PERCEPTION OF DEVOICING VARIATION AND THE JUDGMENT OF SPEAKERS' REGION IN JAPANESE

By

Midori Yonezawa Morris

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ABSTRACT

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Vowel devoicing occurs in the Tokyo dialect, but many people are not aware of it because it is allophonic. It is generally believed that it does not occur in the Kinki (Kyoto-Osaka area) dialect, although it could occur as frequently as in Tokyo in the most general devoicing environments. It has been reported that respondents can identify speakers' regions upon hearing others' pronunciation but that such judgments are sometimes affected by social information or stereotypes about pronunciation itself (Preston 1996, and others). There are some perceptual studies of Japanese using phonemic features, but few using allophones. I conducted an experiment to examine how vowel devoicing affects judgments Tokyo and Kinki respondents make on whether or not others were from the same regions as their own after hearing each word with devoicing variation in a recorded word list on a tape.

Responses were analyzed to examine how phonological and social factors affected the judgment. The overall results show that both Tokyo and Kinki respondents tended to determine speakers' regions based on the general belief (devoicing in Tokyo and nondevoicing in Kinki), but the Kinki

results are much less distinct, supporting the assumption of devoicing in Kinki.

Generally, [-continuant] of the consonant that precedes devoiceable vowels contributes to judgements based on the general belief, while 'palatal [+continuant]' tends to promote the judgment 'from Tokyo/non-Kinki' with both devoiced and nondevoiced tokens. This perception phenomenon coincides with the optimal environment for vowel devoicing in production — a palatal fricative and /i/ (Imai 1997). The respondents apparently 'know' the optimal environment and make judgments, assuming that the vowel is devoiced because of its environment. These results also suggest that Kinki respondents also have the same knowledge, which is consistent with the assumption of devoicing in Kinki. Of the following consonant, [+continuant] tends to promote the judgment 'from Tokyo/non-Kinki' regardless of devoicing status. These results suggest that the respondents assume that the vowel is devoiced when they cannot retrieve the devoicing status after hearing devoicing environments and hear [+continuant], as well as the optimal environment for vowel devoicing in production. These results nicely illustrate making use of linguistic information along the time line, using knowledge about one's own phonological system in production, and 'hearing' what is not in the actual information, thus reflecting results in other studies as in Beddor, et al. (2002), for example.

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I recognize my parents and friends in my hometown as well for my Kinki dialect, which first motivated me to start this study. Finally, I would deeply like to thank my husband, Dick, who understands the Kinki dialect and its culture, and gave generous support during the final stages of this dissertation.

TABLE OF CONTNETS

LIST OF TABLES

1. Introduction

Vowel devoicing in the Tokyo dialect is a common topic in Japanese phonology. The most general description of vowel devoicing is the one found in, e.g., Vance (1987), Tsujimura (1996), and Kondo (1997): The high vowels /i/ and /u/ are devoiced between voiceless consonants and between a voiceless consonant and a pause. For example, /i/ and /u/ in /k*i*kan/ 'duration of time,' /k*u*kan/ 'distance between two places,' and /hon des*u*/ '(It) is a book' are devoiced. (Italics indicate devoiced vowels.) Studies of different aspects of vowel devoicing in the Tokyo dialect have been extensively reported. They include its physiological characteristics, what factors interact with it, its environmental conditioning, whether some trace of the vowel remains after devoicing, and its variability (e.g., Kindaichi 1958, Han 1962, Sugito 1969, Yoshioka 1981, Vance 1987, Jun and Beckman 1993, Kondo 1994, Imai 1997, Kondo 1997, Kondo 1999). Vowel devoicing in non-Tokyo dialects has also been studied, but not yet as fully as for the Tokyo dialect, and studies on perception of devoicing are even fewer.

Although it is generally believed that vowel devoicing does not occur in the Kinki dialect (Horii 1972, Peng 1993), which is spoken in the Kyoto-Osaka area, there are studies which show that it occurs there and in other dialects outside Tokyo (e.g., Sugito 1962, Sugito 1969, Sugito 1988), and a database of the Kinki dialect is available (Tahara et al. 1998). One of the

problems with the investigation of devoicing in Kinki is that the data are scarce and limited due to coverage of only a few phonological environments. Another problem is that, when devoicing in different dialects is compared, the target vowel in one dialect is not compared with a vowel in the same phonological environment in another, which could lead to an inaccurate evaluation of overall devoicing rates if high- or low-frequency environments are over- or under-represented in one data set or another. When the devoicing of vowels in the same phonological environments is compared, using the limited data available from some of the previous studies of the Kinki dialect, the ratio of devoicing turns out to be almost the same in Tokyo and Kinki. Before comparing vowel devoicing in non-Tokyo dialects with that in the Tokyo speech, it is necessary to collect more data and to analyze them taking environmental effects into account to determine the factors influencing its distribution and variation in non-Tokyo dialects.

The studies mentioned above focus on vowel devoicing in production. Perception of it is another important and interesting issue. Previous studies of variety perception show not simply that hearers can discriminate different dialects, but also that hearers' judgments are based on low-level phonetic and other variables. Some studies also show that the respondent judgments (e.g., evaluations of dialects) match their knowledge about dialect distinctiveness, and furthermore such evaluations are affected by social information. On the other hand, social information has also been shown to interfere with both

evaluation and identification of dialects (Graff, Labov, and Harris 1983, Kerswill 1985, Preston 1993, Niedzielski 1999, Purnell, Idsardi, and Baugh 1999, Strand 1999). It should also be noted that in many of these studies the respondents cannot describe the linguistic forms they used in making their identifications and/or evaluations, even though some of these studies controlled for the manipulation of only linguistic factors.

Warner (1997) conducted an experiment about the perception of the Kinki accent pattern, and showed that people from outside the region can acquire knowledge of such suprasegmental differences in another dialect. How people perceive and judge vowel devoicing, however, is a perhaps even more valuable investigation because devoicing is not phonemic and not obvious for every speaker of Japanese, as accent patterns are.

It is difficult to predict the results of any work on vowel devoicing perception. Although devoicing is described in dictionaries as a 'standard' language phenomenon and Tokyo is taken to be the source of the standard variety, devoicing or nondevoicing as a clue for Tokyo people to judge a speaker as a Tokyo person or not is complicated by the factors outlined above, namely, that devoicing and nondevoicing are allophonic and that Japanese people are not usually aware of them. In addition, since the devoicing rate could be similar in the Kinki and Tokyo dialects, people might, unconsciously, have some knowledge of that. The results of judgments by non-Tokyo, Kinki respondents are at least unpredictable.

In this dissertation, I will present the results of an experiment that investigates how people from Tokyo and Kinki make judgments of whether or not a speaker is from the same region as their own upon hearing him or her speaking. All features except for vowel devoicing will be held constant in the primary data presented to respondents.

I will show, as a result of this experiment, that devoicing and nondevoicing contribute to judgments by both Tokyo and Kinki respondents just as the differences of the Tokyo and Kinki pitch accent patterns do. The results are consistent with an assumption that devoicing is a Tokyo feature and nondevoicing is a Kinki feature. That is, the respondents tend to use devoicing and nondevoicing as clues when making judgments. Perhaps more importantly, the respondents tend to use devoicing/nondevoicing as a clue even though it may not reflect the actual distribution of devoicing/nondevoicing in different dialects. In other words, they appear to use an unconscious stereotype of devoicing in making judgements. The results for Kinki respondents are not strong, and I will suggest that their responses are more finely tuned to an interaction between voicing/devoicing and other phonological features such as devoicing in accented mora. I will also show that the respondents could not describe the reason why they judged certain speakers as non-Tokyo or Kinki, just as indicated for other features in previous perception studies.

Examination of phonological factors and social factors that significantly affect judgments are also investigated and show distinct differences between the Tokyo and Kinki results. Both Tokyo and Kinki respondents tend to make use of the most salient factors influencing vowel devoicing in production (Imai 1997), letting them override actual devoicing and nondevoicing as a clue. For example, when Tokyo respondents hear preceding consonants that most strongly promote devoicing in production, they tend to judge the speaker as a Tokyo or non-Kinki person regardless of actual devoicing or nondevoicing of the following devoiceable vowels. It seems that the respondents also know, again, of course, unconsciously, the best environments for devoicing in production and use that knowledge to assume that the vowel should be devoiced. I will also show that the identity of the following consonant also has an influence on devoicing/nondevoicing perception. In short, the Tokyo respondents appear to assume that devoiceable vowels are devoiced after having heard a phonological environment which promotes vowel devoicing, and judge the speaker as a Tokyo person. Again, this tendency was weaker for the Kinki respondents.

In the following section, I will review previous studies of differences in the Tokyo and Kinki dialects, of vowel devoicing in them, and of perception of dialects in general. I will then outline how I controlled factors, collected data, and analyzed them, and then show the results, discuss them, and give the conclusions of my study.

2. Previous studies

2.1. Some differences between the Tokyo and Kinki dialects

There are many dialects in Japan, but the *hyôjungo* (vowels with carets indicate long vowels), 'the standard language,' is based on a dialect spoken in Tokyo (Sanada 1991). One of the major dialects other than the Tokyo dialect is the Kinki dialect, which is spoken in the Kyoto-Osaka area (Hirayama et. al. 1982). The Tokyo and Kinki dialects differ at various linguistic levels. An example of difference in vocabulary is *toriniku* 'chicken meat,' which is used in Tokyo, while *kashiwa* is used in Kinki. An example of morphological difference is the use of clause-final forms such as *-to*, *-ba*, and *-tara* 'if; when.' These forms are generally called conditional forms, and these three have a complex set of usage restrictions in the Tokyo dialect. In the Kinki dialect, on the other hand, *-tara* is almost always used.

The accent system in Japanese involves low and high pitch. In the Tokyo dialect, some words are called "accentless," although they actually have a low pitch in the first mora and high pitches in the rest of the word, and the pitch stays high even when a morpheme is added (e.g., LHH+H, where "+" indicates a morpheme boundary and "H" and "L" indicate high and low pitch, respectively). All other words are "accented," and may have a low pitch or a high pitch in the first mora. If the first mora of a word is high-pitched, the rest of the moras are all low-pitched (e.g., HLL). If the first mora is low-

pitched, there are one or more successive high pitched moras after the first mora, and the moras following the last high pitched one are all low (e.g., LHHLL). The accent pattern of a word can be, then, described as either "accentless" or "accented" according to the position of the last high pitched mora. Accent is phonemic, and may create a minimal pair such as *áme* 'rain' (HL) and *ame* (accentless) 'hard candy' (LH). The Kinki dialect has a pitch-accent system as well, and accent patterns are the same as Tokyo patterns for some words, as in (1a) below, but some are different, as in (1b). In addition to the patterns that exist in Tokyo, the Kinki dialect has some patterns of its own, namely, more than one high pitched mora at the beginning of the word, more than one low pitched mora at the beginning of the word, and descending or ascending pitch within a mora (Makimura 1979, Warner 1997) as in (1c), (1d), (1e), and (1f), respectively. 'D' and 'A' indicate descending and ascending pitch, respectively. The Kinki patterns in (1c), (1d), (1e) and (1f) are not found, at least phonemically, in Tokyo.

(1a)	'seat'	Tokyo: seki (HL)	Kinki: seki (HL)
(1b)	'scary; scared'	Tokyo: kowai (LHL)	Kinki: kowai (HLL)
(1c)	'box'	Tokyo: hako (LH)	Kinki: hako (HH)
(1d)	'egg white'	Tokyo: shiromi (HLL)	Kinki: shiromi (LLH)
(1e)	'rain'	Tokyo: ame (HL)	Kinki: ame (LD)
(1f)	'hand'	Tokyo: te (H)	Kinki: te (A)

Sugito (1962) describes differences of pronunciation between the Tokyo dialect and the Kinki dialect. According to her, in the Kinki dialect the larynx

is narrow in vocalization, vowels are clear and longer, and there is no nasalized /g/, while in Tokyo the larynx is wide open in vocalization, many vowels are voiceless, and /g/ is nasalized in the second or later mora and particles. Additionally, the diphthong /ei/ in some areas of Kinki is pronounced /e:/ in Tokyo. She also points out other phonetic differences among consonants.

For this study, I controlled those features that are different in Tokyo and Kinki so that I could focus on the effects on the respondents' judgments by devoicing or nondevoicing only and compare these effects with that of other features.

2.2. Vowel devoicing in the Tokyo dialect

Jun and Beckman (1993) state that vowel devoicing relates to a glottal gestural overlap of the vowel and neighboring consonants. Yoshioka (1981) used electrode techniques and showed what occurs in the laryngeal muscles in vowel devoicing. He asked a subject to pronounce a set of words and showed that vowel devoicing is accompanied by reciprocal movements of two groups of laryngeal muscles, namely abductor and adductor, that cause the glottis to open. Han (1962) treats four factors as important in devoicing vowels: (i) shorter vowels, i.e., high vowels, (ii) faster speech tempo, (iii) unaccented syllables, and (iv) neighboring sounds which makes vowels shorter, i.e., voiceless consonants.

The most general description of vowel devoicing in the Tokyo dialect is that unaccented high vowels /i/ and /u/ are devoiced between voiceless consonants and between a voiceless consonant and a pause (Vance 1987, p.48). Examples are shown in (2) below. Italicized vowels indicate devoiced vowels.

(2) k*i*kan	"duration of time"
k*u*kan	"distance between two places"
Hon des*u*.	"(It) is a book."

Vowels in the devoicing environments stated above, however, are not devoiced in certain conditions. For example, devoicing interacts with accentuation. Vance (1987) explains how accentuation on a devoiced vowel is avoided, using the examples in (3).

(3a)	taká-i	'is expensive'	táka-katta	'was expensive'
(3b)	f*u*ká-i	'is deep'	f*u*ká-katta	'was deep'

When the accent is on the second mora in the present form as in (3a), it shifts regularly to the first mora in the past form of an adjective. However, as seen in (3b) it does not shift to avoid accentuation on the devoiceable /u/, which is between two voiceless consonants. Two words which have the same segments in the same order but different accent patterns have a devoiced vowel in one and a nondevoiced vowel in the other, as seen in the data from Yoshioka (1981). In his data, /sisee/ (accentless, i.e., LHH) 'posture' is

generally pronounced with devoiced /i/ while /sísee/ (HLL) 'death and life' is generally pronounced with nondevoiced /i/. Han (1962) says, furthermore, that vowel devoicing does not occur in a high pitched syllable, not simply in an accented syllable.

Devoicing interacts with intonation, too. Vance (1987) gives an example of a question without an interrogative particle as in *Nani ka arimasu?* 'Is there something?' to show that the sentence final /u/ is not devoiced since it carries rising intonation.

When a word contains two or more consecutive moras with vowels in a devoicing environment, the accented vowel is not devoiced and the rest take alternate devoicing (Kindaichi 1958, Han 1962), as in *kutsushita* /kutúsita/ 'a sock' and *shikifuku* /sikihuku/ 'a formal suit.' The latter example, pronounced in the pitch pattern LHHH, contradicts Han's (1962) statement because the second devoiced mora /hu/ is pronounced in a high pitch. Kondo (1999) conducted a production experiment using words containing consecutive devoicing environments, and argues that the devoicing site is determined by the largest syllable structure. She suggests that the structure may be more flexible than previously considered, allowing a heavy syllable with a non-nasal, non-geminate coda as seen in the first syllable in *shôhichi* /ʃoohiti/ 'consumer belt.'

It is also pointed out that devoicing tends not to occur at a word boundary (Sugito 1969, Tsuchida 1993). Tsuchida does not give data, but

Sugito gives such examples as *hayaku#haku* (# indicates a word boundary) 'put on quickly,' *hayaku#hiku* 'pull quickly,' and *hayaku#fuku* 'blow quickly,' in which /u/ at the word boundary is not devoiced. Vance (1987) points out that devoicing morpheme-medially is preferred to devoicing morpheme-finally as in *oshi-tsukeru* /osi-tukéru/ 'push against' rather than /osi-tukéru/.

The studies cited above are qualitative, and even prescriptive, as in Kindaichi (1958). There are reports of data that shows variation of vowel devoicing in both unaccented and accented moras. Vance (1987) states that another way to avoid accentuation on a devoiced vowel other than not shifting an accent in the adjective conjugation, as in the example (3) above, is to simply nondevoice an accented vowel in a devoicing environment. He does not give any examples, but another adjective /hikú-i/ 'is low' might be one because its past form is pronounced /hikú-katta/ (Kindaichi 1958) 'was low' with /u/ nondevoiced.

Sugito (1969) asked nine people from Tokyo and Osaka to read sentences containing words with devoiceable vowels and compared how they devoice and nondevoice them. Her results show that 3 Tokyo speakers did not devoice 54 to 59 vowels out of 163 in devoicing environments. She concludes that devoiceable vowels tend to be nondevoiced at word boundaries or in consonant combinations which are difficult to pronounce such as [kuh] and [ɸuɸ]. Lovins (1976) also asked five men and four women

from Tokyo or near Tokyo to read sentences containing devoiceable vowels. She reports that accented vowels in her data were devoiced 24% of the time. Yoshioka's (1981) data also include examples of variation, both in nondevoicing of devoiceable vowels and devoicing of accented high vowels between voiceless consonants (e.g., 5 cases out of 28 of /sisee/ 'posture' and 8 cases out of 28 of /sísee/ 'death and life,' respectively). Sugito (1969) further reports that when a mora follows a mora with a devoiced vowel which was supposed to be accented, the following mora starts with a high pitch and then the pitch descends rapidly. For example, in /húsu/ 'lie on the stomach' the frequency of /u/ in the second mora drops rapidly from the beginning toward the end, while the frequencies in the mora following a devoiced vowel stay almost the same in accentless words. She concludes that this pitch contour helps listeners determine the position of accent in the preceding mora in spite of vowel devoicing. Kitahara (1998) basically confirms Sugito's results. He reports that the pitch elevation occurs at the beginning of the mora following one with a devoiced accented vowel, but it occurs only when the mora preceding it is in a low pitch, and that there is no clue to locate the accented mora for listeners when the preceding mora is in a high pitch.

