɪu] \end{Bmatrix}$

4. 1. 11. [ɚ] and *r*-diphthongs

The mid central retroflex vowel [ɚ] appeared in words such as *hurry, curry, courage, turkey, hurt, work, girl, first, bird, heard, manner, paper, after, diner, dinner, stewardess, winter, summer, pleasure, older, were, near, year, nuclear, there, tear, farmhouse, park, far, morning, mourning, for, before, tire* and *fire*. The following Table 14.1 categorizes these words:

Table 14. 1

hurry	[ɚ] (29) ⋯⋯ [ʊɚ] (1)
curry	[ɚ] (29) ⋯⋯ [ʊɚ] (1)
courage	[ɚ] (30)
turkey	[ɚ] (29) ⋯⋯ [ʊɚ] (1)
hurt	[ɚ] (30)
work	[ɚ] (30)
girl	[ɚ] (29) ⋯⋯ [ʊɚ] (1)
first	[ɚ] (29) ⋯⋯ [ʊɚ] (1)
bird	[ɚ] (29) ⋯⋯ [ʊɚ] (1)
heard	[ɚ] (30)
manner	[ɚ] (29) ⋯⋯ [ə] (1)
paper, after, diner, dinner, stewardess, winter, summer, pleasure, older, were	[ɚ] (30)
near	[ɪɚ] (30)
year	[ɪɚ] (30)
nuclear	[ɪɚ] (22) ⋯⋯ [ɚ] (8)
there	[əɚ] (10) ⋯⋯ [ɛɚ] (10) ⋯⋯ [eɚ] (10)
tear	[iɚ] (5) ⋯⋯ [ɪɚ] (2) ⋯⋯ [eɚ] (22) ⋯⋯ [ɛɚ] (1)
farmhouse	[ɑɚ] (30)
park	[ɑɚ] (30)
far	[ɑɚ] (30)
morning	[ɔɚ] (30)
mourning	[ɔɚ] (30)
for	[oɚ] (30)
before	[oɚ] (30)
tire	[ɪɚ] (30)
fire	[aɪɚ] (27) ⋯⋯ [aəɚ] (3)

In the words in the first section of Table 14.1, the primary stress was placed on the vowel. The retroflex [ɚ] was sometimes preceded by the backing onglide [ʊ]. In the words in the second section, the retroflex [ɚ] appeared in unstressed syllables. In the words of the last section, the diphthongs, [ɪɚ], [ɛɚ], [ɑɚ], [ɔɚ], [oɚ], and the triphthong [aɪɚ] and their variants could be heard.

In *hurry, curry, hurt, courage, first* and *bird,* the glide [ʊ] preceded the retroflex one. This retroflex with the glide [ʊ] was produced by two informants. We can divide these words in which [ʊɚ] was pronounced into three categories. The first category includes *hurry, curry* and *hurt.* In these three words, the two informants who pronounced [ʊɚ] retained their ME pronunciation. According to Kenyon (1962), the words which have the spelling of -*ir*-, -*er*- and -*ur*- used to be pronounced as they were spelled in ME. For example, *stir, term* and *hurt* were pronounced [stɪɚ], [tɛɚm] and [hʊɚt] in ME. As [ɚ] decreased, the glide [ə] began to appear between the preceding vowel and [ɚ] like in [stɪəɚ], [tɛəɚm] and [hʊəɚt]. In Early Modern English, [ɪ], [ɛ] and [ʊ] in these words were assimilated

into [ə], resulting in producing a vowel which is phonetically the same as [ɜ] (This mid central vowel is the one pronounced without retroflexion and is often heard in New England speech). This vowel change also took place when [r] occurred between vowels. After that, [ɪ] and [ɛ] were established in words such as *spirit* and *very*, although [u] was not (cf. Kenyon 1962). The second category is *courage*, which is spelled *-ou-*. *Courage*, coming from Old French, is influenced by other words of French origin, such as *coup*, *coupon* and *courier* which are spelled *-ou-* and phonetically transcribed as [u]. Therefore, the informant who pronounced [uɚ] might have generalized the vowels in these French origin words. The third category is characterized by *first* and *bird*. They do not have the letter *-u-* but [uɚ] was heard once. We can explain this occurence by means of the distinctive feature analysis of this word. If the contrast of the distinctive features of the neighboring segments is retained, a phonological sequence of segments becomes stable. In *bird* and *first*, the consonants preceding

the vowel are [b] and [f] with the feature matrix of $\begin{bmatrix} -\text{hi} \\ -\text{lo} \\ -\text{bk} \end{bmatrix}$. The feature of [r] is

the same as that of [b] and [f] while [u] is featured by $\begin{bmatrix} +\text{hi} \\ -\text{lo} \\ +\text{bk} \end{bmatrix}$. That is to say,

[u] appeared in between [b] and [ɚ] or [f] and [ɚ] in *bird* and *first*, and the segments with the same phonological features do not occupy their neighboring positions. Contrastively, [uɚ] did not occur in *work* and *girl*. In these words, the phonological sequences of [w] or [g] and [ɚ] can be considered to be stable in so far as the preceding consonants [w]

and [g] are featured by $\begin{bmatrix} +\text{hi} \\ -\text{lo} \\ +\text{bk} \end{bmatrix}$.

Observing the *r*-diphthongs, we note that the vowel in *nuclear* was pronounced [ɪɚ] by 22 informants and [ɚ] by the rest. RHD lists [njuːklɪɚ] as the most common pronunciation in American English; however, [njuːkjəlɚ], which comes from the metathesis between [l] and [j], is becoming more common, and is heard frequently among well-educated speakers although many people disapprove of this variant.

