

A Language-Universal Tendency among Adolescents in the Production of Vowels : a Plan for Testing a Hypothesis Using Miyazaki Residents (Part 1)¹

Yuichi TODAKA

This is second in a series of studies on vowel shifts in Japanese and other languages to be conducted in the next few years. Based upon the findings of American English and of Japanese, we tentatively hypothesize that the tendency among adolescents to articulate vowels farther forward in the mouth is a language-universal phenomenon for the moment. And we are in the process of collecting a larger sample of Japanese data from 400 Miyazaki residents, since the data on which the hypothesis is based is limited both in number and methodology. We will not only test our hypothesis, but we will also examine the dialect-specific vowel rotation patterns of Miyazaki as a whole. Furthermore, we are also planning to gather data from residents of large cities such as Osaka and Tokyo in the next few years.

Key words : vowel shifts, apparent time, generational, age-grading

1. Introduction
 2. Research Methods
 3. Subjects/Experimental Procedures
 - 3.1 Subjects
 - 3.2 Reading Materials
 - 3.3 Experimental Procedures
 4. Final Comments
- References

¹This study is partly funded by Miyazaki Research Foundation during the academic year 2005.

1. Introduction

Japanese is extremely rich in dialectal variations. While various dialect divisions have been proposed on the basis of linguistic patterns taken holistically, the major divisions in Mainland Japan are (a) the Western dialect group; and (b) the Eastern dialect group.

While most studies on Japanese dialects center upon morpho-syntax, and lexical items (Hashimoto, 1969; Maekawa, 1989 as cited in Shibatani, 1990), phonological characteristics that have been reported as two opposing groups include: (a) the labiality of /u/; (b) the lengthening of one-mora words; and (c) the accentual system (Shibatani, 1990). The Eastern dialects generally have an unrounded /u/, while in the Western region it is rounded. In the Western dialects, one-mora words are lengthened and pronounced as two-mora words, e.g., Tokyo *ki* 'tree', *na* 'name': Osaka *kii*, *naa*. (see Shibata, 1962; Sawashima, 1971; Hattori, 1955; McCawley, 1968; Ushijima and Sawashima, 1972; Kato, 1983; Hibiya, 1988, Vance, 1980 for further examinations of phonological features).

Although various studies of dialects have been conducted, there have been only a few studies on sound change in Japanese that considered social factors such as age and gender. Among those, Inoue (1989), for instance, reported on some of the consonantal pronunciation changes (e.g., de-nasalization of word-medial /ga/, /gi/, /gu/, /ge/, and /go/) which had taken place among young people. Concerning vowel production, Inoue (ibid.) reported that there is a tendency among young speakers to pronounce /a/ farther forward in the mouth, which in turn triggers the narrowing of the articulation of /e/. In addition, young female speakers tend to articulate /ʃ/ as /s/, and this tendency is seen as a characteristic of 'burikko' articulation. Imanishi (via Internet) reported on the fronting of /u/ and /e/ by various dialect speakers (i.e., Izumo, Hirokai Village, Takajo and Tsugaru dialect speakers), which causes the vowels /i/ and /e/ to come closer to each other.

The same can be said about the previous studies of Miyazaki dialects. Miyazaki dialects can be roughly divided into (a) Morokata and (b) Hyuga dialects. The Morokata dialect is spoken in the southwestern regions of Miyazaki, and the Hyuga dialect, on the other hand, is spoken in the rest of the regions. Some of the prominent vowel features of Miyazaki dialects that have been reported are (a) the 7 vowel system (including centralized high and mid front vowels) used in the Gokase area (Hidaka, 1974); (b) a substitution of /i/ for /e/, and /u/ for /o/; and (c) frequent de-voicing of vowels in the

Kiyotake area (Hidaka, 1975). The features described here are, however, based on aural coding and are, therefore, tentative pending the incorporation of acoustic measurement.