Devoicing before a pause shows a different distribution of variation for /i/ and /u/ according to Sugito (1988). She gives data for vowel devoicing in a reading passage, and shows remarkable differences in frequencies of devoicing sentence-finally, namely /u/ in /desu/ (copula), and clause-finally,

namely /i/ in *idô-shi* /idoo-si/ 'moves and' and /u/ in *ôku* /ooku/ 'many and' and in *waruku* /waruku/ 'bad and.' In her data, all the Tokyo people devoice one of the two sentence-final /u/s and 89% of them devoice the other, while none of them devoices the clause-final /i/ and none of them devoices the clause-final /u/ in /ooku/, while 22% of them devoice the other clause-final /u/ (See Table 1).

Devoicing in an unaccented high-pitched mora occurs frequently, contradicting Han's (1962) statement that it does not occur. Lovins (1976) reports that fewer than 2% of the devoiceable vowels in her data are nondevoiced in such moras.

Devoicing also has variation in two or more unaccented moras in a consecutive devoicing environment, in spite of Han's (1962) general rule which calls for undevoicing accented vowel and alternate devoicing for the rest. In Sugito's (1988) data, *kakuchi-tomo* /kakuti-tomo/ 'in all regions' has a consecutive environment, and 67% of the Tokyo people devoice /u/ and 78% devoice /i/ (See Table 1). This means at least 45% (67-(100-78)) of them devoice both /u/ and /i/. Imai (1997) also reports that consecutive devoicing occurs frequently, even in three or four consecutive environments. The data I collected also contain examples of consecutive devoicing. I asked fourteen people from Tokyo to read the same passage and thirteen of them read a phrase with consecutive devoicing as in /hanas*u*-k*i*kai/ 'chance of talking.'

Devoicing at a word boundary and at a morpheme boundary also occurs quite frequently. The example /hanas*u*#k*i*kai/ in my data shows a very high rate of devoicing at a word boundary. /u/ is word-final and /i/ in /ki/ is morpheme-final, and both are devoiced by 13 people out of the 14. Many other examples are found in data in previous studies, such as /s*i*-see/ (23 people out of 28) in Yoshioka (1981), *kaku-chi-tomo* /kak*u*-ti-tomo/ 'in all regions' (67%) and /kaku-t*i*-tomo/ (78%) in Sugito (1988), and /hirak*u*#to/ 'when someone opens it' (100%) in Sugito (1969).

Devoicing of non-high vowels and devoicing in the environment that is not a general devoicing environment are also reported. Imai (1997) reports that /a/, /e/, and /o/ besides /i/ and /u/ are sometimes devoiced. She also reports that devoicing sometimes occurs after nasals among other voiced consonants.

There are also studies about the probability of devoicing depending on different consonants in the devoicing environment. Han (1962) states that effects on devoicing are greater with fricatives than affricates, and with affricates than stops. She also states that the effect of /ʃ/ is greater than the effect of pitch accent.

Imai (1997) collected data from natural casual conversation and examined approximately 1,600 tokens of vowel devoicing. Based on her analysis, the most significant promoting factor in vowel devoicing is the following voiceless segment and the second one is the preceding voiceless

segment. She determined a best promoter of devoicing in terms of articulation of the preceding segment for each of 5 vowels: the fricative for /i/, the feature [+stop] for /u/ and /o/, and the stop consonant for /e/ and /a/. She further states that "the vowel /i/ with a preceding fricative most strongly promotes devoicing." She also points out that a shared feature between the preceding consonant and the vowel promotes devoicing; the feature palatal for /i/ and the feature labial for /u/ (pp. 52-53).

In this study, I use the most general description of the devoicing environment: unaccented high vowels between voiceless consonants. I eliminated non-high vowels, accented vowels, and unaccented high vowels in consecutive devoicing environments. This made it possible for me to examine devoicing variation without the influence of other factors such as accentuation, intonation, vowel height, and syllable structure.

2.3. Vowel devoicing in the Kinki dialect

It is generally believed that, in the Kinki dialect, vowels are nondevoiced. In particular, it is often suggested that Kinki speakers nondevoice /u/ at the end of a sentence as in /desu/ (copula) or /masu/ (polite present affirmative ending). Maeda (1977) describes vowels in the Osaka dialect (one of the dialects within the Kinki area) as very resonate and pronounced more deliberately than consonants, as opposed to those in the Tokyo dialect, in which vowels are pronounced less deliberately. Horii (1972) and Peng (1993)

state that vowel devoicing does not occur in the Kinki dialect. Tsujimura (1996) states that devoicing is "not common (p. 25)," and Shibatani (1990) states that it is "less noticeable in Kyoto (p. 161)," rather than not present at all. None of them gives any data.

In spite of those widespread ideas, devoicing in the Kinki dialect has been reported. Nakai (1991) reports that vowel devoicing at the end of the sentence tends to occur in some regions within Kinki. He collected pronunciations of *Itadakimasu* 'I humbly receive' (a greeting phrase before having a meal) by children from more than 200 elementary schools in Kinki and examined the accent pattern and devoicing of /u/. He reports that a more standardized accent is used and devoicing tends to occur more in inner Kinki, which is Osaka city and its suburban area, while the Kinki accent is used and nondevoicing tends to occur in the peripheral areas, but the Kinki accent is used and devoicing tends to occur in the very center of Osaka city.

Devoicing occurs within a word as well in Kinki. Tahara, et al. (1998) created a database of the Kinki dialect on a CD-ROM, by asking twenty male and female subjects of different age groups, who were from Osaka, to read a set of sentences. In the sample data I checked, 2 sentences include vowels in the most general devoicing environments: (i) *Ka tsukamaeta de* 'I caught a mosquito,' and (ii) *Ha ochiteru wa* 'Leaves have fallen and are on the ground.' Sixteen people out of 20 devoiced /u/ in the former sentence and 17 people devoiced /i/ in the latter.

There are more studies which show devoicing in the Kinki dialect. Sugito (1969) shows that 3 Kinki dialect speakers devoice 28 to 50 vowels out of 163 in devoicing environments. She also reports on devoicing by an 83 year-old male subject from central Osaka city. Nakai (1991), cited above, similarly reports on devoicing in the very center of Osaka city based on an extensive data set, thus showing that devoicing by Sugito's particular subject is not a mere idiosyncratic example. Sugito shows that one of the subjects devoices accented vowels as well, as in /kúsa/ 'grass.'

Sugito (1988) also gives data to show that Osaka people devoice vowels less frequently than Tokyo people do. She chose 8 cities in Japan (Sendai, Tokyo, Nagoya, Osaka, Kochi, Okayama, Kumamoto, and Naha) and asked 9 or 10 males from each city to read a weather report in *kyôtsûgo* 'common language; language for mutual understanding.' She examined devoicing tendencies in these data in terms of phonological environments and of the regions where the subjects live. An excerpt from her table is shown in Table 1 below.

In her data, the subjects from Tokyo sometimes fail to devoice vowels, but the frequencies for devoicing by the Osaka subjects are not higher in any word than those by the Tokyo subjects, confirming the statements by Tsujimura, Shibatani, and Maeda. At the same time, the studies reviewed above show how frequently Osaka people devoice vowels in certain

environments, and the results clearly deny the general belief that Osaka people do not devoice vowels.

Table 1 Devoicing by people from Tokyo and Osaka in Sugito (1988)

		Tokyo	Osaka
Sentence-finally	des*u* 1	89%	56%
	des*u* 2	100%	78%
Clause-finally	idô-sh*i*	0%	0%
	ôk*u*	0%	0%
	waruk*u*	22%	0%
Within words	its*u*ka-wa	100%	67%
	kak*u*chi-tomo	67%	33%
	kakuch*i*-tomo	78%	67%
	kaif*u*ku-suru	78%	11%
	kaifuk*u*-suru	22%	11%
Total		55.6%	32.3%

However, devoicing in the Kinki dialect is still not fully investigated. In data from Tahara et al. (1998), 82.5% of devoiceable vowels (33 out of 40) are devoiced by Osaka people. This is higher than the frequency of any word pronounced by Osaka people, and it would not even be exceptional as a frequency in Tokyo, in Sugito's (1988) data. This does not seem impossible, knowing that there is a tendency for devoicing before a pause, which is the most common environment of nondevoicing in Kinki described by non-linguist Japanese speakers, in inner regions of Kinki, although it is only one

phrase pronounced by only one age group in Nakai (1991). Nevertheless, it is tempting to assume that the devoicing rate in Osaka (Kinki) is not all that different from that in Tokyo. Devoicing by an 83 year-old male subject from the very center of Osaka in Sugito (1969) also supports this tempting assumption. Table 2 shows the percentages of devoicing and nondevoicing in some of the previous studies (calculation mine, based on numbers of the tokens in each study).

Table 2 Variations of devoicing

	Tokyo subjects		Osaka subjects	
	Devoicing	Nondev.	Devoicing	Nondev.
Sugito (1969)	65.8%	34.2%	29.4%	70.6%
Sugito (1988)	55.6%	44.4%	32.2%	67.8%
Yoshioka (1981)	56.5%	43.5%	N/A	N/A
Tahara et al. (1988)	N/A	N/A	82.5%	17.5%

The data in Tahara et al. are different from those in the others, in that all tokens have high vowels in the most general devoicing environments, i.e., high vowels in unaccented mora between two voiceless consonants and not in consecutive devoicing environments. The others, on the other hand, have devoiceable vowels that may interact with other factors and may therefore remain nondevoiced, such as in accented moras, in consecutive devoicing environments, and before pauses. The comparison, then, is not for

the same environments, and the conclusion that Kinki speakers devoice vowels less frequently is not a reasonable one. For example, if one compares /kusa/ in Tokyo and /kúsa/ in Kinki (both mean 'grass') as Sugito (1969) does, a lower rate of devoicing in Kinki does not mean simply a difference due to dialectal difference. Kinki speakers may well avoid devoicing due to the accentuation, just as Tokyo speakers do.

Table 3 shows the percentages of devoicing and nondevoicing in unaccented and accented moras separately from two sets of data.

Table 3 Devoicing variation in different positions (Tokyo subjects)

	Unaccented		Accented		Consecutive
	Devoicing	Nondev.	Devoicing	Nondev.	Devoicing
Yoshioka (1981)	76.8%	23.2%	16.1%	83.9%	N/A
Morris	80.6%	19.4%	N/A	N/A	92.9%

The frequencies of devoicing unaccented vowels (also without any interaction with other factors) are approximately the same as that in Tahara et al. (1998). Sugito's data (1969, 1988) could not be separated by unaccented and accented tokens because the accent pattern used for each token is not indicated. The low frequencies of devoicing in Sugito (1969) might be explained, therefore, by the mixture of unaccented and accented tokens. The frequencies in unseparated data in Yoshioka (1981) are similar to those in

both of Sugito's, so it is reasonable to suppose that the devoicing rate in unaccented moras might increase in Sugito's data when counted separately, but the factor that lowers the devoicing frequency in Sugito (1988) is not certain. It should be pointed out, however, that the passage she asked her subjects to read contains only one devoiceable vowel with no possible interaction with other factors out of ten devoiceable vowels. Of the other 9 devoiceable vowels, 5 are before a pause, and 4 are in two words containing two consecutive devoiceable vowels. It is natural, then, to suspect those interactions are connected with low devoicing frequency.

The data I reviewed above are not, however, sufficient to determine the devoicing in Kinki in detail, due to a lack of variety of phonological environments, the limited number of the subjects, and the lack of gender and age variety. It would not be unreasonable, however, to make a tentative assumption that devoicing of a vowel in an environment in which no other factor suppresses devoicing occurs with about the same frequency in Tokyo and Kinki. Different frequencies in other environments could emerge because of different influences of other factors, which may be the same in Tokyo and Kinki.

To avoid some of the gaps in previous studies, I collected data from both male and female speakers, and I selected the words I used in the experiment by the following criteria, so that I could compare the words in the same phonological environment: (i) pronounced in the same pitch accent in

Tokyo and Kinki, (ii) containing only one high vowel in a general devoicing environment, (iii) containing a devoiceable vowel that does not interact with other factors. That is, I excluded words containing a devoiceable vowel in such positions as in accented moras, in consecutive devoiceable moras, and before a pause. I did, however investigate both morpheme and non-morpheme boundary environments.

2.4. Perception of dialects and attitudes toward them

Labov (1972) discusses the benefits of sociolinguistic investigation and states that "The speech community is not defined by any marked agreement in the use of language elements, so much as by participation in a set of shared norms; these norms may be observed in overt types of evaluative behavior, and by the uniformity of abstract patterns of variation which are invariant in respect to particular levels of usage" (pp. 120-121) and "Once the social significance of a given linguistic variant has been determined, ... , this variable may then serve as an index to measure other forms of social behavior" (p. 120).

There are many studies on dialect perception within Lobov's general framework. Kerswill (1985) conducted a perception experiment using standard Norwegian (Bergen) and a rural dialect (Stril). He presented 9 samples spoken by different people to subjects and asked them to judge the speakers as Bergen or Stril. He concludes that the subjects made judgments by

perceiving degrees of mixing of the two dialects and rated the samples relatively along a linguistic continuum from purely Bergen to purely Stril, and that morpho-lexical cues are utilized most. In his methods, however, cues at the morpho-lexical and phonetic levels are not controlled; therefore it is not possible to identify precisely the salience of each type of cue. He also mentions that judges' comments do not help because their descriptions of the samples they heard did not match the actual features. This implies those features are unconscious.

Preston (1993) conducted 4 experiments in the United States, namely, asking respondents to draw maps of areas where people speak differently and labeling them, to rate the 50 states for 'correctness' and 'pleasantness,' to rate the 50 states for the degree of difference they perceive between them and the respondent's own dialect, and to identify the regions from which 9 different speech samples came. In this last experiment of area identification, respondents used the numbers 1 to 9 which were assigned to the cities along a north-south line from Saginaw, Michigan to Dothan, Alabama, as the places the speakers are from and the numbers 1 through 9 for the voices, representing the order in which they were placed. The respondents not only placed the voices correctly by region (misplacing only one), but also indicated larger distances (as determined by mean scores differences) between some adjacent areas, which can be interpreted as major boundaries of

distinctiveness, and these, interestingly, often corresponded to the major boundaries which resulted from the map-drawing and rating tasks.

Purnell, Idsardi, and Baugh (1999) conducted 4 perception experiments using African American Vernacular English, Chicano English, and Standard American English. They show that the subjects can significantly discriminate the callers' ethnicity over the phone. They also show that such dialect discrimination is possible by hearing only one word 'Hello,' and, more specifically, that the hearers' ability can be explained on the basis of the frequency of the second formant of the first syllable alone.

Niedzielski (1999) conducted perception experiments confounded with social information, namely indicating to the respondents whether the speaker was from Michigan or Canada, using words that contain vowels involved in Canadian Raising (CR) and the Northern Cities Chain Shift (NCCS). She shows that the respondents, who are all Detroiters, tend to choose 'standard' vowels as matches to the ones they actually heard when they are told the speaker is from Michigan and choose raised vowels (CR) when they are told the speaker is from Canada, although the speaker was the same person, one from Michigan, pronouncing only raised vowels. She also shows that they tend to choose 'standard' or 'hyperstandard' vowels when told the speaker is from Michigan, while more people tend to choose shifted vowels (NCCS) when told the speaker is from Canada. She states that Detroit listeners use

social information for perception and judgment and hear the sounds to fit the phonetic features of those socially stereotyped categories.

Strand (1999) reports on perception experiments (Strand and Johnson 1996) on the effects of gender information using the words *sod* and *shod*, which form a minimal pair with /s/ and /ʃ/. There is an acoustic continuum between /s/ and /ʃ/, and the boundary between them is at higher frequency in female speech than in male speech. The hearers drew boundaries between the two sounds at lower frequencies when they heard the sounds looking at a male face, in accordance with the lower frequencies of male speakers' pronunciation of /s/ and /ʃ/, than when they heard the same sounds without looking at a face. These results suggest that gender stereotypes alter the hearers' perception on the basis of the interaction of phonetic information at a low level and socially constructed information at a higher level.

These studies support the following ideas: (i) respondents may identify someone's ethnicity or dialect region based on his or her speech, (ii) they can do this based on forms they are not aware of and cannot describe accurately, (iii) such judgments are affected by social as well as linguistic information.

Speakers of Japanese also usually can tell whether someone is from the same region as their own upon hearing him or her talking, sometimes even when he or she tries to imitate a non-native dialect. This is a consequence of judging such speech as having or not having shared features with their own dialect. It is quite obvious that people can easily recognize differences in

vocabulary and differences in structures to some extent. It is also expected that it is easy to perceive such differences and make judgments about whether someone is from the same region as one's own based on pitch accent patterns because they are phonemic.

Warner (1997) conducted an experiment on the recognition of accent patterns to examine some factors from the viewpoint of dialect acquisition. In earlier studies using segmental differences, reviewed by her, it was found that forms in lexical opposition and forms which do not exist in one's own dialect make acquisition harder. In her experiment, Tokyo and Kansai (Kinki) people listened to a word list in the Kansai and Tokyo dialects, respectively, and responded by choosing the meanings that they thought were meant. The word lists consisted of pairs of words that have the same segments but of different types because of accent patterns: (i) words in lexical opposition, in which a word is in the listener's dialect but with a different meaning, as in *háshi,* meaning 'chopsticks' in Tokyo and 'bridge' in Kansai, versus *hashí,* meaning 'bridge' in Tokyo and 'chopsticks' in Kansai, (ii) homophones in the listener's dialect but different words in the speaker's dialect, as in *kámi,* meaning 'god' or 'paper' in Kansai, versus *kámi,* meaning 'god' and *kamí,* meaning 'paper' in Tokyo, and (iii) words with accent patterns that do not exist in Tokyo, such as *e,* meaning 'picture' in an ascending pitch in Kansai, versus *é,* meaning 'picture' and *e* (accentless), meaning 'handle' in Tokyo. Her results show that the first type and the third

type of words explained above make acquisition of pitch accent patterns harder, and she concludes that forms in lexical opposition and forms which do not exist in one's own dialect make it harder to acquire segmental differences as well as suprasegmental differences such as accent patterns.