Morning and *mourning* were pronounced identically as [mɔɚnɪŋ] in our data, although some dialects distinguish these two as [mɔɚnɪŋ] and [moɚnɪŋ] respectively. Kenyon (1962) claims that the tendency for these two words to be phonetically identical occured recently; *morning* and *mourning* used to be distinguished from each other as [moɚnɪŋ] and [mɔɚn ɪŋ]. We believe that the distinction of pronunciation between these two words has been lost in MT.

Three informants pronounced [aɚ] instead of [aɪɚ] in *fire*. This phenomenon can be explained adequately by taking into consideration the difference in the degree of sonority of [a] and [ɪ] (see Table 8, p. 162). The degree of sonority of [a] is 10 and that of [ɪ] is 7. That is, [ɪ] was absorbed in [a] because of the high degree of the sonority of [a]. As a result, [ə] was left behind as a phonetic trace of [ɪ], and [aə] appeared (See 4.1.14., p. 176).

In the words *there* and *tear*, the vowels were pronounced in various ways. In *there*, the weak form [əɚ], the strong form [eɚ], and its variant [ɛɚ] appeared. *Tear* was taken as a verb or as a noun by the informants, so the vowel was read in various ways. See Table 14.2 for a summary of this discussion:

Table 14. 2

```
┌─────────────────────────────────────────────────────────────────┐
│ [ɚ] and r-diphthongs :                                           │
│   (i)  GA: [ɚ] ······ MT: [ɚ]                                    │
│              ⎧ (ii.1) in words which are spelled -ur- (e.g. hurry)│
│   (ii) [ʊɚ]:⎨ (ii.2) in French origin words (e.g. courage)       │
│              ⎩ (ii.3) in words such as first and bird             │
│                       ⎧ [njuːklɪɚ] ⎫                             │
│   (iii)  nuclear :    ⎨            ⎬                             │
│                       ⎩ [njuːkjəlɚ] ⎭                            │
│   (iv)  mourning : [mɔɚnɪŋ] vs. mourning : [mɔɚnɪŋ]              │
│                   ⎧ [faɪɚ] ⎫                                     │
│   (v)  fire :     ⎨        ⎬                                     │
│                   ⎩ [faəɚ] ⎭                                     │
└─────────────────────────────────────────────────────────────────┘
```

4. 1. 12. [ʌ]

The mid central lax vowel [ʌ] was heard in words such as *won, Stuffy, Sunday* and *bug.* In *won,* however, [ɔ] was dominant. Notice the following table:

Table 15. 1

won	[ɔ] (28)······[ɒ] (1)······[ʌ] (1)
Stuffy	[ʌ] (29)······[ɪ] (1)
Sunday	[ʌ] (30)
bug	[ʌ] (29)······[ɛ] (1)

In *won,* which is the past tense of *win,* 28 informants pronounced [ɔ], and 1 informant [ɒ], while the phonetic symbol of this vowel in GA is [ʌ]. We believe that [ɔ] and [ɒ] come from a phonological analogy; the vowel in *won* has only the phonetic symbol [ʌ], but many other words with the spelling -*on*- in themselves have two candidate vowels in GA; i. e. [ɑ] and [ɔ] which are exemplified by *bon, don, fond* and *pond.* Thus, the round vowels [ɔ] and [ɒ] come to appear. The other alternate reason is the phonological 'blocking' in relationship to *one. Won* and *one* with the phonetic symbol [wʌn] are homonyms in GA. *Won,* however, was pronounced [wɔn] or [wɒn] by our American informants.

In *Stuffy,* which is the nickname of a dog in Reading (I), one informant pronounced [ɪ]. It seems that the principle of 'economy' is functioning in this case. The vowel *Stuffy* is positioned between the alveolar [t] and the labiodental [f] which are both featured by [+ant]. The articulation point of the high front vowel [ɪ] comes closer to that of [t] and [f] than that of the mid central vowel [ʌ]. As a result, one informant pronounced [ɪ] instead of [ʌ] in this word. See Table 15.2 below:

Table 15. 2

```
┌─────────────────────────────────────────────┐
│ [ʌ]:                                         │
│   (i)  GA: [ʌ] ······ MT: [ʌ]                │
│   (ii) won : [wɔn]                           │
│                      ⎧ [stʌfɪ] ⎫            │
│   (iii)  Stuffy :    ⎨         ⎬            │
│                      ⎩ [stɪfɪ] ⎭            │
└─────────────────────────────────────────────┘
```

4. 1. 13. [ə]

The mid central lax vowel [ə] is articulated at almost the same tongue position as [ʌ] although [ə] appears in unstressed syllables. In our data, [ə] was heard in words such as *recognize, miracle, accepting, helpless, avenue, at, and, of, a, but, the* and *haven't.* The variants of [ə], [ɪ] and [ɛ], appeared in the words listed in the first section of Table 16.1 below, while [ə] was sometimes eliminated in the words listed in the second section:

Table 16. 1

recognize	[ə] (28) ······ [ɪ] (2)
miracle	[ə] (28) ······ [ɪ] (2), [ə] (29) ······ [ɪ] (1)
accepting	[ə] (14) ······ [ɛ] (15) ······ [æ] (1)
helpless	[ə] (1) ······ [ɛ] (29) ······ φ (1)
avenue	[ə] (1) ······ [ɛ] (29)
at	[æ] (28) ······ [a] (1) ······ φ (1)
and	[ə] (29) ······ φ (1), [ə] (27) ······ φ (3)
of	[ə] (29) ······ φ (1)
a	[ə] (30), [ə] (4) ······ [e] (13) ······ [eɪ] (13)
but	[ə] (29) ······ φ (1), [ə] (29) ······ [ɛ] (1)
the (before a C)	[ə] (28) ······ φ (2), [ə] (29)
the (before a V)	[ə] (12) ······ [ɪ] (18)
haven't	[ə] (29) ······ φ (1)

The vowel in *recognize* and *miracle* are [ə] in GA, while [ɪ] was also heard in our data. According to Takebayashi (1982), the exchange of the weak vowel [ə] for [ɪ] takes place more frequently in American English than in Queen's English. Furthermore, the exchange of vowels can be accounted for in terms of the phonological priciple of 'economy'. The weak vowel [ə] is raised when it precedes a velar consonant (cf. Takebayashi, 1982). The velars [k], [g] and [ŋ] are featured by [+hi]. Therefore, [ɪ] which is [+hi] is more economical than [ə] which is [−hi]. Thus, [ə] is replaced by [ɪ].