As seen above, several studies of sound change in Japanese were conducted approximately a decade ago; however, very few investigations of vowel shifts in Japanese considering age and gender have been conducted recently nor have studies of vowel shifts in reference to those of other languages been conducted.

Concerning age differences, an interesting report has been made about the pronunciation of young American English speakers:

Young speakers, especially mobile ones, appear to be breaking with local patterns in favor of broader regional and perhaps even newly developing national ones. As the United States becomes more completely urbanized (integrated) in its social structure, the language will necessarily reflect that trend. The movement seems to be toward articulation of vowels farther forward in the mouth... (Dictionary of American Regional English, 1985, p. xlix).

Todaka (2005), therefore, conducted a preliminary study of vowel shifts in terms of age and gender variables. Todaka (ibid.) used 22 adolescent and elderly subjects residing in five different areas in Japan and acoustically compared their productions of monosyllabic words (i.e., /a/, /i/, /u/, /e/, and /o/). In this study, Todaka reported the following findings:

Concerning the age variable, he found that (a) adolescents tend to pronounce the vowels slightly farther forward; (b) the vowel space of the young male group is wider than that of their elderly male counterpart; (c) young females articulate all the vowels except for /a/ farther forward than their elderly counterparts; and that (d) the perceptual distance between /e/ and /u/ is not so prominent in the case of the young females while the same tendency is found between /i/ and /e/ in the case of the elderly females.

Regarding the gender variable, he found that (a) the vowel positions of the female groups are farther forward than those of the male counterparts except for /a/; and that (b) the vowel space of the young male group is much narrower than that of the young female group, which seems to be triggered by the forward movement of /o/.

The above results indicate that the tendency for the young to articulate vowels farther forward in the mouth is seen not only among young American English speakers, but also among young Japanese speakers. Though the number of subjects was small

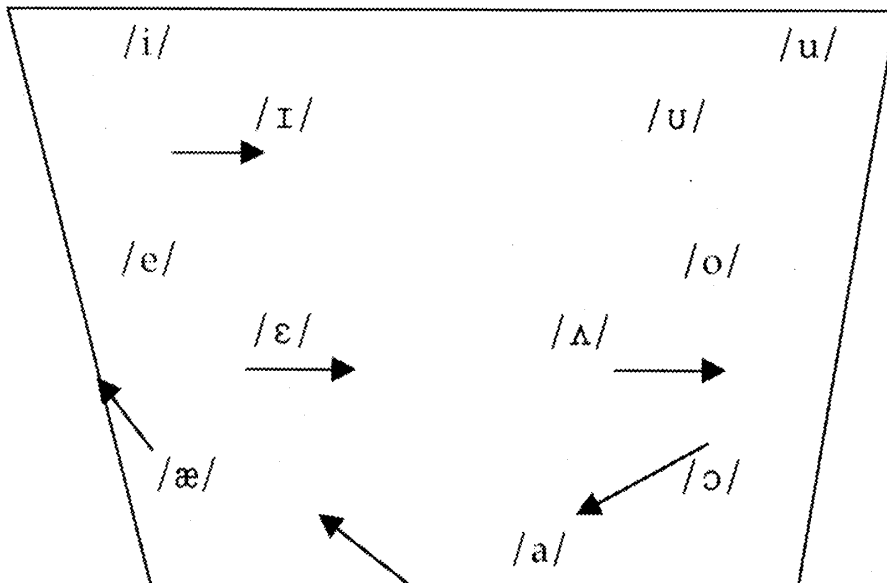
and the recording conditions were not kept constant, we can speculate that this tendency is a language-universal rather than language-specific feature. In other words, dialect and language-specific vowel rotation patterns have been observed both in Japanese and in American English; however, there might be a language-universal tendency among adolescents to produce vowels farther forward in the mouth.