It does not seem, on the other hand, that some features of pronunciation, in particular allophonic features such as vowel devoicing, could be consciously activated or perceived in natural conversations, although it does surface in such cases as, for example, the training of announcers. Han (1962) states that "native speakers of Japanese are not usually aware of the fact that some of the Japanese vowels are not heard by foreigners." Some Japanese people cannot recognize or tell the difference upon hearing two pronunciations of the same words, one with a devoiced vowel and another with a nondevoiced vowel. This is quite reasonable because devoicing and nondevoicing are allophonic and are not features they would be aware of. That is why the respondents in Kerswill (1985) and Strand (1999) did not describe what they heard exactly as they heard it and those in Niedzielski (1999) did not realize their own shifts.

Some careful speakers of Japanese describe Tokyo devoicing and believe that Kinki speakers do not devoice, but they seldom suggest variation in these behaviors, believing it to be categorical. Most speakers, however, do not comment on this phenomenon. Some people apparently have conscious knowledge that devoicing occurs in the Tokyo dialect, particularly at the end

of the sentence. However, they may well not know that it occurs in the Kinki dialect as well or that nondevoicing occurs occasionally in the Tokyo dialect. This gap may create a stereotype about dialects. The Kinki dialect and the Tokyo dialect are sometimes contrasted in frequency of vowel devoicing, but speakers of other dialects are not mentioned as often. According to Sugito (1988), in fact, Tokyo is not the place where people devoice vowels most, and Osaka is not the place where people devoice them least. Among 8 cities she investigated, Nagoya and Kochi are the places where people devoice vowels most and least, respectively.

Maekawa (1983) states that vowel devoicing may be required "as a norm in the society." He has an impression that a word with nondevoicing, even pronounced in the standard pitch accent, sounds as if it has "local characteristics," which probably means non-Tokyo or non-standard. He says it is problematic to bring such a personal judgment into a discussion of the standard language, but also admits to having idiosyncratic views about the lexicon (pp. 78-79). His impression, without quantitative investigation nor reasonable explanations, suggests the possibility of similar responses from others to devoicing variation and may indicate the possibility for a number of personal judgments which may form meaningful patterns.

It seems quite reasonable then to ask the question, "Is vowel devoicing one of the shared norms among speakers of the Tokyo dialect?" and to collect quantitative data from Tokyo people to answer this question. It would be a

straightforward or even simple question if devoicing had no variation, displayed considerable dialectal differences, and was a conscious feature. However, the answer may not be so simple because of variation, dialectal differences and similarities, and the unconscious nature of devoicing. Perhaps the Tokyo judgment norm will be that someone who devoices vowels is from Tokyo and that someone who does not is not. That would be phonologically simple, but does not reflect the reality of distribution of devoicing, at least, in the Kinki dialect as shown in Tables 2 and 3, since the non-Tokyo (i.e., Kinki) data Tokyo speakers hear contains devoiced vowels in the most general environments. In other words, the criteria speakers of Japanese use in identifying the regional background of speakers of devoiced and nondevoiced tokens may be based on linguistic stereotypes, entailing an oversimplified knowledge of the distribution of devoicing. Furthermore, if they use not only phonological information but also social information when they hear such tokens, what information would affect their judgments and how?

Since devoicing is a "standard" feature, will Kinki respondents use it differently as a clue to regional identity? In other words, is it one of the shared norms among them, when the data they hear contain devoiceable vowels in the most general environment? Their judgments could be the mirror image of the Tokyo people's, based on phonological environments and stereotypes; that is, their basis for judgment could be that a nondevoicer

is from Kinki and a devoicer is not. Or, because their devoicing rates are as high as about 80%, their basis could be that a devoicer is from Kinki and nondevoicer is not.

Since I have mentioned social factors, it is important to consider attitudes toward the standard language and dialects. People, including those from Tokyo, tend to believe that those who are from the Tokyo metropolitan area speak the standard language. Actually, as investigated by Sanada (1991), no single dialect in Tokyo is identical with the standard language. Instead, one of the dialects spoken in Tokyo was selected to establish the standard (pp. 92-95). The standard language is an abstract ideal form to aim for, as opposed to *kyôtsûgo* 'common language; language for mutual understanding,' which is used in real life (pp. 202-205).

Sanada (1991) describes the process of promoting use of the standard language by the government after the Meiji Restoration (1868) and states that dialects were "devalued as disturbing or useless for promoting use of the standard language (p. 105, translation mine)." Mogami (1994) points out that the standard language may well have the image of nationalism, coersiveness, and authority because of the process of its establishment in the history of the country. Sibata, cited by Sanada (pp. 106-107), states that teaching the standard language has divided people on the basis of availability of education, economic status, and power relations in spite of the original purpose of unification. Some people may think that no one speaks the standard

language entirely accurately, while others, Yoshioka (1995) states, may find prestige in the Tokyo dialect and call it the standard simply because Tokyo is the capital.

Warner (1997) noted that the Kinki dialect "has some prestige as the descendant of the language of the ancient court (p. 365)." Umesao (1995) states that Kyoto people take a pride in being the center of culture in Japan, based on the fact that Kyoto, in Kinki, was an ancient capital of Japan. Shibuya (1995) conducted a study of Kyoto people's attitudes toward their own dialect, Osaka dialect, and the language for mutual understanding, and of their codeswitching between their dialect and the language for mutual understanding. They gave positive descriptions about their own dialect, such as 'deliberate,' 'beautiful,' and 'gentle,' the highest among 14 dialects, and they gave negative descriptions of their dialect the lowest ratings out of the 14. In 7 different situations, the percentages of approval for speaking the language for mutual understanding were the lowest among the 14 dialect regions. The results suggest that the Kyoto speakers tend to speak their own dialect in any situation. The results on their attitude and codeswitching clearly show that they consider their own speech to have strong prestige.

For this study, I conducted an experiment using vowel devoicing to determine its significance in judgments about whether or not the speaker is from the same region as one's own. I chose words with devoiceable vowels in the most general devoicing environment and neutralized other possible

features that could be a clue for making judgments as much as possible, and collected data from Tokyo people and Kinki people. I eliminated the responses to speakers who were known to the respondents personally to avoid any judgment based on social information. In the experiment, I asked my subjects "Is the speaker from your own region?" rather than "Does the speaker use the standard language (the Kinki dialect)?" This is to avoid the strict reaction "No one speaks the standard language" and reactions influenced by 'value,' added during the history of the language policy although those ways of thinking might be changing nowadays.

My hypothesis is that a speaker is more likely to be judged as a Tokyo person by Tokyo people and as a non-Kinki person by Kinki people if he or she devoices a devoiceable vowel, and as a non-Tokyo person by Tokyo people and as a Kinki person by Kinki people if he or she does not. In other words, I predict that both Tokyo people and Kinki people have stereotypes that Tokyo (or non-Kinki) people devoice vowels and Kinki (non-Tokyo) people do not, and I believe that judgments are based on the stereotypical perceptions of standard language behavior which I have outlined above.

3. Methods

To find out how devoicing and nondevoicing would affect a listener's judgment on where the speaker is from, I collected data by presenting the subjects with a word list and asking them to make a judgment for each word. Then, I analyzed the responses from Tokyo people and Kinki people to find out which factors determined their judgments and compared the results of the subjects from the two areas.

3.1. Preparing a test tape

First, I prepared a test tape with a list of words. Target words in the list were selected so that vowel devoicing was the only factor which might sound 'foreign' to the respondents. I selected lexical items that are used commonly in Tokyo and Kinki and pronounced in the same pitch accent patterns in both areas. I eliminated two other factors which would be used as clues to make judgments about the speaker. One is non-word-initial /g/, which is nasalized in some regions, and the other is /ee/ (the long /e/), which is pronounced as [ei] rather than [e:] in certain regions (Kindaichi 1958). These exclusions were important because very often those factors are conspicuous and allow people to tell where the speaker is from even by hearing only one word in a long passage. Loan words were excluded from this study.

Among the selected lexical items, I further selected words that had only one high vowel between voiceless consonants in an unaccented mora with a low pitch. I eliminated words that had high vowels in positions where devoicing is often avoided in the Tokyo dialect, such as in high-pitched moras (both accented and unaccented), before pauses, and in consecutive devoicing environments. I eliminated all these because responses based on them may not have resulted from the simple criterion sought here, that is, that devoicing represents Tokyo and nondevoicing represents non-Tokyo, and comparison of responses to such data would have deviated from my assumption that rate of vowel devoicing in the most general devoicing environment is the same in Tokyo and Kinki.

The pitch accent pattern of the words selected for this study is either HLL or LHL at the beginning of the word, common in Tokyo and Kinki, and such words contained a devoiceable vowel in a low-pitched mora. For example, *atafuta* 'hurriedly' is pronounced as HLLL and /u/ is devoiceable, and *nadeshiko* 'a type of pink flower' is LHLL and /i/ is devoiceable. Using these two distinct pitch accent patterns made it possible also to compare how the effects of accent pattern may differ in respondent judgments about whether or not a speaker is from the same region as the respondent.

Words pronounced in the other two patterns, LHH with accent on the last mora and LHH without any accented mora, are not included. The reasons are the following. First, devoicing in the high-pitched mora tends to

be avoided in Tokyo and may therefore affect the responses. Second, words which contain a devoiceable vowel in the first mora do not seem to have parallels in the two areas investigated here. It seems that words pronounced in LHH in the Tokyo dialect are pronounced as HLL, LHL, or HHH in Kinki as shown in (4):

(4a)	(a place name)	Tokyo: kyôbashi (LHHH)	Kinki: kyôbashi (HLLL)
(4b)	'rice planting'	Tokyo: taue (LHH)	Kinki: taue (LHL)
(4c)	'replacement'	Tokyo: kawari (LHH)	Kinki: kawari (HHH)

In such cases, the respondents may judge whether the speaker is or is not from the same region as their own on the basis of differences of the pitch accent pattern.

There are 110 possible environments of the high vowels between voiceless consonants. For /i/, there are 5 possible preceding consonants [k, ʃ, tʃ, ç, p] and 10 possible following ones [k, s, ʃ, t, tʃ, ts, h, ç, ɸ, p]. For /u/, there are 6 possible preceding consonants [k, s, ʃ, ts, ɸ, p] and the same 10 possible following ones. [tʃ] preceding /u/ is not included here although it is considered to be a voiceless phoneme, because there seems to be no word which contains [tʃu] followed by another voiceless consonant or a pause except for very few loanwords, as Kondo (1999) observes.

Ideally, each environment of vowel devoicing should have a sample word, but not all environments can be filled by actual words in order to

examine which consonant and which position (preceding or following devoiceable vowels) promotes or demotes judgment based on my hypothesis. Among the total 110 possible environments, words were found for 58 environments. The default verb, *suru* 'to do,' a particle such as *de* 'at; by,' and *mo* 'also' or suffix such as *-san* 'Mr./Ms.' is added to the word in some cases, to avoid word final devoicing or to create a devoicing environment. For example, I could not find a word that has [ʃitʃ] in the second mora and [tʃ] in the third mora's onset, so I chose *Toshi* [toʃi], which is a two-mora truncation of a man's name, and added *-chan* [tʃan], a suffix added to names when addressing a child or very close family member or friend. Adding this suffix creates the environment [ʃitʃ] and avoids a word final devoiceable vowel /i/. It is not ideal to combine morphemes or words, but I sometimes did simply because it was difficult to find sample words containing devoiceable vowels within a morpheme in the various phonological environments I wanted to study. However, the effects of a boundary on the production and perception of devoicing are separate issues, and by also focusing on such boundaries, it is possible to investigate their effects on perception and judgment. Furthermore, devoicing frequently occurs at morpheme boundaries and sometimes consecutive devoicing occurs even at word boundaries. The list of words and phrases containing /i/ in the possible environments of devoicing is shown in Table 4, and the one containing /u/ is shown in Table 5.

Table 4 Example words containing environment of devoiceable /i/

		Preceding consonant				
		k	ʃ	tʃ	ç	p
	k	*tanuki-kana* 'I wonder if it's a racoon'	*Hiroshi-kun* 'little boy Hiroshi' *nadeshiko* 'a type of pink flower'	*inchikina* 'fake'	*torihiki-mo* 'a deal also'	*henpi-kana* 'I wonder if it's away from town'
	s	*neoki-suru* 'stay; live'	*Konishi-san* 'Ms/Mr. Konishi'	*hôchisuru* 'leave it' *ninchisuru* 'recognize'	*kaihi-suru* 'avoid'	*Karupisu-wa* 'as for Karupisu'
	ʃ	*rikishi-wa* 'as for sumo wrestlers'	*soshi-shiyô* 'let's stop it'		*mahi shi* 'paralyzed and'	*gatapishi naru* 'squeak'
	t	*tenki-to kion* 'weather and temperature'	*hatashite* 'really'	*Michi-tono sôgû* 'Close Encounter of the Third Kind'	*tôhi-to môhatsu-ni* 'for scalp and hair'	
	tʃ	*hekichide* 'at a remote place'	*Toshi-chan* 'little Toshi'			
	ts	*sekitsui* 'spine'	*jimushitsu-ni* 'at the office'		*muhitsu-de* 'no pen'	*sanpitsu wa* 'three famous calligraphers'
	h	*osekihan* 'red bean rice'				
	ç			*michihi-de* 'by high and low tides'		
	f			*kochi fuite* 'east wind blows and'		
	p	*tekipaki-yaru* 'do efficiently'		*pachipachi* 'flickering'		

Vertical columns contain preceding consonants; horizontal columns contain following consonants.

Table 5 Example words containing environment of devoiceable /u/

		Preceding consonant					
		k	s	ʃ	ts	f	p
	k	*kazoku-kana* 'I wonder if it's a family'	*nomisuke* 'drinker'	*senshu-ka* 'player or'	*asatsuki-o* 'green onion'	*kyôfu-ka* 'fear or'	*tanpuku-de* 'by the singlar and the plural'
	s	*nanakusa* '7 wild flowers'		*saishu-suru* 'collect'	*kubetsu-suru* 'differentiate'	*jifu-suru* 'self-conceit'	*tenpu-suru* 'attach'
	ʃ	*akushu-de* 'by shaking hands'	*Yasushi-dono* 'Mr. Yasushi'		*Atsushi-dono* 'Mr. Atsushi'		
	t	*Kinki-to Kantô* 'Kinki and Kanto'	*risu-to kuma* 'squirrel and bear'	*genshu-towa* 'sovereign means'	*kajitsu-to kajû* 'fruit and fruit juice'	*shufu-to seikatsu* 'housewife & life' *atafuta* 'hurriedly'	*ninpu-to akachan* 'a pregnant woman and a baby'
	tʃ	*kirikuchi-ni* 'cut side'					
	ts	*herikutsu-mo* 'quibble also'			*katsu tsumetai* 'also cold'		
	h	*dokuha* 'finish reading'	*Yasuha* (woman's name)				
	ç	*kokuhi-de* 'by national fund'					
	f	*bakufu-wa* 'as for the shôgunal government' *shakufu-wa* 'liquor server'					
	p	*pakupaku* 'munching'			*potsupotsu* 'bit by bit'		

Vertical columns contain preceding consonants; horizontal columns contain following consonants.

The position of a devoiceable vowel relative to a morpheme boundary could affect judgments about the speaker because of possible effects of devoicing variation in production. A devoiceable vowel in this study is either at a word boundary, at a morpheme boundary, or within a morpheme, and the effects will be compared among these three. Examples are given in (5) below.

(5a)	At a word boundary	kats*u*#tsumetai	'also cold'
(5b)	At a morpheme boundary	Tosh*i*-chan	'little Toshi'
(5c)	Within a morpheme	ataf*u*ta	'hurriedly'

Another aspect of the position of a devoiceable vowel focused on in this study is the fact that it may occur in either the second or third mora from the beginning of the word. In either case, I chose the words with unaccented devoiceable vowels only. In my data, a devoiceable vowel is in the second mora of a word with the initial HLL pattern or in the third mora in HLL or LHL. For example, *Toshi-chan* 'Toshi (a truncated name)-(suffix to address a child)' has a devoiceable vowel in the second mora in the HLLL pattern, and *Hiroshi-kun* 'Hiroshi-(suffix to address a boy)' in the third mora in HLLLL. It is also possible to compare this with such a word as *nadeshiko,* 'a pink,' which has a devoiceable vowel in the third mora in LHLL.

Two types of words that do not contain any environment for vowel devoicing are selected for the purpose of comparison: (i) words that are

common in both the Kinki and Tokyo areas but pronounced with different pitch accent patterns, and (ii) words that are common and pronounced with the same pitch accent in both areas. In other words, they are words that might be judged as 'foreign' by pitch accent alone and completely neutral words which give no clue to region, neither from accent nor devoicing. Using these words, it is possible to compare the extent of the effects on the respondent judgments between accent patterns and devoicing variability. It is also possible to compare the extent of effects between the different Tokyo and Kinki accent patterns. The words containing no devoiceable vowel are listed in Table 6.

The subjects who pronounced these words and phrases were 14 male and female speakers of Japanese. Their native dialects were not controlled, because variation did not show up frequently enough in the data I collected from Tokyo people prior to this study. An examination of the responses showed that the hometown origin of the speakers did not influence judgments in this study. The list of the subjects with their gender and hometown is shown in Appendix I. They were asked to read the list in a 'natural' way.