Vowel reduction occurred in *accepting*. The initial vowel in here is [æ] in GA, but only one informant pronounced [æ] in our data. The initial vowel in this word is positioned in an unstressed syllable. Unstressed vowels in English tend to be reduced to [ə]; in fact [ə] was pronounced by 14 informants and another 15 pronounced the fronted variant of [ə]. We transcribe this variant of [ə] as [ɛ] here because it was articulated as [ə] which is phonetically closer to [ɛ] than [ə]. It seems therefore that this fronted variant [ɛ] comes about from the vowel reduction of [æ] to [ə].

In *helpless* and *avenue*, [ɛ] also appeared. The vowel in these words is the weak vowel [ɪ] in GA, but [ɛ] was dominant in MT. Since the vowel in here corresponds to the spelling -e-, it is likely that this phenomenon comes from the correspondence between pronunciation and spelling.

All the words in the second section of Table 16.1 are function words. The vowels in these words were sometimes eliminated because function words are not usually prominent in context. As for the indifinite article *a*, however, the strong form [eɪ] and [e], and the weak form [ə] appeared interchangeably. In order to explain this interchange, we have to

take account of the syntactic environment where the indifinite article *a* appears. Notice the following examples :

   (a)   ······ *he gave Stuffy a dinner.* (Reading Ⅰ)

   (b) *I haven't recognized a team you mentioned.* (Reading Ⅱ)

The indifinite article *a* both in (a) and (b) appear with the direct object. However, *a* in (a) was pronounced [eɪ] by 13 informants, [e] by another 13, and [ə] by 4 informants, while [ə] was dominant in (b). In other words, [eɪ] and [e] were heard when the indirect object was positioned between the predicate verb and [ə] when its direct object was positioned together. That is, if a direct object is distant from its predicate verb, a relatively strong stress is placed on *a* in order to make the grammarical relationship between the verb and the direct object clearer.

In the case of the definite article *the*, [ə] appeared when the following word began with a consonant, and [ɪ] when it began with a vowel. Notice the following examples:

   (c) *The old gentleman's eyes were bright* ····· (Reading (Ⅰ))

   (d) *Who wins the pennants then ?* ·····(Reading (Ⅱ))

   (e) *The Miracle Mets won an exciting World Series* ····· (Reading (Ⅱ))

In (c), the vowel in *the* was pronounced [ɪ] by 18 informants, and [ə], by 12 informants while only [ə] was heard in (d) and (e). As we mentioned earlier in this chapter, the CV pattern is dominant in English. Furthermore, if consonants and vowels appear in every other position in a phonological sequence, then the sequence will be stable. In (d) and (e), *the* and its following consonant, [p] or [m], is symbolized as CVC, which is stable. In (c), however, *the* ([ðə]) and its following vowel [o] make the phonetic combination of CVV, which is not stable. The two vowels occupy the final position in this combination, and stress is placed on the vowel in *the* to make clear the difference between the two vowels. Thus, the high front vowel [ɪ] rather than the 'schwa' [ə] is pronounced in *the*. The following table summarizes this discussion:

Table 16. 2

[ə]:

   (i) GA: [ə] ······ MT: [ə]

   (ii) ə ⟶ ɪ / _____ $\begin{bmatrix} -\text{cont} \\ +\text{high} \end{bmatrix}$ (e.g. *recognize*)

   (iii) *accepting* : $\left\{ \begin{array}{l} [\text{əksɛptɪŋ}] \\ [\text{ɛksɛptɪŋ}] \\ [\text{æksɛptɪŋ}] \end{array} \right\}$

   (iv) spelling pronunciation : [ɛ] in *helpless* and *avenue*

   (v) *a* (indef. art.) : $\left\{ \begin{array}{l} (\text{v. 1}) \left\{ \begin{array}{l} [\text{eɪ}] \\ [\text{e}] \end{array} \right\} \text{in direct object (after indirect object)} \\ (\text{v. 2}) [\text{ə}] \text{ in direct object (after predicate verb)} \end{array} \right.$

   (vi) *the* (def. art.) : $\left\{ \begin{array}{l} (\text{v. 1}) [\text{ðə}] \text{ before a consonant} \\ (\text{v. 2}) [\text{ðɪ}] \text{ before vowel} \end{array} \right.$

4. 1. 14. [aɪ]

The fronting diphthong [aɪ] was heard in words such as *I, eyes, my, pie, spy, time, sixty-nine, nine, find, right, bright, life, ice, eyes, like* and *dinner*. The two segments in [aɪ] were generally pronounced clealy, but several variants were heard: i. e. [aə], [əː], [əɪ] and [ɛɪ]. See the breakdown of these variants in Table 17.1 below:

Table 17. 1

I (Pairs Test)	[aɪ] (27) ⋯⋯ [aə] (3)
I (I don't..)	[aɪ] (24) ⋯⋯ [əːɪ] (5) ⋯⋯ [əː] (1),
	[əɪ] (8) ⋯⋯ [əː] (1), [aɪ] ⋯⋯ (21)
	[aɪ] (28) ⋯⋯ [əɪ] (2)
I (I like..)	[aɪ] (12) ⋯⋯ [aə] (18)
I (I haven't..)	[aɪ] (27) ⋯⋯ [əɪ] (3)
I'm	[aɪ] (15) ⋯⋯ [əː] (15), [aə] (24) ⋯⋯ [əː] (6)
eye	[aɪ] (27) ⋯⋯ [aə] (3)
eyes	[aɪ] (26) ⋯⋯ [aə] (4)
my	[aɪ] (28) ⋯⋯ [aə] (2)
pie	[aɪ] (23) ⋯⋯ [aə] (7)
spy	[aɪ] (30)
time	[aɪ] (29) ⋯⋯ [aə] (1), [aɪ] (25) ⋯⋯ [aə] (4) ⋯⋯ [ɛɪ] (1)
sixty-nine	[əɪ] (29) ⋯⋯ [əː] (1)
nine	[aɪ] (26) ⋯⋯ [aə] (4)
find	[aɪ] (21) ⋯⋯ [əː] (8) ⋯⋯ [ɛə] (1)
right	[aɪ] (29) ⋯⋯ [əɪ] (1)
bright	[aɪ] (27) ⋯⋯ [əː] (2) ⋯⋯ [ɛɪ] (1)
life	[aɪ] (29) ⋯⋯ [ɛɪ] (1), [aɪ] (24) ⋯⋯ [aə] (6)
ice	[aɪ] (30)
like	[aɪ] (29) ⋯⋯ [aə] (1)
dinner	[aɪ] (30)

The second segment [ɪ] in [aɪ] is reduced to [ə] frequently in many English words. As we discussed earlier in this chapter, the vowels in English are phonetically related to their following consonants which trigger the production of a number of vowel variants. In the case of the diphthong [aɪ], we believe that the primary reason for the reduction of [ɪ] in [aɪ] into [ə] is a difference in the degree of sonority between [a] and [ɪ]. The degree of sonority of [a] and [ɪ] are 10 and 7 respectively (see Table 8. p. 162). The latter segment [ɪ] with the lower degree of sonority is assimilated into [a], changing itself into [ə]. Thus, [aə] appeared in *I, my, pie,* and *spy* in our data. The same thing happens in the cases of [eɪ] and [ɔɪ] (see 4. 1. 3, pp. 157−159, and 4. 1. 16, p. 179). Therefore, we claim that the fronting diphthongs, [aɪ], [eɪ] and [ɔɪ], have this tendency. The variant, [aə] also appeared when certain consonants followed the vowel. In *I* in *"I like," time, nine, life* and *eyes,* [l], [m], [n], [f] and [z] follow the vowel, while in the case of I in *"I like,"* a word boundary exists between [aɪ] and [l] ; we here included *I* in the context of *"I like"* because the personal pronoun *I* is not considered to be prominent in reading context unless a reader psychologically

places stress on it. Because of this, *I* is influenced by the neighboring segments. The degree of the sonority of the liquid [l] is 5, and that of the nasals [m] and [n] is 4, which is higher than that of all the stops and fricatives. That is to say, these consonants function as phonetic "catalyzers" to reduce [ɪ] in [aɪ] into [ə]. The voiced and voiceless fricatives [z] and [f] have the degree of sonority 1. It seems, however, that the feature of [+cont] which is common to [z] and [f] triggers the production of [aə].

Another variant [əɪ] was heard in *I'm, sixty-nine, find, right* and *bright,* all of which were included either in the Reading (I) or Reading (II). We assume that [a] in [aɪ] is replaced by the weak vowel [ə], when a strong stress is not placed on it in a context. Furthermore, the diphthong [əɪ] was sometimes reduced to the long vowel [əː], especially in *I'm* and *find* ; fifteen informants pronounced [əː] in *I'm* and 8 informants in *find.* The nasals [m] and [n] are also 'catalyzers' causing the reduction of [əɪ] into [əː] in these cases. The following table shows a summary of this discussion:

Table 17. 2

$$
\begin{array}{l}
\text{[aɪ]:} \\[6pt]
\text{(i) GA: [aɪ] } \cdots\cdots \text{ MT: } \left\{ \begin{array}{l} \text{[aɪ]} \\ \text{[aə]} \\ \text{[əɪ]} \\ \text{[əː]} \end{array} \right\} \\[24pt]
\text{(ii) aɪ} \longrightarrow \text{aə/} \underline{\quad}\# \quad \text{(e.g. } pie\text{)} \\[12pt]
\text{(iii) aɪ} \longrightarrow \text{aə/} \underline{\quad} \left\{ \begin{array}{l} \text{[+lat]} \\ \text{[+nas]} \\ \text{[+cont]} \end{array} \right\} \text{(e.g. } I \text{ } like, \text{ } nine \text{ and } eyes\text{)} \\[24pt]
\text{(iv) } \left\{ \begin{array}{l} \text{[əɪ]} \\ \text{[əː]} \end{array} \right\} \text{ in case the vowel is not prominent}
\end{array}
$$

4. 1. 15. [aʊ]

The backing diphthong [aʊ] appeared in words such as *mouth, mouse, out, about, house, thousand, Brown, down* and *cow.* The variant [æʊ] was dominant in *down* and *cow.* Another variant, [əʊ], also appeared in *out* and *down.* Note the variants in Table 18.1 below:

Table 18. 1

mouth	[aʊ] (22) ⋯⋯ [æʊ] (8)
mouse	[aʊ] (23) ⋯⋯ [æʊ] (7)
house	[aʊ] (27) ⋯⋯ [æʊ] (3)
about	[aʊ] (23) ⋯⋯ [æʊ] (7)
out	[aʊ] (16) ⋯⋯ [æʊ] (13) ⋯⋯ [əʊ] (1)
thousand	[aʊ] (30)
Brown	[aʊ] (29) ⋯⋯ [æʊ] (1)
down	[aʊ] (10) ⋯⋯ [æʊ] (19) ⋯⋯ [əʊ] (1)
cow	[aʊ] (1) ⋯⋯ [æʊ] (19)