If we hypothesize that there is a language-universal tendency among the young to produce vowels farther forward in the mouth, we can speculate that there exist two different kinds of language and/or dialect change in progress. In other words, there are language-specific changes in progress due to age-grading, generational, communal changes, or a mixture of some of these configurations, and even within a given language there are dialect-specific sound changes in progress caused by the aforementioned factors. However, there might be an entirely different language-universal tendency for young speakers to produce vowels farther forward in the mouth. Thus, the findings of the previous studies of vowel rotation patterns have been focusing on the inner circle of language change in progress (i.e., language and/or dialect-specific phenomena). On the other hand, there is also a language-universal change in progress among young speakers of different languages of the world at the same time. If so, we can represent the current language change in progress as shown in the following figures.

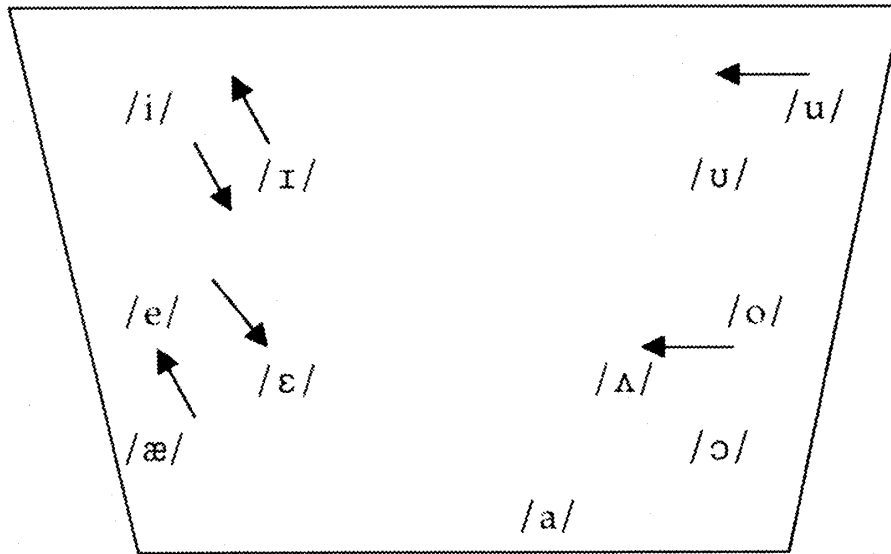
Figure 1. Pattern of vowel rotation in American English:

(1) Language-specific change in progress

(a) The Northern Cities Vowel Shift

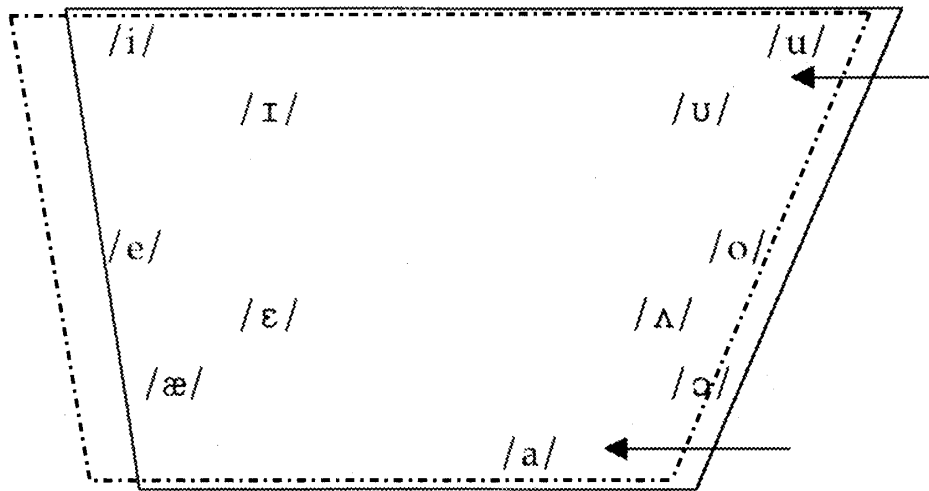


(b) The Southern Vowel Shift



adapted from Labov, 1991

(2) Language-universal change in progress



Although the above figures exemplify American English speakers, a similar vowel shift among young Japanese speakers has been found, as mentioned earlier.