Both versions of devoiced and nondevoiced vowels of the same word were needed to see if the respondents judged them differently. I examined whether or not the vowels of the recorded pronunciations were devoiced by using the Signalyze program. It converts the recorded sounds into wave

Table 6 List of the words containing no devoiceable vowel

	Word	Pitch Accent in Tokyo	Pitch Accent in Kinki
Words with different accent	*kawari* 'replacement'	LHH	HHH
	kamakura 'Kamakura' (place name)	LHHH	HHHH
	taue 'rice planting'	LHH	LHL
	kyôbashini 'at Kyobashi'	LHHHH	HLLLL
	maekake 'apron'	LHHH	LLHL
	kowai 'scary; scared'	LHL	HLL
	oyayubi 'thumb'	LHLL	HHLL
	taberu 'eat'	LHL	LLH
	boyakeru 'blur'	LHHL	HHHH
	tabezakari 'growing with a good appetite'	LHHLL	LLHLL
	masaka 'you cannot mean it'	HLL	LHL
	nansai 'how old'	HLLL	LHLL
	himeji 'Himeji' (place name)	HLL	HHH
Neutral Words	*odeko* 'forehead'	LHL	LHL
	semotare 'back of a seat'	LHLL	LHLL
	ninensei 'second year student'	LHLLL	LHLLL
	tabun 'probably'	HLL	HLL
	tamashii 'soul'	HLLL	HLLL

forms, showing voiced sounds as periodic waves and voiceless sounds as very attenuated wave forms or flat lines. As Kondo (1997) concluded, devoicing is not categorial, and I obtained many waveforms that were gradient, but I chose, for my sample tape, the most devoiced and the most nondevoiced versions of the same word.

In my data, 41 identical words were pronounced with devoiced and nondevoiced variants. In addition, 23 words were pronounced either with a devoiced vowel only or with a nondevoiced vowel only; that is, all the subjects pronounced the same word with devoiced vowels, or all the subjects pronounced the same word with nondevoiced vowels. There were 13 words containing no devoiceable vowel and pronounced in the Tokyo pitch accent, with the same 13 words in the Kinki pitch accent. Finally, 5 neutral words were added. Examples of each are given in (6):

(6a) Words pronounced with devoiced and nondevoiced vowels

atafu*u*ta	'hurriedly'	Speaker J	devoiced
atafuta	'hurriedly'	Speaker K	nondevoiced

(6b) Words pronounced with either a devoiced or a nondevoiced vowel only

nadeshi̥ko	'a type of pink flower'	Speaker K	devoiced
michihide	'by high and low tides'	Speaker M	nondevoiced

(6c) Words with regionally different accents and with no devoiceable vowel

kawari	'replacement'	Speaker H	Tokyo (LHH)
kawari	'replacement'	Speaker G	Kinki (HHH)

(6d) Neutral words, with no accent difference and no devoiceable vowel

tabun 'probably' Speaker E HLL

The total 136 words and phrases were randomly arranged in terms of devoicing variation, regionally different accents, neutral words, and speakers, and a test tape was prepared. A list of the words in the order presented in the tape is shown in Appendix II.

I coded speaker, speaker's gender, pitch accent pattern, position of the devoiceable vowel in terms of boundary, position of the devoiceable vowel in terms of mora counting from the beginning, preceding consonant, identity of devoiceable vowel, following consonant, and voicing status or type of words with no devoiceable vowel (Tokyo/Kinki accent or neutral) for each word. Examples are given in Table 7. In the 'Type' column, 'd' stands for 'devoiced' and 'n' stands for 'nondevoiced.' In the same column, 't,' 'k,' and 'x' indicate types of words with no devoiceable vowel: 't' stands for 'Tokyo pitch accent,' 'k' stands for 'Kinki pitch accent,' and 'x' indicates a neutral word that has no devoicing variation or accent difference. The words coded as 'd,' 'n,' and 'x' contain no devoiceable vowel, so they have a '0' in the 'Position' (in terms of mora counting) column and an 'x' in 'Boundary,' 'Precede'(ing consonant), 'Identity' (of devoiceable vowel), and 'Follow'(ing consonant) columns. In the 'Boundary' column, 'w,' 'm,' and 'i' stand for 'at a word boundary,' 'at a morpheme boundary,' and 'morpheme-internally,' respectively.

Table 7 Coding for each word (examples)

Word	Speaker	Gender	Accent	Position	Boundary	Precede	Vowel	Follow	Type
atafuta	J	F	HLLL	3	i	f	u	t	d
osekihan	M	M	LHLL	3	m	k	i	h	n
taberu	A	F	LHL	0	x	x	x	x	t
kawari	G	F	HHH	0	x	x	x	x	k
tamashii	K	M	HLLL	0	x	x	x	x	x

3.2. Response collection

The test tape was presented to subjects, male and female native speakers of Japanese. They listened to each of 136 words twice and were asked to judge whether or not the speaker was from the same region as their own. They listened while looking at a list of the words written in Japanese (Kanji and Hiragana). This written list helped the subjects concentrate on making judgments without taking time to recognize, in particular, unfamiliar words. They responded on a five-point scale: 0=The speaker is certainly from the same region, 1=The speaker is probably from same region, 2=Don't know, 3=The speaker is probably not from the same region, and 4=The speaker is certainly not from the same region.

Demographic data, gender, age, and hometown of the subject were collected. 'Hometown' was based on the place where the respondents spent their elementary and junior high school days, assuming that the dialect learned during those days is the native dialect for them. I chose 'elementary and junior high school days' because children seem to eventually learn the dialect of the region they live in, rather than their parents' dialects, to communicate with their peers. Kitamura (1952) conducted research on about 500 children who moved from Tokyo to Shirakawa, Fukushima prefecture, and reports that those who moved before the age of six learned the Shirakawa dialect while those who moved at a later age did not learn it completely. I eliminated respondents who lived in two places during this crucial period.

Besides demographic questions, it was asked whether or not the respondents could personally identify any of the voices on the tape, and respondents who did so correctly were eliminated because they may have known the hometowns of those speakers, and that may have affected their judgments.

I defined 'Tokyo' as the Tokyo metropolitan area, the area which people would commute for work in downtown Tokyo from, and 'Kinki' as 6 prefectures by governmental region. 'Kinki' used in Japanese dialectology is not identical with the 6 prefectures (Hirayama et. al, 1982), but all the Kinki respondents in my data are also from Kinki by dialect definition.

I collected analyzable responses from 206 subjects, and after eliminating those who do not fill the conditions stated above, I used the responses by 47 from the Tokyo Metropolitan area and by 73 from Kinki for the analysis in this paper.

3.3. Preparation for analysis

I eliminated tokens to the stimuli that were not perfectly pronounced as I intended in the segment after the devoiceable vowel. I also eliminated other invalid tokens (e.g., no response, marking two responses to one token), leaving 6,344 tokens judged by Tokyo respondents and 9,785 tokens judged by Kinki respondents.

With these data, first I flipped the ratings for words of nondevoiced versions of devoiceable vowels and words with the Kinki accent in responses

by Tokyo people, and the ratings for words of devoiced version of devoiceable vowels and words with the Tokyo accent in responses by Kinki people, changing 0 to 4, 1 to 3, 3 to 1 and 4 to 0. This reflects the decision to use as expectations those responses which indicated that a speaker is judged as a member of the same region as the region the respondent belongs to depending on the devoicing variation and the pitch accent patterns. The responses expected from Tokyo people were that a speaker who devoices devoiceable vowels or uses the Tokyo pitch accent pattern would be judged as a Tokyo speaker, and that a speaker who nondevoices them or uses the non-Tokyo pitch accent pattern would be judged as a non-Tokyo speaker. In order to find out whether or not the data reflect that respondents judge the speakers as expected depending on the experimental conditions (devoicing, nondevoicing, Tokyo pitch accent, or Kinki pitch accent), I needed to have a single scale so that 'certainly from the same region (from Tokyo)' for the tokens with devoicing and the Tokyo accent and 'certainly not from the same region (not from Tokyo)' for the tokens with nondevoicing and Kinki accent would have the same value. I needed to have these four types of tokens show the same value and be placed at one end of the scale, and at the other end I needed to have 'certainly from Tokyo' for the tokens with nondevoicing and the Kinki accent and 'certainly not from Tokyo' for the tokens with devoicing and the Tokyo accent. For example, with the two data sets given below, (7a) fits the hypothesis and (7b) does not.

(7a)	Word A	devoiced	score 0 (certainly from Tokyo)
	Word B	nondevoiced	score 4 (certainly from non-Tokyo)
	Word C	Tokyo accent	score 0 (certainly from Tokyo)
	Word D	Kinki accent	score 4 (certainly from non-Tokyo)
(7b)	Word E	devoiced	score 4 (certainly from non-Tokyo)
	Word F	nondevoiced	score 0 (certainly from Tokyo)
	Word G	Tokyo accent	score 4 (certainly from non-Tokyo)
	Word H	Kinki accent	score 0 (certainly from Tokyo)

With this coding, the experiment cannot be treated statistically because it does not have a single scale, which would require that the scores of words A, B, C, and D have the same value on one end and the scores of words E, F, G, and H the same value on the other end. If the scores are flipped as in (8) below (italic scores are flipped), the results are shown on a single scale, and (8a) will show that the expectations on responses are right by the score 0 while (8b) will show that they are wrong by the score 4 in contrast to 0. After flipping these ratings, 0 and 1 are judgments that confirm my expectations, and 3 and 4 are judgments that contradict them.

(8a)	Word A	devoiced	score 0 (judged as expected, Tokyo)
	Word B	nondevoiced	score *0* (judged as expected, non-Tokyo)
	Word C	Tokyo accent	score 0 (judged as expected, Tokyo)
	Word D	Kinki accent	score *0* (judged as expected, non-Tokyo)
(8b)	Word E	devoiced	score 4 (judged not as expected, non-Tokyo)
	Word F	nondevoiced	score *4* (judged not as expected, Tokyo)
	Word G	Tokyo accent	score 4 (judged not as expected, non-Tokyo)
	Word H	Kinki accent	score *4* (judged not as expected, Tokyo)

Similar procedures were applied to the responses by Kinki people. For Kinki people, 'the same region' as their own is Kinki, and the expectation in responses from Kinki people is that a speaker who devoices devoiceable vowels or uses the Tokyo pitch accent pattern is judged as a non-Kinki speaker, and that a speaker who nondevoices them or uses the Kinki pitch accent pattern is judged as a Kinki speaker. Examples of their raw data sets can be illustrated as in (9a), confirming the expectations, and (9b), contradicting them.

(9a)	Word A	devoiced	score 4 (certainly from non-Kinki)
	Word B	nondevoiced	score 0 (certainly from Kinki)
	Word C	Tokyo accent	score 4 (certainly from non-Kinki)
	Word D	Kinki accent	score 0 (certainly from Kinki)
(9b)	Word E	devoiced	score 0 (certainly from Kinki)
	Word F	nondevoiced	score 4 (certainly from non-Kinki)
	Word G	Tokyo accent	score 0 (certainly from Kinki)
	Word H	Kinki accent	score 4 (certainly from non-Kinki)

In order to compare the responses by Tokyo people and Kinki people, I needed a scale with the responses confirming the expectations placed on one end with the value 0 and the responses contradicting them placed on the other with the value 4. That is, I needed a scale so that the tokens judged as 'non-Kinki' with devoicing and the Tokyo accent and as 'Kinki' with nondevoicing and the Kinki accent would have the value 0, and the tokens judged as 'Kinki' with devoicing and Tokyo accent and as 'non-Kinki' with

nondevoicing and Kinki accent would have the value 4. I can obtain such a scale by flipping the scores of the tokens with devoiced vowels and Tokyo accent.

I will present and discuss the results in two tables, one with Tokyo data and the other with Kinki data, that show frequencies and percentages of each of 5 ratings in each of the token types. Then, I will present the results in two tables in which I collapsed the ratings into a three-point scale and eliminated the response 'don't know.' Having two-way results is necessary for the analysis using the statistics program GoldVarb, which I used in the later analysis, and as I will show, this collapse did not distort the overall picture. Specifically, I collapsed 0 and 1 to 0, 2 to 1, and 3 and 4 to 2. After collapsing, 0 is a judgment confirming the expectations and 2 is a judgment contradicting the expectations based on my hypothesis, and 1 is 'don't know,' which was eliminated after looking at the five-way results.

3.4. Analysis

I analyzed the responses that confirm or contradict the expectations to determine which factor(s) affect judgments on the speaker and how each factor affects such judgments. Imai (1997) examined preceding and following consonants to find the promoting and demoting factors for devoicing in speech production. Using my data, it is possible to compare the same factors

in perception. I examined the following phonological and social factors as in (10) below.

(10) Between devoicing variation and regional accents
Position of a devoiceable vowel in terms of mora count
Position of a devoiceable vowel in terms of morpheme boundaries
Pitch accent pattern
Preceding consonant
Identity of devoiceable vowel
Following consonant
Speaker's identity
Gender of the speaker
Gender of the respondent
Age of the respondent

I used the statistics program GoldVarb not only to determine the significance of each factor group and the rates of expected responses, but also to examine the significance of each factor relative to all other factors.

GoldVarb is a multivariate logistic regression program, which identifies insignificant factor groups by an up and down regression test. After those groups are excluded, the 'weight' of each factor of each group is obtained by the logistic regression process. The weight indicates how heavily the factor promotes (above .5) or demotes (below .5) the results (in this case, the extent of how strongly respondents' judgments confirm or contradict the expectations of the hypotheses). Then if factors with similar weights in a factor group are combined (when phonologically or socially justified), and if the results of a new run are not significant, those factors can be put together

permanently as a new factor. This examination makes it possible to identify which factor groups and factors within groups have the greatest influence on respondent judgments.

4. Results

With the data prepared for analyses, I first examined the overall frequency and percentage of each score on the basis of the devoicing variation and regional accents and then compared the results of responses by Tokyo people to the ones by Kinki people. Then I analyzed the Tokyo data and the Kinki data separately to examine how the phonological factors and the social factors affected their judgments of whether or not the speaker is from the same region as theirs. I also analyzed the devoiced tokens and the nondevoiced tokens separately for the Tokyo and Kinki data, respectively, in order to examine the phonological factors and the social factors.

4.1. Overall results by token type

Overall results are examined by the five token types, that is, tokens with devoiced vowels, with nondevoiced vowels, with the Tokyo accent, with the Kinki accent, and neutral tokens, separately, and then by the two factor groups, that is devoicing variation and regional accents.

4.1.1. Overall results by the five token types

The next three tables illustrate the results by the token types. Table 8 shows how tokens are tabulated in Tables 9 and 10 after flipping the scores of the respondents based on the hypotheses and assumptions as explained in the

Table 8 Tabulation

Respondent	Token type	Expected		Unexpected	
		'Certainly'	'Probably'	'Probably'	'Certainly'
Tokyo	Devoiced	from the same region		not from the same region	
	Tokyo PA	from the same region		not from the same region	
	Nondevoiced	not from the same region		from the same region	
	Kinki PA	not from the same region		from the same region	
	Neutral	from the same region		not from the same region	
Kinki	Devoiced	not from the same region		from the same region	
	Tokyo PA	not from the same region		from the same region	
	Nondevoiced	from the same region		not from the same region	
	Kinki PA	from the same region		not from the same region	
	Neutral	from the same region		not from the same region	

previous chapter. In the "Token Type" column, "Devoiced" and "Nondevoiced" refers to the tokens that have devoiced vowels and nondevoiced vowels, respectively, while "Tokyo PA" and "Kinki PA" refer to the tokens that are pronounced in the Tokyo pitch accent and in the Kinki pitch accent, respectively.

In the top row "Expected" and "Unexpected" indicate whether the tokens are judged confirming the hypotheses or contradicting the hypotheses, respectively, assuming that vowel devoicing and the Tokyo pitch accent are Tokyo features while nondevoicing of vowels and the Kinki pitch accent are Kinki features. In other words, "Expected" responses by Tokyo people are the judgment "certainly or probably from the same region (Tokyo)" for the tokens with devoicing and the Tokyo pitch accent and the judgment "certainly or probably not from the same region (not Tokyo)" for the tokens with nondevoicing and the Kinki pitch accent, while "Unexpected" responses by them are the judgment "certainly or probably from the same region" for the tokens with nondevoicing and the Kinki pitch accent and the judgment "certainly or probably not from the same region" for the tokens with devoicing and the Tokyo pitch accent. "Expected" responses by Kinki people, on the other hand, are the judgment "certainly or probably from the same region (Kinki)" for the tokens with nondevoicing and the Kinki pitch accent and the judgment "certainly or probably not from the same region (not Kinki)" for the tokens with devoicing and the Tokyo pitch accent, while

"Unexpected" responses by them are the judgment "certainly or probably from the same region" for the tokens with devoicing and the Tokyo pitch accent and the judgment "certainly or probably not from the same region" for the tokens with nondevoicing and the Kinki pitch accent.

"Neutral" refers to tokens that do not contain devoiceable vowels and are pronounced in the same pitch accent in Tokyo and Kinki. In this study, the neutral tokens are expected to sound like the respondent's own pronunciation because of the lack of salient clues. Following this expectation, the neutral tokens judged as "certainly or probably from the same region" are tabulated in the column "Expected" and the ones judged as "certainly or probably not from the same region" are tabulated in the column "Unexpected," regardless of whether the respondent is from Tokyo or Kinki.