We assume that the variant [æʊ] occurs when a speaker places stress on it, and [əʊ] when he/she does not. The tongue position of [æ], [ə] and [ʊ] is low front, mid central and high back, respectively; the two segments of [æʊ] are articulated at positions more distant from each other than those of [aʊ], while the two segments of [əʊ] are articulated closer to each other than those of [aʊ]. Therefore, [æʊ] comes to be pronounced when a speaker can differentiate the two segments of the diphthong more clearly than those of [aʊ]. On the other hand, [əʊ] is heard when the speaker does not place stress on the vowel. Shuy (1967) lists the diphthong [æʊ] as a unique variant of the Midland dialects and some of the Southern varieties. Since [æʊ] was heard frequently in our data, the informants may be influenced from the Midland or Southern pronunciation of [aʊ].

It seems that the first segment of [aʊ] tends to be replaced by [æ] when the diphthong is followed by a nasal consonant, or is placed in word-final position. We claim that the nasals [m], [n] and [ŋ] are effective enough to replace the first segment of [aʊ] by [æ] because the degree of sonority of the nasals is 4 which is higher than that of all the voiceless consonants, voiced stops and fricatives. Therefore, [æʊ] was dominant in *down*. In the case of *Brown*, [æʊ] was pronounced by only one informant, and [aʊ] by the others. The vowel in *Brown* is also followed by the nasal [n], but we have to take into account the semi-vowel [r] which precedes the diphthong. In this case, [r] with the degree of sonority 6 prevents [aʊ] from being replaced by [æʊ]. The tongue position of [r] is mid central, and that of [a] and [æ] is low central and low front, respectively; that is, [r] works to retain [a] in [aʊ] because the tongue position of [a] is closer to that of [r] than the position of [æ]. Thus, [aʊ] was dominant in *Brown*.

In the case of *cow*, the vowel in it is placed in word-final position, and was pronounced [æʊ] by 29 informants. We assume that [æʊ] is preferred to [aʊ] in this position when a speaker psychologically places prominence on the vowel in order to emphasize the word.

Among the words in the first section of Table 18.1, [æʊ] was heard more frequently in *out* than in the other listed words. The vowel in *here* is placed in word-initial position. In this case, no phonetic segment, which might prevent the vowel exchange of [a] for [æ] like [r] in *Brown*, precedes the vowel. Therefore, the vowel exchange in a word in which [aʊ] is placed in word-initial position functions more freely than in a word in which consonants precede the vowel. See Table 18.2 below:

Table 18. 2

[aʊ]:
(i) GA: [aʊ] ⋯⋯ MT: $\left\{ \begin{array}{c} [aʊ] \\ [æʊ] \end{array} \right\}$
(ii) $\left\{ \begin{array}{c} [æʊ] \\ [aʊ] \end{array} \right\}$ $\left\{ \begin{array}{l} \text{(ii.1) at word-final (e.g. } cow) \\ \text{(ii.2) before a nasal consonant (e.g. } down) \end{array} \right.$
(iii) *Brown* : $\left\{ \begin{array}{c} [braʊn] \\ [bræʊn] \end{array} \right\}$
(iv) *out* : $\left\{ \begin{array}{c} [aʊt] \\ [æʊt] \\ [əʊt] \end{array} \right\}$

4. 1. 16. [ɔɪ]

The fronting diphthong [ɔɪ] appeared in *boy*. Twenty-seven informants pronounced the fronting offglide [ɪ] clearly, while the other three replaced [ɪ] by [ə] as seen in Table 19.1:

Table 19. 1

boy	[ɔɪ] (27) ······ [ɔə] (3)

According to Kenyon (1962), the first segment of [ɔɪ] is sometimes pronounced [ɒ] in American English, although [ɔ] is generally heard. In our data, however, [ɒ] did not appear (See Table 19.2 below).

The reduction of the fronting offglide [ɪ] into the centralizing one [ə] can be explained adequately by considering the degree of sonority as in the case of [aɪ] in 4.1.14. The degree of the sonority of [ɔ] and [ɪ] is 9 and 7, respectively (cf. Table 8,). Therefore, the lower degree of the sonority of [ɪ] is absorbed into the higher degree of the sonority of [ɔ]. And the phonetic trace [ə] is left behind in place of [ɪ]. Thus, the centralizing diphthong [ɔə] comes to be realized:

Table 19. 2

$$
[ɔɪ]: \\
\text{GA:} \left\{ \begin{matrix} [ɔ\,ɪ] \\ [ɒɪ] \end{matrix} \right\} \cdots\cdots \text{MT:} \left\{ \begin{matrix} [ɔə] \\ [ɔɪ] \end{matrix} \right\}
$$

4. 2. Summary

In this paper, we discussed MT vowels which consist of GA vowels and their variants. Table 20 shows the summary of our analysis of MT vowels compared with GA vowels.