Based upon the findings of American English and of Japanese, we tentatively hypothesize that the tendency among adolescents to articulate vowels farther forward in the mouth is a language-universal phenomenon for the moment. In addition, we are in

the process of collecting a larger sample of Japanese data, since the data on which the hypothesis is based is limited both in number and methodology. In addition, it is important to consider research techniques in analyzing prospective data, we shall overview the techniques utilized in recent studies of sound change.

2. Research Methods

Since the 1990s, there has been a great upsurge in cross-sectional and longitudinal research in sociolinguistics. This is because sociolinguists have been exploiting the possibility of conducting follow-up studies of communities studied in the past (Sankoff, 2002).

Those studies have been carried out based upon the concept of "apparent time" (i.e., inferring change in progress from synchronic observations) and of "real time" (i.e., basing analysis on diachronic observations).

The "apparent time" interpretation of changes in progress proposes that individuals in a community retain their childhood patterns but that each individual age cohort of speakers entering into the speech community is increasing (or decreasing) their use of particular variants of that community. In other words, the speech of different generations is interpreted as a reflection of the different stages in the history of that speech community (Gordon, 2001).

"Real time" interpretation, on the other hand, makes use of earlier observations of variants as benchmarks, so that the distribution of forms across generations may be distinguished from the possible observations of age-graded differences based on synchronic techniques.

A series of studies re-examining earlier observations of variants carried out in the past can disambiguate and disentangle the two interpretations of age grading and generational change for the particular community under investigation. In fact, various studies have been conducted to examine past data to verify that the observed differences should be attributed to either age grading or generational change.

For instance, in Copenhagen, Brink and Lund (1975) examined recorded speech data of several Danish speakers over many decades and found all speakers' phonological features to be stable. Labov and Auger (1998) also showed in a real-time study that a group of middle-aged American Philadelphia speakers retained their vowel productions over a 17-year time span. Daveluy's (1987) study of the variant forms of the feminine demonstrative "cette" in Montreal French and Lessard's study (1989) of the preposition "de"

in infinitival constructions using Daveluy's data found no change between the findings of 1971 and 1984 (cited in Sankoff, 2002).

There are, however, other studies reporting on age effects as an age grading phenomenon, rather than as evidence of real-time change. For instance, Thibault (1991) cited in Sankoff, 2002 studied the same 60 speakers who were interviewed in both 1971 and 1984 and reported that "the youngest speakers used more extension particles, but this tendency is lost after the teen years" (p. 129). Callou et al (1998), cited in Sankoff, 2002, reported on the same age grading phenomenon. They re-examined 10 of the 66 subjects of a study on the weakening of syllable- and word-final (r) in Carioca Portuguese conducted in the early 1970s. They reported that not only did the 10 re-interviewed subjects reduce their frequency of (r) deletion as they got older, but also the new sample of young people almost perfectly matched their peers of a generation earlier. Nonetheless, there are other studies reporting of a mixture of real-time change and age-grading (e.g., Labov, 1994; and Sankoff et al, 2001a). Thus, certain precautions must be taken before asserting age effects as change in progress. Gordon (2001) suggests that misdiagnoses of age-differences as change in progress based upon "apparent-time" reasoning should be guarded against by verifying observed apparent-time age effects in consultation with the records of previously mentioned studies conducted some time ago.

Thus, our follow-up study will make use of such anchors in real time by incorporating evidence from the recordings made earlier in the previous studies.

As residents of Miyazaki, we are planning to gather 20,000 utterances from 400 subjects in this study. In addition, some of the recordings made in the previous studies of Miyazaki dialects will be used as the anchors in real time.

The following section summarizes the methodology of the proposed study to be conducted in the next few months.