Tables 9 and 10 show the overall frequency and percentage of each rating by devoicing variants and regional accents in the Tokyo data and in the Kinki data, respectively. The figures in the parentheses are percentages. The results show that the respondents tend to make judgments confirming the hypotheses, in other words, they tend to make judgments as expected — that is, devoiced and Tokyo accent versions tend to be rated as 'Tokyo speaker' by Tokyo respondents and as 'non-Kinki speaker' by Kinki respondents, while nondevoiced and Kinki accent versions tend to be rated as 'non-Tokyo speaker' by Tokyo respondents and as 'Kinki speaker' by Kinki respondents. This is indicated by the higher percentages in the "Expected" columns than in

Table 9 Overall Results by Token Types (Tokyo)

Token Type	Expected		"Don't Know"	Unexpected		Total
	'Certainly'	'Probably'		'Probably'	'Certainly'	
Devoiced	932 (34.20)	780 (28.62)	283 (10.39)	470 (17.25)	260 (9.54)	2725 (100)
Tokyo PA	193 (31.59)	184 (30.11)	50 (8.18)	97 (15.88)	87 (14.24)	611 (100)
Nondevoiced	583 (26.97)	591 (27.34)	202 (9.34)	398 (18.41)	388 (17.95)	2162 (100)
Kinki PA	432 (70.70)	75 (12.27)	23 (3.76)	40 (6.55)	41 (6.71)	611 (100)
Neutral	83 (35.32)	72 (30.64)	25 (10.64)	36 (15.32)	19 (8.09)	235 (100)
Total	2223 (35.04)	1702 (26.83)	583 (9.19)	1041 (16.41)	795 (12.53)	6344 (100)

Table 10 Overall Results by Token Types (Kinki)

Token Type	Expected		"Don't Know"	Unexpected		Total
	'Certainly'	'Probably'		'Probably'	'Certainly'	
Devoiced	773 (18.37)	992 (23.57)	825 (19.61)	1028 (24.43)	590 (14.02)	4208 (100)
Tokyo PA	470 (49.95)	254 (26.99)	86 (9.14)	82 (8.71)	49 (5.21)	941 (100)
Nondevoiced	731 (21.95)	774 (23.24)	579 (17.38)	686 (20.59)	561 (16.84)	3331 (100)
Kinki PA	545 (57.79)	232 (24.60)	56 (5.94)	58 (6.15)	52 (5.51)	943 (100)
Neutral	161 (44.48)	114 (31.49)	51 (14.09)	24 (6.63)	12 (3.31)	362 (100)
Total	2680 (27.39)	2366 (24.18)	1597 (16.32)	1878 (19.19)	1264 (12.92)	9785 (100)

the "Unexpected" columns, except for the Kinki devoiced tokens. In the Kinki devoiced tokens, too, the total percentage of "Expected" columns (18.37% + 23.57% = 41.94%) is higher than that of "Unexpected" columns (24.43% + 14.02 = 38.45%), showing similar tendencies. These general tendencies mean devoicing variation contributes to judgments of whether the speaker is from the same region just as the Tokyo and Kinki accent patterns do, although, as noted above, devoicing and nondevoicing are allophonic phenomena and many people are not aware of them in detail.

Tables 9 and 10 also show some differences between the Tokyo results and the Kinki results and between token types. The results of regional accents are more distinct than those of devoiced and nondevoiced versions for "Expected" and "Unexpected" in both Tokyo and Kinki data, and the results of devoiced and nondevoiced versions are much more distinct in the Tokyo data than in the Kinki data. In the bottom rows in both tables, the percentage of the expected response with respondents' confidence 'certainly' in the leftmost column is highest and the percentages decrease toward the rightmost column, skipping the 'Don't Know' (35.04, 26.83, 16.41, and 12.53 in Tokyo, and 27.39, 24.18, 19.19, and 12.92 in Kinki). In the Tokyo data (Table 9), the results of each token type generally follow the decreasing pattern as in the 'Total' row, and the decreasing in regional accents and neutral tokens is sharper than in devoiced and nondevoiced tokens.

In the Kinki data (Table 10), the results of the tokens of regional accents and neutral tokens show decreasing patterns similar to the Tokyo results. The results of devoiced and nondevoiced tokens show higher percentages in both expected and unexpected 'probably' responses and lower percentages in both 'certainly' responses. Devoiced tokens are unexpectedly rated as 'probably from Kinki' with the highest percentage (24.43%). 'Don't Know' responses in devoiced and nondevoiced tokens are relatively high compared to other token types (and 'Don't Know' in all token types are rated relatively higher compared to the Tokyo results as well), and the percentages of all 5 responses in devoiced and nondevoiced are mostly in the range of 20% plus or minus 5%. This is a small range compared to the other token types in the Kinki results and all types in the Tokyo data. Nonetheless, tendencies similar to the ones in results for regional accents are indicated in the devoiced and nondevoiced tokens in that more tokens are rated expectedly than unexpectedly.

Tables 9 and 10 also show that the Kinki pitch accent contributes to the expected judgment more strongly than the Tokyo accent does, both in the Tokyo and Kinki data. In particular, the 'Certainly' expected response in the Tokyo data is very high (70.70%) and the difference between 'Certainly' and 'Probably' is very large. Among devoicing variants, on the other hand, devoiced tokens contribute to the expected judgment more than nondevoicing does in the Tokyo data, and the Kinki data show the opposite

results. In other words, the presumed Kinki features (nondevoicing and the Kinki accent) contribute more in the Kinki data, while in the Tokyo data, the non-Tokyo feature contributes more in pitch accent pattern, but the Tokyo feature contributes more in devoicing variation. I will offer explanations for these results in the discussion chapter.

The results of neutral tokens should also be noted. In my hypothesis, neutral tokens were expected to be judged as 'from the same region,' that is, 'from Tokyo' by Tokyo respondents and 'from Kinki' by Kinki respondents, due to the lack of any salient clue, and, in fact, respondents from both areas tended to make judgments as expected.

Tables 11 and 12 show the two-way results by token types for the Tokyo and Kinki data, respectively. They are obtained by collapsing the frequency and percentages of 'Certainly' and 'Probably' expected responses into one column, collapsing unexpected responses similarly into another column, and eliminating 'Don't Know' responses.

Tables 11 and 12 preserve the general tendencies observed in the five-way results in Tables 9 and 10, although the distribution between 'Certainly' and 'Probably' responses and that of 'Don't Know' responses are not visible. Tables 11 and 12 still show that the respondents tend to make judgements as expected — devoiced and Tokyo accent as Tokyo or non-Kinki, and nondevoiced and Kinki accent as non-Tokyo or Kinki.

Table 11 Overall two-way results by token types (Tokyo)

Token Type	Expected	Unexpected	Total
Devoiced	1712 (70.11)	730 (29.89)	2442 (100)
Tokyo PA	377 (67.20)	184 (32.80)	561 (100)
Nondevoiced	1174 (59.90)	786 (40.10)	1960 (100)
Kinki PA	507 (86.22)	81 (13.78)	588 (100)
Neutral	155 (73.81)	55 (26.19)	210 (100)
Total	3925 (68.13)	1836 (31.87)	5761 (100)

Table 12 Overall two-way results by token types (Kinki)

Token Type	Expected	Unexpected	Total
Devoiced	1765 (52.17)	1618 (47.83)	3383 (100)
Tokyo PA	724 (86.84)	131 (15.32)	855 (100)
Nondevoiced	1505 (54.69)	1247 (45.31)	2752 (100)
Kinki PA	777 (87.60)	110 (12.40)	887 (100)
Neutral	275 (88.42)	36 (11.58)	311 (100)
Total	5046 (61.63)	3142 (38.37)	8188 (100)

Tables 11 and 12 also preserve some difference between the Tokyo results and the Kinki results and between token types. The results of regional accents are more distinct than those of devoiced and nondevoiced versions in both the Tokyo and Kinki data, and the results of devoiced and nondevoiced versions in the Kinki data show tendencies similar to other tokens but more weakly, as shown in the percentages close to 50% in both expected and

unexpected responses. Tables 11 and 12 also preserve the different token types that contribute to expected responses; the presumed Kinki features contribute more in the Kinki data, while in the Tokyo data the non-Tokyo feature contributes more in regional accents, but the Tokyo feature contributes more in devoicing variation.

Thus, it seems reasonable to use the collapsed tables for further analysis to examine how phonological factors and social factors affect the respondents' judgments, knowing that they preserve important tendencies for further analysis, although the distribution of responses in five ratings is invisible.

4.1.2. Overall results by devoicing variation and regional accents

The results shown in the previous section suggest that the pitch accent pattern contributes to expected judgments more strongly than the devoicing variation does. Tables 13 and 14 show the results by the two factor groups with the Tokyo data and the Kinki data, respectively.

Table 13 Results by regional accents and devoicing variation (Tokyo)

Token Type	Expected	Unexpected	Total
Devoicing/Nondev.	2886 (65.56)	1516 (34.44)	4402 (100)
Tokyo/Kinki PA	884 (76.94)	265 (23.06)	1149 (100)
Total	3770 (67.92)	1781 (32.08)	5551 (100)

Table 14 Results by regional accents and devoicing variation (Kinki)

Token Type	Expected	Unexpected	Total
Tokyo/Kinki PA	1501 (86.17)	241 (13.83)	1742 (100)
Devoicing/Nondev.	3270 (53.30)	2865 (46.70)	6135 (100)
Total	4771 (60.57)	3106 (39.43)	7877 (100)

The Chi-square probabilities of Tables 13 and 14 are 0.000, but it is clear that the differences of pitch accent patterns affect judgments more powerfully than the devoicing factor.

The following analyses focus on what phonological and social factors do or do not affect such judgments when the respondent hears tokens with devoicing and nondevoicing of a devoiceable vowel.

4.2. Insignificant factors for overall results

Before analyzing factors that affect judgments and comparing the results between Tokyo respondents and Kinki respondents, it is necessary to find out which factors are not significant.

4.2.1. Insignificant factor groups

The factor groups that were examined in this study, listed in (10) in the previous chapter (in 3.4.), are repeated here in (11) for convenience:

(11) Between devoicing variation and regional accents
Position of a devoiceable vowel in terms of mora count
Position of a devoiceable vowel in terms of morpheme boundaries
Pitch accent pattern
Preceding consonant
Identity of devoiceable vowel
Voicing status (devoiced or nondevoiced) of devoiceable vowel
Following consonant
Speaker's identity
Gender of the speaker
Gender of the respondent
Age of the respondent

The results by devoicing variation and regional accents were shown in the previous section (4.1.2). Insignificant factor groups are found by running the up-and-down regression test in GoldVarb (the logistic regression test used to analyze these data). The insignificant factor groups in the Tokyo data and in the Kinki data are listed in (12).

(12a) The insignificant factor groups in the Tokyo data

Position of a devoiceable vowel in terms of mora count
Pitch accent pattern
Identity of devoiceable vowel
Gender of the speaker

(12b) The insignificant factor groups in the Kinki data

Identity of devoiceable vowel
Gender of the respondent

After the initial factor groups were selected for this study, it became apparent that it would also be necessary to examine whether some differences

not focused on in this study were significant. There are two such factors that were not singled out for this study but could yield significant results. One is the differentiation between devoicing and nondevoicing at the end of the stimulus, and the other is the length of the word. I examined these factors in the data of the Tokyo and Kinki respondents separately, as reported in the following sections (4.2.2. and 4.2.3.).

4.2.2. Devoicing and nondevoicing at the end of the stimulus

First, I examined whether or not the words that have devoiceable vowels at the end of the stimulus, which I did not eliminate completely, should be included for the analysis. The two words *pachipachi* and *pakupaku* were pronounced with either devoiced or nondevoiced vowels at the end of the word as well as internally. The significance of differentiating the tokens with one devoiced vowel (between consonants) only and the tokens with two devoiced vowels was determined by running the logistic regression test of GoldVarb before and after the combining these two types of tokens.

The difference of log likelihood times two, which is to be compared to the significance level in a chi-square test, is 2.572 for the Tokyo data, and 0.254 for the Kinki data. Both are smaller than 3.84, which is the significant level at one degree of freedom. This means that devoicing and nondevoicing at the end of the stimulus does not make a significant contribution to judgments about the speaker as examined in this study and is ignored in what follows.

These results were determined before the overall results reported in the previous section, and these tokens with two devoicings were included in the factor 'devoiced' in the overall results.

4.2.3. Words of different length and accent patterns

The accent pattern of the stimulus which contains a devoiceable vowel in the raw data was either HLL, HLLL, HLLH, or LHLL. HLL is a three-mora word, such as *dókuha* 'finish reading.' The others are the beginnings of words and phrases containing four or more moras. For example, *ínchikina* 'fake' has five moras but is coded as HLLL, and *osékihan* 'red bean rice' also has five moras but is coded as LHLL. HLLH occurs when two words are combined as in *kátsu#tsumetái* 'also cold' (shown in the previous section 3.1). It was already determined for the Tokyo data that the accent pattern was not a significant factor group (see (12a) above). That means combining HLL, HLLL, and HLLH and even LHLL does not make significant difference. In addition, the log likelihood difference times two when combining HLL, HLLL, and HLLH for the Kinki data is 4.59, which is smaller than 5.99, the significance level at two degrees of freedom. With the Kinki data, therefore, the tokens of HLL, HLLL, and HLLH can be combined as one new factor group (HLL), and compared with the tokens of LHLL to examine the different effects between the tokens starting with a high pitch and the tokens starting with a low pitch.

4.3. Overall results by phonological and social factors

After discarding insignificant factor groups, I analyzed the effects of each factor group on judgments about the speaker. I eliminated the "Don't know" responses to focus the comparison on expected responses and unexpected responses more sharply. I did not take the factor group of the speaker's identity into account either, in order to maintain statistically more meaningful results, because the number of speakers was only fourteen, and the tabular investigations did not show particularly interesting effects except for one or two respondents (discussed below).

4.3.1. Position of devoiceable vowels in terms of mora count

The position of a devoiceable vowel is either in the second mora (in HLL) or the third mora (in HLL or LHL) from the beginning of the stimulus. This was already found to be an insignificant factor group for the Tokyo data in the initial run, but it is significant for the Kinki data. Table 15 shows the final results by position for the Kinki data, after removing the insignificant factor groups and repeating the run with some combined factors (explained more fully below). In GoldVarb, the "weight" indicates how heavily a factor promotes (above .5) or demotes (below .5) the likelihood of the dependent variable, in this case "expected response." It is clear that for Kinki respondents voicing variability promotes expected judgments when that variation occurs in the second mora.

Table 15 Final results by mora count (Kinki)

Position	Weight
2nd mora	0.532
3rd mora	0.474

4.3.2. Position of devoiceable vowels in terms of boundary types

A devoiceable vowel is either in a morpheme internal position or at a morpheme or word boundary. Tables 16 and 17 show the initial results for the Tokyo data and the Kinki data, respectively.

Table 16 First results by boundary type (Tokyo)

Position	Weight
Word boundary	0.608
Morpheme internally	0.571
Morpheme boundary	0.464

Table 17 First results by boundary type (Kinki)

Position	Weight
Word boundary	0.636
Morpheme internally	0.535
Morpheme boundary	0.477

The results in Tables 16 and 17 are very similar. Positions at the word boundary and morpheme internally are promoters of the expected response, with the position at the word boundary being the strongest promoter, while the morpheme boundary is a demoter. For the Tokyo data, the tokens with devoiceable vowels at the word boundary or morpheme internal position can be combined as a new category, identifying this new category as that of a devoiceable vowel at the outermost or innermost in the structure of the word. The results of combining them do not create a statistically significant difference (by means of the log-likelihood test described above). With the Kinki data, on the other hand, no combining of factors is allowed because the differences of the weights between any two are too large. The final results for the Tokyo data are shown in Table 18.

Table 18 Final results by boundary type (Tokyo)

Position	Weight
Innermost/outermost	0.571
Morpheme boundary	0.466

4.3.3. Pitch accent pattern

The pitch accent pattern is either HLL or LHL at the beginning of the stimulus. It was already found to be an insignificant factor group for the

Tokyo data. Table 19 shows the final results by accent pattern for the Kinki data, where it is clear that HLL promotes expected judgments.

Table 19 Final results by accent pattern (Kinki)

Accent	Weight
HLL	0.511
LHL	0.439

4.3.4. Preceding consonant

There are 8 possible consonants that precede a devoiceable vowel. Table 20 shows the first results by preceding consonant for the Tokyo data.

Table 20 First results by preceding consonant (Tokyo)

Consonant	Place of art.	Manner of art.	Weight
k	velar	-continuant	0.607
tʃ	palatal	±continuant	0.544
s	alveolar	+continuant	0.495
ɸ	labial	+continuant	0.440
ç	palatal	+continuant	0.416
ts	alveolar	±continuant	0.411
p	labial	-continuant	0.401
ʃ	prepalatal	+continuant	0.396

There are two ways to generalize on this table: by looking at place of articulation or manner of articulation.

Looking at manner of articulation, both promoting consonants have the [-continuant] feature, and all the demoting consonants except for [p] have [+continuant].

On the basis of place, the promoting consonants [k] and [tʃ] are palatal and velar consonants; that is the consonants whose places of articulation are more back. Among the 6 demoting consonants [s], [ɸ], [ç], [ts], [p], and [ʃ], only [ç] belongs to the same 'back' consonant group as the promoting consonants. The others are labial, alveolar, and prepalatal — that is, consonants whose place of articulation is more forward (describing [ʃ] as prepalatal follows Vance (1987: 20) and Bloch (1970:131)).

It seems reasonable to interpret these results as an interaction of the place and manner of articulation. Backness (velar or palatal) and [-continuant] promote expected judgments, while frontness (labial, alveolar, or prepalatal) and [+continuant] demote them, but place is more salient than manner. [k] and [tʃ] are back consonants and have [-continuant], so they are undoubtedly promoters, and [s], [ɸ], and [ʃ] are front consonants and [+continuant], so they are undoubtedly demoters. [ts] and [p] have [-continuant], but their frontness cause them to be demoters. [ç] is palatal and [+continuant], but is a demoter for some reason which will require further interpretation. Table 21 shows the final results for the preceding consonants

after they were regrouped by the log-likelihood statistical procedure outlined above.