Table 20

[i]	(i) GA: [i] ······ MT: [i] (ii) *creek* : $\left\{ \begin{matrix} [krik] \\ [krɪk] \end{matrix} \right\}$ (iii) *speak* : $\left\{ \begin{matrix} [spik] \\ [speɪk] \end{matrix} \right\}$
[ɪ]	(i) GA: [ɪ] ······ MT: [ɪ] (ii) ɪ ⟶ ə / $\left[\overline{} \atop -\text{stress} \right]$ (e.g. *himself*) (iii) *helpless* : $\left\{ \begin{matrix} [helplɛs] \\ [helples] \end{matrix} \right\}$ (iv) ɪ ⟶ i / ____ $\begin{bmatrix} +\text{ant} \\ +\text{cor} \\ +\text{vd} \end{bmatrix}$ (e.g. *film*) (v) *believe* : [bliːv]

[e]	(i) GA: [e] ······ MT: $\begin{Bmatrix} [eɪ] \\ [e:] \\ [e] \end{Bmatrix}$ (ii) *Sunday* : [sʌndeɪ] (iii) eɪ ⟶ ẽɪ / ___ $\begin{bmatrix} C \\ +nas \end{bmatrix}$ (one-syllabled word like *main*) (iv) eɪ ⟶ iɪ / ___ $\begin{bmatrix} C \\ -son \end{bmatrix}$ (e.g. *race*) (v) *tail* : [teəl]
[ɛ]	(i) GA: [ɛ] ······ MT: $\begin{Bmatrix} [e] \\ [ɛ] \end{Bmatrix}$ (ii) ɛ ⟶ ɪ / ___ $\begin{bmatrix} +cor \\ +ant \end{bmatrix}$ (e.g. *getting*) (iii) ɛ ⟶ ɛə / ___ $\begin{bmatrix} +ant \\ +cor \\ +str \end{bmatrix}$ (e.g. *fresh*) (iv) *men* : $\begin{Bmatrix} [men] \\ [meɪn] \\ [mẽɪn] \end{Bmatrix}$ (v) *merry* : [merɪ] vs. *Mary* : [merɪ]
[æ]	(i) GA: [æ] ····· MT: $\begin{Bmatrix} [æ] \\ [a] \end{Bmatrix}$ (ii) æ ⟶ a / ___ $\begin{Bmatrix} \# \\ \begin{bmatrix} C \\ -vd \end{bmatrix} \end{Bmatrix}$ (e.g. *half*) (iii) *aunt* : $\begin{Bmatrix} [æ:nt] \\ [ɑ:nt] \end{Bmatrix}$ (iv) *ask* : $\begin{Bmatrix} [æsk] \\ [ask] \\ [æəsk] \end{Bmatrix}$
[ɑ]	(i) GA: [ɑ] ······ MT: [ɑ] (ii) *ma* : $\begin{Bmatrix} [mɑ:] \\ [mæ] \end{Bmatrix}$
$\begin{Bmatrix} [ɑ] \\ [ɔ] \\ [ɒ] \end{Bmatrix}$	(i) GA: $\begin{Bmatrix} [ɑ] \\ [ɔ] \end{Bmatrix}$ ······ MT: $\begin{Bmatrix} [ɑ] \\ [ɒ] \\ [ɔ] \end{Bmatrix}$ (ii) ɑ / ___ $\begin{bmatrix} C \\ -d.r. \end{bmatrix}$ (e.g. *talked*) (iii) *doc* : [dɒk] (iv) ɒ / ___ $\begin{bmatrix} C \\ +lat \end{bmatrix}$ (e.g. *all*) (v) ɒ / $\begin{bmatrix} -skl \\ +son \\ +rd \end{bmatrix}$ ___ (e.g. *want*)

[o]	(i) GA: [o] ······ MT: $\left\{ \begin{array}{l} [\text{oU}] \\ [\text{o}] \end{array} \right\}$ (ii) *won't* : [wount] (iii) oU $\longrightarrow$ o: / ____ $\left[\begin{array}{c} C \\ +\text{lat} \end{array} \right]$ (e.g. *cold*)
[U]	(i) GA: [U] ······ MT: [U] (ii) *understood* : $\left\{ \begin{array}{l} [\text{əndɚstUd}] \\ [\text{əndɚstʌd}] \end{array} \right\}$
$\left\{ \begin{array}{l} [\text{u}] \\ [\text{ju}] \\ [\text{Iu}] \end{array} \right\}$	(i) GA: $\left\{ \begin{array}{l} [\text{u}] \\ [\text{ju}] \\ [\text{Iu}] \end{array} \right\}$ ······ MT: $\left\{ \begin{array}{l} [\text{u}] \\ [\text{ju}] \\ [\text{Iu}] \end{array} \right\}$ (ii) *boot* : $\left\{ \begin{array}{l} [\text{but}] \\ [\text{bUt}] \end{array} \right\}$ (iii) ju $\longrightarrow$ Iu / $\left[\begin{array}{c} C \\ +\text{cont} \end{array} \right]$ ____ (e.g. *view*) (iv) hypercorrection: [ju] in *too, do, grew* (v) *new* : [nu] vs. *knew* : [nju] (vi) *do* : $\left\{ \begin{array}{l} [\text{du}] \\ [\text{dju}] \\ [\text{dIu}] \end{array} \right\}$ vs. *dew.* $\left\{ \begin{array}{l} [\text{du}] \\ [\text{dju}] \\ [\text{dIu}] \end{array} \right\}$
[ɚ] *r*-diph-thongs	(i) GA: [ɚ] ······ MT: [ɚ] (ii) [Uɚ]: $\left\{ \begin{array}{l} \text{(ii. 1) in words which are spelled } \textit{-ur-} \text{ (e.g. } \textit{hurry}) \\ \text{(ii. 2) in French orgin words (e.g. } \textit{courage}) \\ \text{(ii. 3) in words such as } \textit{first, bird} \end{array} \right.$ (iii) *nuclear* : $\left\{ \begin{array}{l} [\text{njuːklIɚ}] \\ [\text{njuːkjəlɚ}] \end{array} \right\}$ (iv) *morning* : [mɔɚnIŋ] ······ *mourning* : [mɔɚnIŋ] (v) *fire* : $\left\{ \begin{array}{l} [\text{faIɚ}] \\ [\text{faəɚ}] \end{array} \right\}$
[ʌ]	(i) GA: [ʌ] ······ MT: [ʌ] (ii) *won* : [wɔn] (iii) *Stuffy* : $\left\{ \begin{array}{l} [\text{stʌfI}] \\ [\text{stIfI}] \end{array} \right\}$
[ə]	(i) GA: [ə] ······ MT: [ə] (ii) ə $\longrightarrow$ I/ ____ $\left[\begin{array}{c} -\text{cont} \\ +\text{high} \end{array} \right]$ (e.g. *recognize*) (iii) *accepting* : $\left\{ \begin{array}{l} [\text{əksɛptIŋ}] \\ [\text{ɛksɛptIŋ}] \\ [\text{æksɛptIŋ}] \end{array} \right\}$ (iv) spelling pronunciation : [ɛ] in *helpless, avenue* (v) *a* (indef. art.) : $\left\{ \begin{array}{l} \text{(v.1)} \left\{ \begin{array}{l} [\text{eI}] \\ [\text{e}] \end{array} \right\} \text{in direct object (after indirect object)} \\ \text{(v.2) [ə] in direct object (after predicate verb)} \end{array} \right.$ (vi) *the* (def. art.) $\left\{ \begin{array}{l} \text{(vi.1) [ðə] before a consonant} \\ \text{(vi.2) [ðI] before a vowel} \end{array} \right.$