3. Subjects/Experimental Procedures

3.1 Subjects

400 Miyazaki residents will be asked to participate in the present study. The participants consist of 80 junior high school students (40 boys and 40 girls), 160 middle-aged, and 160 elderly residents of Miyazaki. All the middle-aged and elderly subjects are parents and grandparents of the adolescent subjects, respectively.

200 subjects reside in Miyazaki city, while the rest of the subjects live in the

Yamanokuchi area.

3.2 Reading Materials

As Inoue (1989) conducted a similar study and formulated a word list to be read, we will make use of this list for our study. The word list consists of 50 utterances which include all the consonants and vowels of Japanese in various phonetic environments.

3.3 Experimental Procedures

The material to be read aloud will be pre-amplified and recorded on a tape recorder. All the subjects will read a list of 50 sentences that contain five Japanese vowels at a normal speaking rate. Thus, a total of 20,000 (50 x 400 subjects) utterances will be measured.

Productions will then be digitized at a 12,800 Hz sampling rate, and the linear prediction polynomials in a frame of sampled data first computed. The complex roots of each polynomial will then be determined and each pair of roots is converted to its corresponding formant frequency and bandwidth using the Kay Computerized Speech Lab (CSL).

Anatomical differences between the subjects will be filtered out first by calculating the average F4 as an indicator of an individual's head size. Then, the obtained first and second formant values in frequency will be converted to percentages of the average F4 for each subject (Ladefoged, 1993). In addition, the obtained first and second formant values in the percentage for each vowel will be plotted in a way that the percentages of the first formants of all the subjects in producing the target vowels will be plotted on the ordinate and the percentages of the corresponding second formants will be shown on the abscissa.

Since the formant frequencies are inversely related to the traditional articulatory parameters, the axes have been placed so that zero frequency will be at the top right corner of the figure rather than at the bottom left corner, as is more usual in graphic representations (Ladefoged, 1993).

Because a consideration for the idiosyncratic features of individual speakers seems more important than that for equal distance between frequency and pitch, decisions about prominent differences found in the present study were based on F1/F4 and F2/F4 in percent analyses. In addition, for all vowels that will be measured, formant values

will be measured from vowel mid-point, so as to avoid transitions into and out of surrounding consonants.

In addition, the same experimental procedures will be taken for the recordings made earlier in the previous studies.

4. Final Comments

This is second in a series of studies on vowel shifts in Japanese and other languages to be conducted in the next few years. Based on the findings of our first preliminary study, we have formulated a tentative hypothesis. In addition, up-to-date techniques for conducting such a study have been reviewed.

We are now in the process of gathering data from 400 Miyazaki residents. We will not only test our hypothesis, but we will also examine the dialect-specific vowel rotation patterns of Miyazaki as a whole. Furthermore, we are also planning to gather data from residents of large cities such as Osaka and Tokyo in the next few years.

In the near future, our quest to find the language-general tendency might encounter various patterns of diffusion such as contagious diffusion and/or cascade diffusion. Thus, the results obtained from young people living in small or big cities might have different patterns. In addition, the expected tendency might not be found among adolescents who speak other languages besides English and Japanese. Nevertheless, our search for vowel shifts among the young can be utilized as a road map on the variations of phonological structures of various languages in years to come.

References

- Brink, L. and Lund, J. (1975). Social factors in the sound changes of modern Danish. *Proceedings of the Ninth International Congress of Phonetic Sciences*. Vol. II, pp. 196-203. Copenhagen: University of Copenhagen.
- Frederic G. Cassidy (ed.) *Dictionary of American Regional English*. (1985). Cambridge: Belknap Press.
- Dubois, S. (1992). Extension particles. *Language Variation and Change* 4, pp. 179-203.
- Gordon, E. (2001). Phonological correlates of ethnic identity: evidence of divergence? *American Speech* 75, pp. 115-36.