Table 21 Final results by preceding consonant (Tokyo)

Consonant	Place of Articulation	Weight
k, tʃ	Back	0.592
s, ɸ, ts, p, ʃ	Front	0.422
ç	Back	0.419

I will discuss the behavior of [ç] in the following section where I look at separate results for devoicing tokens and nondevoicing tokens.

The results with the Kinki data are different. Table 22 shows the first results by the preceding consonant for the Kinki data.

Table 22 First results by preceding consonant (Kinki)

Consonant	Place of art.	Manner of art.	Weight
p	labial	-continuant	0.636
k	velar	-continuant	0.568
ts	alveolar	±continuant	0.514
ʃ	prepalatal	+continuant	0.477
ç	palatal	+continuant	0.461
tʃ	palatal	±continuant	0.394
s	alveolar	+continuant	0.348
ɸ	labial	+continuant	0.335

In this case, it seems that manner of articulation plays a more important role than place. It seems reasonable to say that [-continuant] is generally a promoting feature and [+continuant] is a demoting feature. The only exception is [tʃ], which has the feature [-continuant] but nevertheless turns out to be a demoter. Table 23 shows the final combined results by preceding consonant for the Kinki data.

Table 23 Final results by preceding consonant (Kinki)

Consonant	Manner of Art.	Weight
p	-continuant	0.638
k, ts	-/±continuant	0.557
ʃ, ç	+continuant	0.470
tʃ	±continuant	0.389
s, ɸ	+continuant	0.344

Combining [p] with [k] and [ts] turns out to be significant because the weights of [p] and the weights of [k] and [ts] are too different, and so does combining [ʃ] and [ç] with [s] and [ɸ].

4.3.5. Following consonant

There are ten possible consonants that follow a devoiceable vowel. Tables 24 and 25 are the results by following consonant for the Tokyo and Kinki data, respectively.

Table 24 Final results by following consonant (Tokyo)

Consonant	Place of Art.	Manner of Art.	Weight
t	alveolar	-continuant	0.647
ʃ	prepalatal	+continuant	0.537
s	alveolar	+continuant	0.519
k	velar	-continuant	0.498
p	labial	-continuant	0.496
h	glottal	+continuant	0.426
ts	alveolar	±continuant	0.420
ç	palatal	+continuant	0.413
tʃ	palatal	±continuant	0.321
ɸ	labial	+continuant	0.244

Table 25 Final results by following consonant (Kinki)

Consonant	Place of Art.	Manner of Art.	Weight
k	velar	-continuant	0.638
t	alveolar	-continuant	0.569
h	glottal	+continuant	0.562
s	alveolar	+continuant	0.520
ʃ	prepalatal	+continuant	0.501
tʃ	palatal	±continuant	0.466
p	labial	-continuant	0.377
ç	palatal	+continuant	0.367
ɸ	labial	+continuant	0.341
ts	alveolar	±continuant	0.283

There is such considerable variation among these consonants that there does

not seem to be any reasonable linguistic basis on which to put factors together. There are stops and continuants and front and back consonants at both ends of the spectrum. The results by following consonant with the devoiced tokens and with the nondevoiced tokens separated will be shown in sections 4.4. and 4.5. in hopes that this more detailed analysis will reveal some interesting patterning. It is perhaps worth noting here, however, that some consonants are rather strong demoters of expected responses, much more so than any for preceding consonants.

4.3.6. Identity of devoiceable vowels

The devoiceable vowels I selected for this study are /i/ and /u/. It is an insignificant factor group for both the Tokyo data and the Kinki data as determined by the up and down regression run.

4.3.7. Voicing of devoiceable vowels

The frequencies and percentages of expected and unexpected judgments about the speaker by the token type were shown in Tables 9, 10, 11, 12, 13, and 14 in section 4.1. They show the results by devoicing variants and by Tokyo and Kinki accent patterns. These variants (voiced and devoiced) are shown in Tables 26 and 27 for the Tokyo data and the Kinki data, respectively, within this logistic regression format.

Table 26 Final results by voicing of the vowel (Tokyo)

Voicing	Weight
Devoiced	0.552
Nondevoiced	0.436

Table 27 Final results by voicing of the vowel (Kinki)

Voicing	Weight
Nondevoiced	0.521
Devoiced	0.483

In the Tokyo data, a devoiced vowel contributes to the expected judgments more than a nondevoiced vowel does, while in the Kinki data the results are opposite.

4.3.8. Gender of the speaker

There are seven male speakers and seven female speakers on the tape. Gender of the speaker was found to be an insignificant factor for the Tokyo data in the initial run. The final results with the Kinki data are shown in Table 28 below.

Table 28 Final results by gender of the speaker (Kinki)

Gender	Weight
Male	0.521
Female	0.479

Male voices contribute more to the expected judgments than female voices do for the Kinki data.

4.3.9. Gender of the respondent

Gender of the respondent was found to be an insignificant factor group for the Kinki data in initial run. The final results for the Tokyo data are shown in Table 29, in which female respondents are shown to be more likely to make expected responses.

Table 29 Final results by gender of the respondent (Tokyo)

Gender	Weight
Female	0.524
Male	0.466

4.3.10. Age of the respondent

The Tokyo respondents were from 18 to 49 years old, and the Kinki

respondents were from 18 to 59. Tables 30 and 31 show the first results by age of respondent with the Tokyo data and with the Kinki data, respectively.

Table 30 First results by age of the respondent (Tokyo)

Age group	Weight
18-22	0.467
23-29	0.512
30-39	0.527
40-49	0.477

Table 31 First results by age of the respondent (Kinki)

Age group	Weight
18-22	0.467
23-29	0.532
30-39	0.489
40-49	0.503
50-59	0.514

For the Tokyo data, the youngest and the oldest groups, who made expected judgments more often, can be put together, as can the two groups in the middle, a typical "age-graded" sociolinguistic pattern. For the Kinki data, on the other hand, all age groups except for the youngest may be combined. The final results for the Tokyo and the Kinki data are shown in Tables 32 and 33, respectively, after combining the age groups.

Table 32 Final results by age of the respondent (Tokyo)

Age group	Weight
23-29, 30-39 (middle)	0.517
18-22, 40-49 (youngest and oldest)	0.469

Table 33 Final results by age of the respondent (Kinki)

Age group	Weight
23-29, 30-39, 40-49, 50-59 (middle and oldest)	0.506
18-22 (youngest)	0.468

In the next two sections, I will show the results for devoiced vowels and nondevoiced vowels separately. Since devoicing variation is a significant factor, there may be different tendencies among which factors promote and demote expected judgments for the devoiced and nondevoiced tokens.

4.4. Results for Tokyo devoiced data and Tokyo nondevoiced data

The insignificant factor groups found in the first run of the up-and-down regression test, as done for the overall data, are accent and gender of the respondent for the devoiced data. Number of devoicing (within the word only or within the word and at the end of the word), which was explained in the section 4.2.2. and turned to be insignificant with all the data, is also insignificant. The insignificant factor groups for the nondevoiced data are

identity of the vowel and differentiation among three accent patterns starting with a high pitch (HLL, HLLL, and HLLH). Number of devoicing is irrelevant with nondevoiced data. The results for each factor group are shown in the following sections.

4.4.1. Position of devoiceable vowels in terms of mora count

Tables 34 and 35 below show the final results for the devoiced and nondevoiced data, respectively.

Table 34 Final results by mora count (Tokyo, devoiced)

Position	Weight
3rd mora	0.567
2nd mora	0.409

Table 35 Final results by mora count (Tokyo, nondevoiced)

Position	Weight
2nd mora	0.605
3rd mora	0.398

These results show the 2nd mora and 3rd mora positions have opposite effects on expected judgments for devoiced and nondevoiced tokens.

4.4.2. Position of devoiceable vowels in terms of boundary types

The outermost and innermost positions among the boundary in both devoiced and nondevoiced data are promoters, as in the overall results. The nondevoiced data also show similar results when combining the outermost and innermost positions. Interestingly, with the devoiced data, however, the weight of the factors of the boundary changed while re-running the logistic regression test with the factors put together. The final results for the devoiced data and with the nondevoiced data are shown in Tables 36 and 37, respectively.

Table 36 Final results by boundary type (Tokyo, devoiced)

Position	Weight
Outermost/innermost	0.621
Morpheme boundary	0.440

Table 37 Final results by boundary type (Tokyo, nondevoiced)

Position	Weight
Outermost/innermost	0.601
Morpheme boundary	0.455

4.4.3. Pitch accent pattern

Pitch accent pattern was found to be insignificant in the initial run of the devoiced data. The final results for the nondevoiced data are shown in Table 38.

Table 38 Final results by accent pattern (Tokyo, nondevoiced)

Accent	Weight
HLL	0.516
LHL	0.378

4.4.4. Preceding consonant

The orders and values of factors among preceding consonants except for [tʃ] and [ç] are very similar to the overall results, both for the devoiced and nondevoiced data. Tables 39 and 40 show the final results using the same criteria for combining factors as in the overall results, with the devoiced data and the nondevoiced data, respectively.

Table 39 Final results by preceding consonant (Tokyo, devoiced)

Consonant	Place of art.	Weight
tʃ	Back	0.743
k	Back	0.590
ç	Back	0.545
s, ɸ, ʃ, p	Front	0.406
ts	Front	0.300

Table 40 Final results by preceding consonant (Tokyo, nondevoiced)

Consonant	Place of art.	Weight
k	Back	0.655
tʃ	Back	0.496
ʃ, s, ɸ, p, ts	Front	0.428
ç	Back	0.214

With the devoiced data, all and only back consonants are promoters while all and only front consonants are demoters. This is perfectly consistent, compared to the overall results, which have the exception of [ç]. With the nondevoiced data, on the other hand, all front consonants are demoters just as with the devoiced data, while only [k] remains as a promoter. [tʃ] and [ç], palatal consonants, are both demoters.

4.4.5. Following consonant

The results by the following consonant with the devoiced data and with the

nondevoiced data turned out to be very different, and those different results explain the complicated overall results. The first results with feature information with the devoiced data and with the nondevoiced data are shown in Tables 41 and 42, respectively.

Table 41 First results by following consonant (Tokyo, devoiced)

Consonant	Manner of art.	Weight
ç	+continuant	0.813
s	+continuant	0.693
t	-continuant	0.650
ʃ	+continuant	0.579
h	+continuant	0.541
ɸ	+continuant	0.483
p	-continuant	0.441
tʃ	±continuant	0.347
k	-continuant	0.283
ts	±continuant	0.244

Table 42 First results by following consonant (Tokyo, nondevoiced)

Consonant	Manner of art.	Weight
k	-continuant	0.910
p	-continuant	0.649
ts	±continuant	0.621
t	-continuant	0.550
ʃ	+continuant	0.468
s	+continuant	0.423
ç	+continuant	0.326
tʃ	±continuant	0.302
h	+continuant	0.220
ɸ	+continuant	0.077

There seems to be a tendency that [+continuant] (in particular without [-continuant]) are promoters and [-continuant] are demoters for the devoiced data, but the tendencies are opposite for the nondevoiced data. [t] and [tʃ], however, behave differently from other [-continuant] consonants: [t] is a promoter in both data sets, and [tʃ] is a demoter in both. [ɸ] behaves differently from other [+continuant] consonants, too. The weight of [ɸ] for devoiced data is higher than any demoting consonant, and can be joined to the promoting factor group after combining factors based on appropriate linguistic and statistical grounds and re-running the logistic regression test. On the other hand, it is the demoter with the lowest weight for the nondevoiced data. Tables 43 and 44 show the final results for the devoiced and nondevoiced

data, respectively.

Table 43 Final results by following consonant (Tokyo, devoiced)

Consonant	Manner of art.	Weight
ç	+continuant	0.804
s	+continuant	0.687
t	-continuant	0.652
ʃ	+continuant	0.577
h, ɸ	+continuant	0.517
p	-continuant	0.440
tʃ, k, ts	±/-continuant	0.285

Table 44 Final results by following consonant (Tokyo, nondevoiced)

Consonant	Manner of art.	Weight
k	-continuant	0.909
p, ts, t	-/±continuant	0.585
ʃ, s	+continuant	0.443
h, ç	+continuant	0.291
tʃ	±continuant	0.255
ɸ	+continuant	0.066

4.4.6. Identity of devoiceable vowels

Identity of the devoiceable vowel was found to be insignificant in the initial run for the nondevoiced data. Table 45 shows the final results for the

devoiced data.

Table 45 Final results by vowel identity (Tokyo, devoiced)

Vowel	Weight
u	0.571
i	0.426

4.4.7. Gender of the speaker

Tables 46 and 47 show the final results by gender of the speaker for the devoiced and nondevoiced data, respectively.

Table 46 Final results by gender of the speaker (Tokyo, devoiced)

Gender	Weight
Female	0.542
Male	0.444

Table 47 Final results by gender of the speaker (Tokyo, nondevoiced)

Gender	Weight
Female	0.588
Male	0.436

4.4.8. Gender of the respondent

Gender of the respondent was found to be insignificant in the initial run for the devoiced data. Table 48 shows the results for the nondevoiced data.

Table 48 Final results by gender of the respondent (Tokyo, nondevoiced)

Gender	Weight
Female	0.556
Male	0.421

4.4.9. Age of the respondent

Tables 49 and 50 show the first results with the devoiced data and the nondevoiced data, respectively.

Table 49 First results by age of the respondent (Tokyo, devoiced)

Age group	Weight
18-22	0.369
23-29	0.601
30-39	0.514
40-49	0.425

Table 50 First results by age of the respondent (Tokyo, nondevoiced)

Age group	Weight
18-22	0.577
23-29	0.414
30-39	0.543
40-49	0.517

The youngest group and the oldest group can be combined as a demoting group, and the two groups in the middle can also be combined in the devoiced data as a promoting group. With the nondevoiced data, the group of 23 to 29 years old can stand alone, and the youngest group and the two older groups can be combined. That is, the weight of the 23-29 year olds is the heaviest with the devoiced data and the lightest with the nondevoiced data. Tables 51 and 52 below show the final results with the devoiced data and with the nondevoiced data, respectively.

Table 51 Final results by age of the respondent (Tokyo, devoiced)

Age group	Weight
18-22, 40-49	0.382
23-29	0.601
30-39	0.513

Table 52 Final results by age of the respondent (Tokyo, nondevoiced)

Age group	Weight
18-22, 30-39, 40-49	0.555
23-29	0.414

4.5. Results for Kinki devoiced data and Kinki nondevoiced data

The insignificant factor groups found by running the up-and-down regression test for the devoiced data were accent, identity of the vowel, and gender of the speaker. Number of devoiced vowels (within the word only or within the word and at the end of the word), which was explained in section 4.2.2. and proved to be insignificant with all the data, is also insignificant. The insignificant factor groups in the nondevoiced data were accent, position of a devoiceable vowel — both in terms of mora count and in terms of the boundary type, identity of the devoiceable vowel, and gender of the speaker. Number of devoiced vowels is irrelevant for the nondevoiced data. The results by each significant factor group are shown in the following sections.

4.5.1. Position of devoiceable vowels in terms of mora count

The position of a devoiceable vowel in terms of mora count is insignificant for the nondevoiced data. With the devoiced data, the weights of the second and third mora in the first results are 0.545 and 0.468 respectively, but this

factor group turned out to be insignificant on repeating the statistical procedures.

4.5.2. Position of devoiceable vowels in terms of boundary types

The position of a devoiceable vowel in terms of the morpheme boundary is insignificant with the nondevoiced data. Table 53 below shows the final results for the devoiced data.

Table 53 Final results by boundary type (Kinki, devoiced)

Position	Weight
Word boundary	0.791
Morpheme internal, morpheme boundary	0.487

Morpheme internal position is a promoter in all the Kinki data, whereas it is a demoter in the devoiced data.

4.5.3. Pitch accent pattern

Accent is insignificant both with the devoiced data and the nondevoiced data.

4.5.4. Preceding consonant

Table 54 shows the first results by the preceding consonant with the devoiced data.

Table 54 First results by preceding consonant (Kinki, devoiced)

Consonant	Place of art.	Manner of art.	Weight
p	labial	-continuant	0.656
k	velar	-continuant	0.555
ts	alveolar	±continuant	0.514
tʃ	palatal	±continuant	0.478
ʃ	prepalatal	+continuant	0.449
ç	palatal	+continuant	0.430
ɸ	labial	+continuant	0.393
s	alveolar	+continuant	0.276

[-continuant] is a promoter and [+continuant] is a demoter, as seen in the Kinki overall results. The order of the factors is consistent based on sonority: the two stops are the promoters with heaviest weight; the two affricates follow them; and the four fricatives are demoters. The final results are shown in Table 55.

Table 55 Final results by preceding consonant (Kinki, devoiced)

Consonant	Manner of art.	Weight
p	-continuant	0.654
k, ts, tʃ	-/±continuant	0.528
ʃ, ç, ɸ	+continuant	0.439
s	+continuant	0.299

Table 56 shows the first results for the nondevoiced data.

Table 56 First results by preceding consonant (Kinki, nondevoiced)

Consonant	Place of art.	Manner of art.	Weight
p	labial	-continuant	0.656
ts	alveolar	±continuant	0.588
k	velar	-continuant	0.546
s	alveolar	+continuant	0.509
ʃ	prepalatal	+continuant	0.499
ç	palatal	+continuant	0.476
tʃ	palatal	±continuant	0.331
ɸ	labial	+continuant	0.297

The tendencies are not so clear-cut as in the devoiced data, but generally [-continuant] is a promoter and [+continuant] is a demoter. Table 57 shows the final results.

Table 57 Final results by preceding consonant (Kinki, nondevoiced)

Consonant	Manner of art.	Weight
p	-continuant	0.653
ts, k	±/-continuant	0.555
s, ʃ, ç	+continuant	0.495
tʃ	±continuant	0.329
ɸ	+continuant	0.296

4.5.5. Following consonant

Table 58 shows the first results by the following consonant with the devoiced data.