[aɪ]	(i) GA: [aɪ] ⋯⋯ MT: $\left\{\begin{array}{c}[aɪ]\\ [aə]\\ [əɪ]\\ [ə:]\end{array}\right\}$ (ii) aɪ ⟶ aə/＿＿＿ # (e.g. *pie*) (iii) aɪ ⟶ aə/＿＿＿ $\left\{\begin{array}{c}[+lat]\\ [+nas]\\ [+cont]\end{array}\right\}$ (e.g. *I like, nine, eyes*) (iv) $\left\{\begin{array}{c}[əɪ]\\ [ə:]\end{array}\right\}$ in case the vowel is not prominent
[aʊ]	(i) GA: [aʊ] ⋯⋯ MT: $\left\{\begin{array}{c}[aʊ]\\ [æʊ]\end{array}\right\}$ (ii) $\left\{\begin{array}{c}[æʊ]\\ [aʊ]\end{array}\right\}$ $\left\{\begin{array}{l}\text{(ii.1) at word-final position (e.g. }cow)\\ \text{(ii.2) before a nasal (e.g. }down)\end{array}\right.$ (iii) *Brown* : $\left\{\begin{array}{c}[braʊn]\\ [bræʊn]\end{array}\right\}$ (iv) *out* : $\left\{\begin{array}{c}[aʊt]\\ [æʊt]\\ [əʊt]\end{array}\right\}$
[ɔɪ]	GA: $\left\{\begin{array}{c}[ɔɪ]\\ [ɒɪ]\end{array}\right\}$ ⋯⋯ MT: $\left\{\begin{array}{c}[ɔɪ]\\ [ɔə]\end{array}\right\}$

In this table, we can see all the GA vowels except [ɒɪ], and also their phonological variants cause to make this dialect diverse and colorful. These variants do not appear at random. Rather, they are systematic and rule-governed in terms of the socio-linguistic background, spelling of a word, 'blocking' by other words and the syntactic environment of a word. Another striking observation for us to consider is the distinctive features of vowels. We find many variants of phonological phenomena which are to be accounted for as assimilation or dissimilation of distinctive features. In these cases, segments with a high degree of sonority may work as phonetic "catalyzers". In addition, what we cannot overlook is that the phonological principle of 'economy' often functions to cause to produce these interesting phenomena.

5. Conclusion

Our research on the phonological aspects of vowels in the Montana dialect started from the data which were colleted from the informants in the State of Montana. The pronunciation of vowels in the Montana dialect was more varied than we had expected, causing us to consider the linguistic reasons for this variety.

In the course of our research, we first claimed that the present MT pronunciation, especially vowel pronunciation, was caused by the migration of various pioneering people to Montana

both from European countries and from many parts of America. We acknowledged that the geographic and historical conditions provided a significant phonological influence on the Montana dialect.

Second, we attempted to provide a reseach design in this paper. This design included the discussion of testing materials, informants, and several conditions necessary for obtaining credible data.

Third, we focussed on the phonological analysis of MT vowels in comparison with GA vowels on the basis of the data taken from the Interview Test. As a result, we found that a number of variants of GA vowels are due to historical, socio-cultural, and linguistic (syntactic and phonological) conditions, and that even a well-educated speaker does not necessarily have the same accent as other educated speakers; that is, each speaker produces variants of GA vowels in his／her own way.

Fourth, we took full advantage of the phonological distinctive feature analysis in this paper, and we proposed the importance of the phonological principles of 'economy' and 'catalysis'. Assimilation of one vowel into another takes place very often due to these two principles which are likely to produce variants such as those observed in the MT data.

Finally, as a result of the analysis of the variety of vowels found in the Montana data, we would like to conclude that there is no "standard speech" in the United States. In addition, we want to suggest that teachers of English in Japan should take into consideration the importance of mentioning regional dialects in addition to GA and the variety of English in their English class.