- Hashimoto, S. (1969). *Zyoshi Zyodoshi No Kenkyu*. Tokyo: Kazama Shobo.
- Hattori, S. (1955). *Onin-ron*. Tokyo: Iwanami.
- Hibiya, J. (1988). *A Qualitative Study of Tokyo Dialect*. Ph.D. dissertation. University of Pennsylvania.
- Hidaka, K. (1974). Miyazakiken nishiusukigun hougen ni okeru chuzetuboon no e・i ni tsuite. *Nihon Hougen Kenkyukai Dai 19 Kai Happyougengkoushu*, pp. 392-397.
- Hidaka, K. (1975). Miyazaki kiyotake hougen no onintaikei (jo).
In Inoue, F., Shinosaki, K., Kobayashi, T., Onishi, T. (eds.), *Kyushu Hougen Kou*, vol. 4, pp. 87-97.
- Hidaka, K. (1976). Miyazakikiyotakehougen no onintaikei (jo). In Inoue, F., Shinosaki, K., Kobayashi, T., Onishi, T. (eds.), *Kyushu Hougen Kou*, vol. 4, pp. 98-108.
- Imanishi M. Retrieved from <http://www.hirojou.ac.jp/imaisi/sojiththeory.htm>.
- Inoue, F. (1989). Phonological and acoustic analysis of geographical/generational differences of Japanese sounds.
Kagakukenkyuhijokin Sougou (A) Kenkyuseukahoukokusho.
- Kato, M. (1983). Tokyo ni okeru nenreibetsu onsei chosa. In F.
Inoue (ed.) *A Sociolinguistic Study of "New Dialect" and "Language Deterioration."*
Report of the 1982 Research Project.
- Labov, W. (1994). *Principles of Linguistic Change, vol. 1: Internal Factors*. Oxford: Blackwell.
- Labov, W. and Auger, J. (1998). The effect of normal aging on
discourse: a sociolinguistic approach. In Hiram H. Brownell, and Yves Joannet
(eds.), *Narrative Discourse in Neurologically Impaired and Normal Aging Adults*. San
Diego: Singular Pub, pp. 115-134.
- Ladefoged, P. (1993). *A Course in Phonetics*. Fort Worth: Harcourt Brace.
- McCawley, J. D. (1968). *The Phonological Component of Grammar of Japanese*. The Hague:
Mouton.
- Newmeyer (ed.), *Linguistics: The Cambridge Survey, vol. IV*. New York: Cambridge
University Press.
- Sankoff, G. (2002). (To appear) In Norbert Dittmar et al (eds.), *Handbook of
Sociolinguistics*.
- Sankoff, G, H. Blondeau, A. Charity. (2001a). Individual roles in a real-time change:
montreal (r->R) 1947-1995. In Hans Van de Velde & Roeland van Hout (eds.), *R-
atics: Sociolinguistic, Phonetic and Phonological Characteristics of /r/*. Brussels: ILVP, pp.
141-157.

- Sawashima, M. (1971). Devoicing of vowels. *Annual Bulletin, No. 5*, pp. 1-6. Research Institute of Logopedics and Phoniatics, University of Tokyo, Faculty of Medicine.
- Shibatani, M. (1990). *The languages of Japan*. Cambridge: Cambridge University Press.
- Thibault, P. (1991). La langue en mouvement: simplification, regularisation, restructurayion. *LINX 25*, pp. 79-92.
- Todaka, Y. (2005). Vowel production of Japanese in reference to speakers of American English from the perspectives of age, gender, and regions. *Journal of English Phonetics, vol. 7*, pp. 29-46.
- Ushijima T. and Sawashima, M. (1972). Fiberscopic observation of velar movements during speech. *Annual Bulletin, No. 6*, pp. 25-38. Research Institute of Logopedics and Phoniatics, University of Tokyo, Faculty of Medicine.
- Vance, T. (1980). Comments on Otsu 1980. In Y. Otsu and A. Farmer (eds.), *Theoretical issues in Japanese linguistics*. MIT Working papers in Linguistics 2. Cambridge, Mass: MIT, pp. 229-36.