Table 58 First results by following consonant (Kinki, devoiced)

Consonant	Place of art.	Manner of art.	Weight
ç	palatal	+continuant	0.677
k	velar	-continuant	0.626
ʃ	prepalatal	+continuant	0.553
s	alveolar	+continuant	0.543
t	alveolar	-continuant	0.516
tʃ	palatal	±continuant	0.489
ɸ	labial	+continuant	0.408
h	glottal	+continuant	0.339
ts	alveolar	±continuant	0.331
p	labial	-continuant	0.282

Some factors can be combined, but it is hard to find general tendencies with both phonological and statistical justification. Table 59 below shows the first results with the nondevoiced data.

Table 59 First results by following consonant (Kinki, nondevoiced)

Consonant	Place of art.	Manner of art.	Weight
h	glottal	+continuant	0.681
k	velar	-continuant	0.664
p	labial	-continuant	0.634
t	alveolar	-continuant	0.621
s	alveolar	+continuant	0.477
ʃ	prepalatal	+continuant	0.476
tʃ	palatal	±continuant	0.397
ç	palatal	+continuant	0.314
ɸ	labial	+continuant	0.301
ts	alveolar	±continuant	0.264

Stop consonants are all promoters while the two affricates and all the fricatives except for [h] are demoters. That is, it is more consistent to interpret [-continuant] as a promoter and [+continuant] as a demoter. The final results are shown in Table 60 below.

Table 60 Final results by following consonant (Kinki, nondevoiced)

Consonant	Manner of art.	Weight
h	+continuant	0.679
k, p, t	-continuant	0.637
s, ʃ	+continuant	0.479
tʃ	±continuant	0.389
ç, ɸ	+continuant	0.302
ts	±continuant	0.266

4.5.6. Identity of devoiceable vowels

Identity of devoiceable vowel is insignificant both for the devoiced and nondevoiced data.

4.5.7. Gender of the speaker

Gender of the speaker is insignificant for both the devoiced data and nondevoiced data.

4.5.8. Gender of the respondent

Tables 61 and 62 show the final results by the gender of the respondent for the devoiced data and for the nondevoiced data, respectively.

Table 61 Final results by gender of the respondent (Kinki, devoiced)

Gender	Weight
Male	0.543
Female	0.470

Table 62 Final results by gender of the respondent (Kinki, nondevoiced)

Gender	Weight
Female	0.528
Male	0.459

4.5.9. Age of the respondent

Tables 63 and 64 show the first results by the age of the respondent for the devoiced and nondevoiced data, respectively.

Table 63 First results by age of the respondent (Kinki, devoiced)

Age group	Weight
18-22	0.430
23-29	0.551
30-39	0.459
40-49	0.557
50-59	0.543

Table 64 First results by age of the respondent (Kinki, nondevoiced)

Age group	Weight
18-22	0.511
23-29	0.516
30-39	0.524
40-49	0.435
50-59	0.490

The 50-59 group can be combined with the 40-49 group, and it is comparable to the Tokyo data, but the final results look very different from the ones for Tokyo data. With the Kinki data, the weight of the group 23-29 is neither the heaviest nor lightest. Tables 65 and 66 show the final results.

Table 65 Final results by age of the respondent (Kinki, devoiced)

Age group	Weight
18-22	0.431
23-29	0.551
30-39	0.459
40-49, 50-59	0.554

Table 66 Final results by age of the respondent (Kinki, nondevoiced)

Age group	Weight
18-22, 23-29, 30-39	0.519
40-49, 50-59	0.445

4.6. Summary of the results

In this study, responses by Tokyo and Kinki people were analyzed to determine how phonological and social factors affect judgments of whether or not the speakers on the test tape are from the same region as the respondent's own. It was expected that a speaker who devoices vowels or uses the Tokyo accent is judged as 'Tokyo' or 'non-Kinki,' while a speaker who nondevoices vowels or uses the Kinki accent is judged as 'non-Tokyo' or 'Kinki.' The results can be summarized as follows.

(a) Devoicing variation contributes to the expected judgments by the respondents, confirming the hypotheses. A speaker who devoices vowels

tends to be judged as 'Tokyo' or 'non-Kinki' and a speaker who nondevoices them as 'non-Tokyo' or 'Kinki.' Voicing variation contributes just as different accent patterns in Tokyo and Kinki (regional pitch accents) do, but less distinctly, and the contribution of voicing variation in the Kinki results is even less distinct than in the Tokyo results. The 'Don't Know' responses in the devoiced and nondevoiced tokens are relatively high in the Kinki results, and this causes the distribution of the 5 responses in the five-point scale within a small range (mostly 20% plus or minus 5%). These general tendencies, which are indicated in the overall five-way results by token types, seem to be preserved in the overall two-way results as well.

(b) The Kinki accent contributes to the expected judgments more strongly than the Tokyo accent in both Tokyo and Kinki data, while devoicing contributes more strongly than nondevoicing in the Tokyo data but nondevoicing contributes more strongly than devoicing in the Kinki data. As for devoicing variation, in other words, presumed local features contribute more strongly to judgments than outside features. These tendencies, indicated in the five-way results, are also preserved in the two-way results.

(c) The neutral tokens, containing no devoiceable vowel and pronounced in the same pitch accent in Tokyo and Kinki, are judged as expected. They tend to be judged as 'Tokyo' by Tokyo respondents and 'Kinki' as Kinki respondents. These tendencies are also indicated in the five-way results as well as in the two-way results.

(d) In the Tokyo data, the place of articulation and the manner of articulation of the consonant that precedes a devoiceable vowel interact, with more salience of the former. In the Tokyo devoiced data, all the back consonants (velar and palatal) promote the expected judgments and all the front consonants (labial, alveolar, and prepalatal) demote them, and, at the same time, all the promoting consonants except for one have the feature [-continuant] (a stop and an affricate), and all the demoting consonants except for one have the feature [+continuant] (fricatives and an affricate). In the nondevoiced data, [tʃ] and [ç] proved to be demoters, leaving [k] as the only promoter.

In the Kinki data, in contrast, all the consonants that have [-continuant] (stops and affricates) are promoters and all the [+continuant] consonants (fricatives) are demoters in the devoiced tokens, and only [tʃ] turned out to be a demoter, leaving the other promoters as promoters and the other demoters as demoters in the nondevoiced tokens. The Kinki overall data show similar tendencies as in the nondevoiced data.

(e) The consonants that follow devoiceable vowels have opposite effects on the judgments with devoiced tokens and nondevoiced tokens in the Tokyo data. When the vowel is devoiced, all the [+continuant] consonants (fricatives) promote the expected judgments while all but one that have [-continuant] (stops and affricates) demote them, and when the vowel is nondevoiced, all but one that have [-continuant] are promoters while all but

one that have [+continuant] are demoters. In other words, just like [tʃ] and [ç] among preceding consonants, the feature [+continuant] and [-continuant] generally switch sides when the devoiced and nondevoiced tokens were examined separately. These opposite results make the overall results look inconsistent.

In the Kinki data, on the other hand, it is hard to find general tendencies with both phonological and statistical justification in the devoiced data as well as in the overall data. In the nondevoiced data, all the [-continuant] consonants (stops) promote the expected judgments, and all but one that have [+continuant] (fricatives and affricates) demote them.

(f) Devoiceable vowels at the word boundary or at the morpheme internal position, in other words, ones at the outermost or innermost in the word structure, promote the expected judgments in the Tokyo data. In the Kinki overall data, the results show similar tendencies, but word boundaries are the only promoters in the devoiced data, and the position of the devoiceable vowel in terms of morpheme boundary turned out to be an insignificant factor in the nondevoiced data.

(g) The devoiceable vowel in the third mora from the beginning, rather than the one in the second mora, contributes to the judgement 'Tokyo' regardless of the actual devoicing or nondevoicing in the Tokyo data. In the Kinki data, the position of the devoiceable vowel in terms of mora count is not a significant factor when devoiced tokens and nondevoiced tokens were

examined separately, and the devoiceable vowel in the second mora contributes to the expected judgments but not strongly in the overall data.

(h) The difference of pitch accent, namely HLL or LHL, generally does not affect the judgments. It was significant only in the Kinki overall data and Tokyo nondevoiced data, with .511 and .516 as the promoters' weights.

(i) The identity of the devoiceable vowel generally does not affect the expected judgments. It was significant only in the Tokyo devoiced data, in which /u/ is a promoter and /i/ is a demoter.

(j) Female speakers contribute more than male speakers to the expected judgments in Tokyo devoiced and nondevoiced data when examined separately, but the gender of the speaker is an insignificant factor group in the overall data. In the Kinki data, male speakers contribute more in overall data, but the gender of the speaker is an insignificant factor group when devoiced and nondevoiced data were examined separately.

(k) Female respondents contribute more than male respondents to the expected judgments in Tokyo overall data and nondevoiced data. In the Kinki data, male respondents contribute more in devoiced data while female respondents do more in nondevoiced data, and the gender of the respondent turned out to be insignificant in the overall data.

(l) Mild age-grading is indicated in the Tokyo overall data, and sharper age-grading is indicated in the devoiced data while nondevoiced data shows a reverse pattern of age-grading; that is, youngest and older age groups are

promoters and the young adult group is the demoter. Age-grading is not indicated in the Kinki data. In the Kinki overall data, the youngest group is the only demoter and the rest of the age groups are promoters. Kinki nondevoiced data shows that middle or young adult age groups are promoters while older groups are demoters. In the Kinki devoiced data, promoting age groups and demoting age groups show up alternately, which makes interpretation of patterning difficult.

5. Discussion

In Chapter 4, the results of the perception experiment I conducted showed how devoicing variants affect judgments on whether or not the speaker is from the same region as the respondent's. The respondents are speakers of the Tokyo and Kinki dialects. The assumption I made was that devoicing as well as the Tokyo pitch accent is a Tokyo feature while nondevoicing as well as the Kinki pitch accent is a Kinki feature. It was expected that a speaker who devoices vowels or uses the Tokyo pitch accent would be judged as a Tokyo person by Tokyo respondents and as a non-Kinki person by Kinki respondents and that a speaker who nondevoices vowels or uses the Kinki pitch accent would be judged as a non-Tokyo person by Tokyo respondents and as a Kinki person by Kinki respondents. I called these responses "expected," and I considered both responses that start with 'certainly' and 'probably' in the same judgment for the same token, "expected."

The results were shown, in the previous chapter, in the tables in which responses in a five-point scale were tabulated (Tables 9 and 10), and also shown in tables in which 'Don't Know' responses were eliminated and the other responses were collapsed into two scales (Tables 11 and 12). The GoldVarb statistics program was applied after finding that similar tendencies were indicated in both tables.

5.1. Comparison of saliency among token types

In the overall results, in particular in Tables 9 and 10 (five-way results) and in Tables 11 and 12 (two-way results), it is shown that both Tokyo and Kinki respondents tend to make judgments confirming the general hypothesis. As shown in Tables 9 and 10, the tokens pronounced with a Tokyo accent tend to be rated 'Certainly' or 'Probably' 'Tokyo speaker' by Tokyo respondents ('Certainly' 31.59% + 'Probably' 30.11%) and 'Certainly' or 'Probably' 'non-Kinki speaker' by Kinki respondents (49.95% + 26.99%), while the tokens with the Kinki accent tend to be rated 'Certainly' or 'Probably' 'non-Tokyo speaker' by Tokyo respondents (70.70% + 12.27%) and 'Certainly' or 'Probably' 'Kinki speaker' by Kinki respondents (57.79% + 24.60%). These tendencies are preserved in Tables 11 and 12. Tokyo accents are rated as 'Tokyo' by Tokyo respondents at 67.20% and as 'non-Kinki' by Kinki respondents at 86.84%, while Kinki accents are rated as 'non-Tokyo' by Tokyo respondents at 86.22% and as 'Kinki' by Kinki respondents at 87.60%. It was expected that making judgments based on pitch accent would be easy because such accent patterns are phonemic and overtly recognized in the speech communities, although people do not always describe the differences accurately.

The results by devoicing variation also confirmed the hypothesis. The five-way results show that the tokens pronounced with devoiced vowels tend to be rated 'Certainly' or 'Probably' 'Tokyo speaker' by Tokyo respondents (34.20% + 28.62%) and 'non-Kinki' by Kinki respondents (18.37%

+ 23.57%), while the tokens with nondevoiced vowels tend to be rated 'non-Tokyo speaker' by Tokyo respondents (26.97% + 27.34%) and 'Kinki speaker' by Kinki respondents (21.95% + 23.24%). The results of the Kinki respondents are not very distinct, but compared to 'unexpected' responses (24.43 % + 14.02% for devoiced tokens, 20.59% + 16.84% for nondevoiced tokens) they show tendencies that confirm the hypotheses. A discussion of the indistinct character of the Kinki devoiced and nondevoiced results follows in this section.

Devoicing variation, therefore, contributes to the judgments, just as the differences between the Tokyo and Kinki accent patterns do. As noted above, however, devoicing and nondevoicing are allophonic phenomena, and it is interesting, though perhaps not surprising, that such allophonic phenomena can also be used as criteria in making judgments because most people are not overtly aware of such differences. A long history of language attitude studies has provided many examples of speech community sensitivity (in, for example, rating tasks) to low-level features which are not available to speaker/hearer awareness. In this case, however, it is more likely than not that the respondent sensitivity to devoicing variation does not reflect the actual pronunciation differences between Tokyo and Kinki. An important question, then, is why these two groups of respondents tend to make judgments based on devoicing variation although they are likely to devoice vowels at about the same rate, at least in the phonological

environments that appeared in the tape for this study (i.e., in low pitched moras that are not in consecutive devoicing environments).

Before approaching that more general question, I will examine some differences between the Tokyo and Kinki results. The relative effects of accent pattern and devoicing variation can be compared for Tokyo (Tables 13) and Kinki (Table 14). In both, the accent pattern contributes significantly more to the expected judgments than devoicing variation does, but there are differences between the two sets of results. In the Kinki results, the difference of percentages of the expected and unexpected responses is very small for devoicing variation (53.30% - 46.70% = 6.6%), and this is very different from the Tokyo results (65.56% - 34.44% = 31.12%). Returning to the five-way tables (Tables 9 and 10) including 'Don't Know' responses, the differences of percentages of the five responses are smaller in the Kinki results than in the Tokyo results. In the Kinki results the range is between 24.43% and 14.02% for devoiced tokens and between 23.24% and 16.84% for nondevoiced tokens, while in the Tokyo results the range is between 34.20% and 9.54% for devoiced tokens and between 27.34% and 9.34% for nondevoiced tokens.

It is reasonable to interpret these results to mean that Kinki respondents used devoicing much less in their judgments than Tokyo respondents did, and this may aid in our understanding why Kinki and Tokyo respondents tend to use the same 'stereotypical' criterion in spite of the similarity in their actual devoicing rates. Devoicing may not be a very

good criterion in making expected judgments for Kinki respondents because they do devoice vowels, and their response to this criterion is minimal. The difficulty in making decisions is also reflected in the comparatively high rates of 'Don't Know' responses in the Kinki results (19.61% for devoiced tokens and 17.38% for nondevoiced tokens). Tokyo respondents, however, who are inclined to believe that their speech is "standard" or the national "norm," may regard devoicing as the norm and regard any token which reflects such behavior as 'Tokyo.' In short, although both responses are based on covert categories, the Kinki responses appear to be more attuned to actual behavioral norms and the Tokyo responses appear to be more attuned to ideal norms. I explore these possible interpretations in more detail as I consider further differences in the Tokyo and Kinki response patterns. In this particular case, however, it is possible that when devoicing variation is the only factor, Kinki people assume that devoicing is a non-Kinki feature based on the higher nondevoicing rate in other phonological environments (for example, in an accented mora), but confirmation of that interpretation would require a different study in which such environments could be compared to the ones actually presented here.

Tables 11 and 12 (two-way results), as well as Tables 9 and 10 (five-way results), also show that the distributions of effects are different in the Tokyo and Kinki results. The Kinki accent contributes to expected judgments more strongly than the Tokyo accent does, in both Tokyo and Kinki results. On the

other hand, devoicing contributes to expected judgments more than nondevoicing in the Tokyo results, but the Kinki results show the opposite. In other words, Kinki features consistently contribute more in the Kinki results, while in the Tokyo results the non-Tokyo feature contributes more in pitch accent patterns, and the Tokyo feature contributes more in devoicing variation. In short, both Tokyo and Kinki respondents use the Kinki feature for pitch accent patterns, and both respondents use their own features (or stereotypes of them) in devoicing variation, to make judgments.

One reason for these opposite results may lie in the hypothetical ordering or ranking of criteria in making a judgment. It seems that the non-Tokyo (Kinki) pitch accent appears to be the most powerful criterion in reaching a judgment, and the criterion of devoicing is applied only when the speaker passes such higher-level screening and is not rejected or accepted as local by Tokyo or Kinki respondents respectively. That is, when Tokyo respondents hear a Kinki pitch accent, they confidently judge the speaker 'non-Tokyo,' and, similarly, when Kinki respondents hear a Kinki pitch accent, they confidently judge the speaker 'Kinki.' The powerful criterion, in particular the 'confidence' by Tokyo respondents to the Kinki accent, could be interpreted from the strikingly high rate of 'Certainly from non-Tokyo' (70.70%) in the five-way results (Table 9). On the other hand, when both respondents hear the Tokyo accent, they may withhold the judgment 'Tokyo' or 'non-Kinki' and pay attention to other features.

It is quite reasonable to assume that respondents can tell someone is not from the same region as their own when they hear a different feature from the one they usually use. Therefore, Tokyo respondents judge a speaker 'non-Tokyo' when they hear the Kinki accent at a higher rate than they judge a speaker 'Tokyo' when they hear the Tokyo accent. On the other hand, the Kinki results do not show this expected pattern. Why do Kinki respondents judge a speaker 'Kinki' when they hear the Kinki accent more easily than they judge a speaker 'non-Kinki' when they hear the Tokyo accent?