[APPENDIX]

(1) Word List

Hurry	Play	After	Live
Music	Lip	Curry	Tune
Candle	New	Nuclear	Time
House	Thousand	Gym	Turkey
Courage	Film	Few	Very
Ice	Hurt	Ask	Spy
Manner	Paper	Tape	Name
Work	Pie	Girl	Cow
Duke	Sunday	Cute	Aunt
View	Creek	Down	

(2) Pairs Test

Live — Leaver	Lack — Like	Back — Bake
Rays — Race	Mouth — Mouse	Main — Men
My — Ma	Bird — Bed — Bad	Do — Dew
First — Fast	Dinner — Diner	Girl — Gal
Tire — Tear	I — Eye	About — Out
Butte — Boot	Stew — Stewardess	
Take — Tail	Morning — Mourning	
Fire — Far	Sit — Seat	
Won't — Want	Rein — Rain	
Mary — Merry	Life — Laugh	

(3) Reading (I)

But the old Gentleman had no family. He lived in a room in one of the old houses near the park. In the winter he grew a few flowers there. In the spring he walked on Fifth Avenue. In the summer he lived in a farmhouse in the hills outside New York, and he talked of a strange bug he hoped someday to find. In the fall seasons he gave Stuffy a dinner. These were the things that filled the Old Gentleman's life.

Stuffy Pete looked up at him for a half minute, helpless and very sorry for himself. The Old Gentleman's eyes were bright with the giving-pleasure. His face was getting older every year, but his clothes were very clean and fresh.

And then Stuffy made a strange noise. He was trying to speak. As the Old Gentleman had heard the noise nine times before, he understood it. He knew that Stuffy was accepting.

(4) Reading (II)

Dr. Brown: All right, future boy. Let me give you a little test. Who's going to win the 1956 World Series ?

McFly: I don't know. That was almost thirty years ago, Doc Brown.

Dr. Brown: No, It's one year in the future. All right, I'm a Brooklyn fan. How many pennants and World Series do they win during the 1960s and '70s ?

McFly: I don't think they win any. Brooklyn's not even in the League.
Dr.Brown: No Bums ? No Brooklyn ? I don't believe it.
McFly: It's true.
Dr. Brown: It's crazy. Who wins the pennants then ?
McFly: The Miracle Mets won an exciting World Series in 1969, but I'm a San Diego
            Padre fan. I like the Chargers, too.
Dr. Brown: Mets ? Who are the Miracle Mets ? And San Diego ? Are you kidding me ?
McFly: No. Teams get changed around a lot.
Dr. Brown: Yeah. but not that much. I haven't recognized a team you mentioned.

References

Flexander, S. B. (1987) *The Random House Dictionary of the English Language, Second Edition,
    Unabridged* (RHD- II), Random House, Inc., New York.
Gove, P. B. (1961) *Webster's Third New World Dictionary, Unabridged* (Webster-III), G. and
    C. Merriam Company, Springfield, Mass.
Otsuka, T. and F. Nakajima (1982) *The Kenkyusha Dictionary of English Linguistics and Philology,*
    Kenkyusha, Tokyo.
Japan External Trade Organization (JETRO) (1987) *Beikoku Shubetsu Gaidobukku, Montana-shi*
    (Guidebook of the States in the U. S. A. : Montana)

Bibliography

Beltramo, A. F. (1981) 'Profile of a State : Montana,' in *Language in the U. S. A.,* (ed.) C.
    A. Ferguson and S. B. Heath, Cambridge · Univ. Press.
Bolinger, D. L. (1975) *Aspects of language,* Harcourt Brace Jovanovich, New York.
Chomsky, N. and M. Halle (1968) *The Sound Pattern of English,* Harper and Row Publishers,
    New York, Evanston, and London.
Coffey, J. E. (1989) 'The Language and Dialects of Pattern, Problems of Dialectal Study in
    the American West,' Universitetet i Bergen Institutt for Fonetikk og Lingvistikk Skriftferie,
    Nr. 28, Serie B (*Mars,* 1989).
Fujii, K. (1987) 'Gendai Amerika Hyojunhatsuon Oboegaki' (Notes on Current American Standard
    Pronunciation),' in *The Collected Articles on the English Longuage* vol. 21, Part 4.
Gimson, A. (1970) *An Introduction to the Pronunciation of English,* 2nd ed. Edward Arnold,
    London.
Griesy, P. V. and Y. Yanoshita (1986) *Sound Spelling Harmony Guidebook,* The College of
    Education, Kumamoto Univ., Kamome Publishing Company, Kumamoto.
Jakobson, R. (1987) 'Les lois phoniques du langage ecfanten et leur place dans la phonologie
    général,' (Translated by A. Izuyama) In S. Hattori (1976). (ed.) *Shitsugoshou to Gengogaku,*
    Iwanami, Tokyo.
Kenyon, J. S. (1962) *American Pronunciation,* George Wahr Publishing Company, Ann Arbor,
    Michigan.

Labov, W. (1972) *Sociolinguistic Patterns,* Univ. of Pennsylvania Press, Philadelphia.

McDavid, R. I. Jr. (1951) "Problems of Linguistic Geography in the Rockey Mountain Area,"
  reprinted in *Dialects in Culture,* Alabama Univ. Press., Alabama, 1976.

Nakamura, H. (1980) "The Vowels of American English," in *The Collected Articles on the English
  Language* vol. 14, Part 4.

Quirk R., S. Greenbaum, G. Leech, and J. Svartvick (1985) *A Comprehensive Grammar of the
  English* Language, Longman, London.

Shuy, R. A. (1967) *Discovery American Dialects,* National Council of Teachers of English.

Takebayashi, S. (1982) *Eigo Onseigaku Nyumon* (An Introduction to English Phonetics),
  Taishukan, Tokyo.

Trager. G. L. & H. L. Smith (1951) *An Outline of English Structure,* Studies in Linguistics,
  Occasional Papers 3, Norman, Okla. : Battenburg Press 3rd ed., Washington D. C.

Trudgill, P. (1974) *The Social Differentiations of English in Norwich,* Cambridge Univ. Press.

Wolfram, W. and R. Johnson (1985) *Phonological Analysis ; Focus on American English,* The
  Center for Applied Linguistics, Washington, D. C.