I believe the explanation lies in the same area of language ideology as that offered earlier — the different positions and values of the language (dialect) in Tokyo and Kinki. Kyoto was a former capital (from 794), and Osaka was the capital before 710, when Nara (another city in Kinki) became the capital. Therefore, it is very natural for present-day people to share the Kinki dialect as a native one inherited from many previous generations. Tokyo, on the other hand, became the capital in 1868, and people started moving in after that. There still are many people who were born in Tokyo but whose parents were not. Consequently, people living in Tokyo may well have a smaller sense of solidarity based on language, placing less value on local language. The Tokyo dialect is prestigious because the standard language is based on it, but it seems that it does not function well in bonding people together when compared to the Kinki dialect. Ryan, Giles and Sebastian (1982) have noticed a general tendency for nonprestigious areas to

have their speech variety more highly evaluated for solidarity than status, and Preston (1996) described this dichotomy as follows:

> Areas with greater linguistic insecurity focus on regional solidarity ... to express local identity. Areas with considerable security do not use local speech to express such identity, for its 'uniqueness' is already taken up in the expression of status rather than solidarity matters. (317)

In this case, however, although the Kinki dialect has only a historically-based prestige, some Kinki people keep using it because they refuse to use the standard language (i.e., the Tokyo dialect) and find it natural to speak the Kinki dialect, even when they visit or work in Tokyo (Sakamoto, Onoe, Hayase, and Saji in Kawauchi 1993; Inoue 1995). These facts seem to support the interpretation of the Kinki dialect as a "high solidarity" variety (in addition to whatever historical standardness, and, hence, prestige, it may have had).

The ideological difference may help explain why nondevoicing (a supposed Kinki feature) contributes to making expected judgments more than devoicing (a supposed Tokyo feature) does in the Kinki results. Kinki respondents can tell someone is from Kinki when they hear nondevoicing more easily than they can tell someone is not from Kinki when they hear devoicing because of the value they place on the Kinki dialect and the "recognition" bonus this valuation gives them.

In the case of Tokyo results, there are further reasons why the Kinki accent contributes judgments more strongly than the Tokyo accent does, other than the explanation that a different feature from one's own is easy to detect. When Tokyo respondents heard the Tokyo accent, they let such tokens pass the first screening (accent pattern) by not judging the speaker 'non-Tokyo,' but they withhold the judgment 'Tokyo' and pay attention to other features, perhaps recognizing features that do not sound 'Tokyo' other than accent and devoicing. Since this is not a matched-guise study, that possibility was not controlled for.

The second reason may be that the accent patterns are changing and that the Tokyo pattern did not induce the judgment 'Tokyo' when I expected it. Younger generation speakers in Tokyo pronounce words differently in this regard (Inoue 1998). For example, *densha* 'train' used to be pronounced as *dénsha* (HLL) but now it is *densha* (accentless), and *sekaishi* 'world history' is pronounced as *sekáishi* (LHLL) but younger people have started to pronounce it *sekaishi* (accentless) (pp. 177-178). In my data, for example, I accepted *oyayubi* 'thumb' in LHLL based on Kindaichi (1958) and confirmation by Tokyo persons whom I consulted, but some of my respondents pronounced it as an accentless word when recording, another example of a word in the process of accent change. It is quite possible for some respondents to have judged the LHLL pronunciation of *oyayubi* as not the correct 'Tokyo' accent in

spite of my expectation. These two circumstances may have lowered the effect of the Tokyo accent on correct judgments.

Neutral tokens, which are pronounced with the same accent patterns in Tokyo and Kinki and contain no devoiceable vowel, tend to be judged as 'Tokyo' by Tokyo respondents and 'Kinki' by Kinki respondents, as shown in Tables 9 and 10, as well as Tables 11 and 12. Those are reasonable results and confirm the fact that the respondents seem to have made judgments based on whether the word is pronounced with the same accent pattern as their own.

5.2. Significant and insignificant factors in overall results

After examining the general tendencies in the overall five-way results by token types and finding that they are preserved in the collapsed two-way results as well, I ran the multivariate logistic regression program on the two-way results in order to investigate how phonological and social factors affect the respondents' judgment of the speaker's region.

In the Tokyo overall results, significant factor groups are the position of a devoiceable vowel in terms of the morpheme boundary, the preceding consonant, the following consonant, voicing of the devoiceable vowel, and the gender and age of the respondent, while insignificant ones are the position of a devoiceable vowel in terms of mora count, the pitch accent patterns, the identity of the devoiceable vowel, and gender of the speaker. These results seem to be reasonable considering the phonetic facts in vowel

devoicing in production. There is a tendency that the factor groups which have been studied previously and described with regard to devoicing preferences (Vance 1988, and others) are significant, and gender and age of the respondent are common, influential sociolinguistic factors. In other words, these seem to be reasonable results, which show that the respondents rely on the conditions which promote and demote devoicing in actual production in making the judgments sought here.

In the Kinki results, on the other hand, there are only two insignificant factors: identity of the devoiceable vowel and gender of the respondent.

5.3. Phonological factors

5.3.1. Voicing of devoiceable vowels

The focus of this study is on devoicing, and Tables 26 (Tokyo) and 27 (Kinki) show opposite results as regards expected responses. Devoiced vowels promote the expected judgment and nondevoiced vowels demote it in the Tokyo results, while nondevoiced vowels promote the expected judgment and devoiced vowels demote it in the Kinki results. In other words, the supposed features of their own varieties are promoters. It is also shown that the range of the weight in the Kinki results is smaller than that in the Tokyo data, strengthening the suggestion that devoicing variation is not as powerful a criterion for the Kinki respondents.

5.3.2. Preceding consonant

As stated in Chapter 4, it seems reasonable to interpret the Tokyo results as an interaction of the place of articulation and the manner of articulation, with greater saliency of the place, as shown in Tables 20 and 21. In particular, the devoiced data are perfectly consistent showing back consonants (velar and palatal consonants) as promoters and front consonants (prepalatal, alveolar, and labial consonants) as demoters, as shown in Table 39. The order of the weights for the devoiced data and the nondevoiced data (final results are in Table 40) is very similar, which means promoting consonants and demoting consonants have the same tendencies, except for [tʃ] and [ç]. Those two consonants were demoters with the nondevoiced data, and because the weight of [tʃ] is close to .5, only [ç] turned out to be a demoter in the overall results.

If the results with devoiced tokens are natural ones, there must be some reason why [tʃ] and [ç] with nondevoiced tokens lower the weights so much and demote the expected judgment, therefore changing the overall results such that [ç] turned out to be a demoter. Perhaps [tʃ] and [ç] promote the expected judgment with devoiced vowels and demote it with nondevoiced vowels. That means they always help the Tokyo respondents "hear" devoiced vowels and judge the speaker as 'Tokyo.' These two consonants are among those which Imai (1997) found as the best promoters of devoicing in production. According to her, /i/ with a preceding fricative and

a shared feature between the preceding consonant and the devoiceable vowel, that is, palatal for /i/ and labial for /u/, are the strongest promoters of devoicing. [ç] is exactly such a consonant, that is, a palatal fricative preceding /i/, and [tʃ] is a palatal consonant with [+continuant] feature preceding /i/. The results mean that when the respondents heard the best combination of a consonant and a vowel for devoicing, they judged the speaker as 'Tokyo,' regardless of whether or not the vowel was devoiced. It seems that the respondents know, although they are not overtly aware of it, which combinations are the best for devoicing vowels and do not pay attention to actual devoicing or nondevoicing, simply assuming that they are devoiced.

The results for the Kinki data are different. In both the devoiced data and nondevoiced data (Tables 55 and 57, respectively), [-continuant] is generally a promoting feature and [+continuant] is a demoting feature. In the devoiced data, in particular, the results clearly show that stops and affricates are promoters and fricatives are demoters with no exception. The only exception in the nondevoiced data is [tʃ]. It has the feature [-continuant] but turned out to be a demoter in the nondevoiced data and in the overall Kinki data (Table 23) as well. The exception in the Kinki results is again what Imai found as a consonant in the best environment for devoicing. Kinki respondents judge the speaker as 'non-Kinki' whether the vowel is devoiced or not; apparently they assume that the vowel is devoiced. This suggests that Kinki respondents also know the best environments for devoicing. This is

consistent if Kinki speakers devoice vowels with (at) the same frequency as Tokyo speakers, because it suggests that Kinki respondents have the knowledge of the best environment for devoicing in their own dialect and that it is the same as in the Tokyo dialect.

In short, the Kinki respondents rely on different features of the preceding consonant ([-continuant] or [+continuant]) from what the Tokyo respondents rely on (front or back) to make judgements, but both Kinki and Tokyo respondents seem to know the best environment for devoicing in general and use the knowledge to judge the speaker as 'Tokyo' regardless of whether the vowel is devoiced or not, assuming that it is devoiced.

5.3.3. Following consonant

The results by the following consonant with the Tokyo devoiced data and with the Tokyo nondevoiced data turned out to be very different as shown in Tables 43 and 44, respectively, and those different results seem to have created the complicated overall results as shown in Table 24.

There seems to be a tendency for the feature [+continuant] to be a promoter and the feature [-continuant] to be a demoter with the devoiced data, but the tendencies are opposite with the nondevoiced data. In other words, the respondents tend to judge the speaker as 'Tokyo' when they hear fricatives in the consonant following devoiceable vowels whether they are devoiced or not.

The different effects of preceding consonants and following consonants seem to be consistent with a temporal order of perception. After noticing a preceding consonant, the respondent still attends to the following vowel, assessing its devoicing or nondevoicing, and judges the speaker accordingly. Different consonants have different effects, but the orders of the consonants by weight are almost the same in the devoiced data and in the nondevoiced data; that is, the same consonants help the respondent make judgments that a devoicer is from Tokyo and a nondevoicer is not from Tokyo. With following consonants, on the other hand, the respondents cannot retrieve their perception of the vowel. So they cannot make judgments based on devoicing variation, and assume the vowel has the character predicted by the production effect of the following consonant, in this case, that it was devoiced when the consonant is [+continuant]. They make judgments based on the type of consonant only in the case when a voiceless fricative comes after a high vowel (that comes after another voiceless consonant), assuming that it is devoiced and go on to reason that a devoicer is from Tokyo.

The two exceptions are the two consonants with [-continuant]: [t] and [tʃ]. The former is a promoter in both data and the latter is a demoter in both data. The reason why they behave differently from the other [-continuant] consonants is not clear.

The overall results for the Kinki data, shown in Table 25, do not seem to show any clear tendencies of which features give rise to the expected and

unexpected judgments. It might be possible, though, to say that the weights of back consonants are heavier than those of front consonants and that the weights of the consonants with the feature [-continuant] are heavier than those of the ones with [+continuant].

In the results of the devoiced data (Table 58), it is hard to find general tendencies with both phonological and statistical justification. In the results of the nondevoiced data (Table 60), on the other hand, show that the [-continuant] consonants (stops) are promoters and the feature [+continuant] is a demoter except for [h], which is a promoter. The results of the nondevoiced data show very similar tendencies to those in the Tokyo nondevoiced data. It is reasonable to have similar tendencies, though that is only in the nondevoiced data, considering the limitation of perception in time. Kinki respondents cannot retrieve their perception of the vowel, just as Tokyo respondents cannot, and both respondents may well have the same knowledge of the best environments for devoicing, if their devoicing rate is almost the same. The Kinki results with the devoiced data are not as consistent as the Tokyo results, though, and I cannot find any explanation for this.

In general, however, for both Tokyo and Kinki respondents, there seems to be a tendency for hearers to believe that vowels are devoiced in high-frequency devoicing environments, i.e., with regard to both preceding and following consonants. This, of course, skews the expected results as I

have outlined in detail above and shows the necessity in sociolinguistic perception experiments such as this one of considering speech perception as well as production facts. The fact that my respondents "hear" a devoiced vowel in high-frequency devoicing environments is what is known in speech perception studies as a "context effect" and is well-documented (e.g., Strange 1995). Although many such studies are based on actual phonetic cues to perception, most conclude that knowledge of the allophonic regularities of a system by its speakers rather than only acoustic detail plays an important role in perception. For example, Beddor, et al. (2002) show that the perception of vowels by English speakers and Shona speakers are based on language-specific patterns of coarticulation, and that they "hear" coarticulation when there is actually none in the coarticulatory context.

Of course, this study is not a straightforward investigation of native speaker perceptions of vowel devoicing since it interposes a social factor (region) between the acoustic signal and the judgment. This study is, therefore, hampered by not having data from such a study available. Nevertheless, the large body of speech perception work (e.g., that summarized in Strange 1995) makes the interpretation here — that respondents believed they heard devoiced vowels in a high-frequency devoicing environment — very likely.

5.3.4. Position of devoiceable vowels in terms of boundary types

Among three positions, at the word boundary, at the morpheme boundary, and at the morpheme internal position, the outermost position and the innermost position of the word structure (word boundary and morpheme internal position) are promoters while the morpheme boundary is a demoter, in both Tokyo and Kinki results, as shown in Tables 18 and 17, respectively.

These results can be interpreted as a straightforward outcome following the tendencies of using and avoiding devoicing in production. According to Vance (1987), devoicing is avoided when a devoiceable vowel is at a morpheme boundary, as it is before a pause. There is an interaction between devoicing and a pause, and it is reasonable to assume a morpheme boundary is less likely to have a pause than a word boundary, and more likely to have a pause than a morpheme-internal position, because a morpheme boundary may be in a word internal position. Therefore it seems natural to expect that devoicing variability is greater at the morpheme boundary because devoicing occurs most frequently at a morpheme internal position and is avoided most frequently at a word boundary. The respondents in this study tend to make the expected judgment at such "innermost" and "outermost" positions, where occurrence and avoidance are highly expected, respectively, but tend to make the unexpected judgment with vowels that are not in such positions.

The Tokyo results show the same tendencies in the devoiced data, the nondevoiced data (Tables 36 and 37, respectively), and the overall results,

while the Kinki results are quite different. Boundaries are not significant factors in the Kinki nondevoiced data, and the Kinki devoiced data show, in Table 53, that the morpheme internal position turned out to be a demoter while it is a promoter in the overall results and Tokyo results. The weight of the word boundary in the Kinki results is the heaviest among all the phonological and social factors in the Kinki devoiced and nondevoiced tokens in this study. It is close to the weights of the Kinki pitch accent and the Tokyo pitch accent in the results by the token type. It means that the Kinki respondents tend to make the judgment 'non-Kinki' very decisively when they hear devoicing at the word boundary, just as they hear the Tokyo and Kinki pitch accent. Considering the word boundary and the morpheme boundary are the only factors in my data that are reported in previous studies as positions in which devoicing is often avoided, it might imply that the heavy weight of the word boundary has some connection with frequencies of devoicing and nondevoicing in the Tokyo dialect and in the Kinki dialect. Data on production in the Kinki dialect must be obtained to further discuss this possibility.

5.3.5. Pitch accent pattern and position of devoiceable vowels in terms of mora count

The pitch accent pattern is a significant factor only in the Kinki overall data (Table 19) and in the Tokyo nondevoiced data (Table 38). HLL at the

beginning of the word is a promoter for making the expected judgment and LHL is a demoter in both cases.

The position of a devoiceable vowel, either in the second mora or the third mora from the beginning of the stimulus, is also significant. In the Tokyo data, the devoiced data and the nondevoiced data show opposite results. The third mora is a promoter and the second mora is a demoter in the devoiced data (Table 34), while the second mora is a promoter and the third mora is a demoter in the nondevoiced data (Table 35). In other words, the respondents tend to make the judgment 'Tokyo' whether the vowel is devoiced or not. The reason is not clear. Due to the opposite results, the overall results show that the position of a devoiceable vowel in terms of mora count is not significant. In the Kinki data, on the other hand, the position of a devoiceable vowel in terms of mora count is not significant in the final results with both devoiced and nondevoiced data. The overall results turned out to show that the second mora is a promoter and the third mora is a demoter (Table 15). The reason for these results is not clear.

Both accent patterns and mora count are factors that play important roles in Japanese phonology, such as conjugation of verbs and adjectives, building compounds, and accentuation of loanwords (Kindaichi 1958, Vance 1987, and others). It seems, however, interaction between devoicing and the accent pattern of the word or devoicing in the position of the word in terms of mora count has not been described or reported. As stated in section 5.2.,

such factors as preceding consonants and morpheme boundaries, whose interaction with vowel devoicing in production, in contrast, have been described and investigated in previous studies, tend to show significant results in this perceptual study. There is, at least at present, little motivation to pursue reasons for the results by accent patterns and by mora count, although some data sets show significant results.

5.3.6. Identity of devoiceable vowels

The identity of the devoiceable vowel is significant only with the Tokyo devoiced data, showing that /u/ is a promoter and /i/ is a demoter (Table 45). It seems reasonable to conclude that the identity of the devoiceable vowel does not heavily affect the respondents' judgments. This is a rather unexpected result, actually, considering the coincidence of the phonological factors of environments that promote devoicing in production (Imai 1997) and that affect respondents' judgments so that they seem to assume devoicing regardless of actual devoicing or nondevoicing. It would not be surprising if /i/ would have been a promoter because it is devoiced more frequently than /u/ (Imai 1997), and it might well promote the respondents' perception of devoiced vowels.

5.4. Social factors

5.4.1. Gender of the speaker and gender of the respondent

Female voices promote the expected judgment in the Tokyo devoiced and nondevoiced results (Tables 46 and 47, respectively), but the overall results show that the gender of the speaker is not a significant factor. In the Kinki data, on the other hand, both the devoiced and nondevoiced data show that the gender of the speaker is not a significant factor, but the overall results show that male voices promote the expected judgment (Table 28).

The gender of the respondent is not significant in the Tokyo devoiced data, while female respondents contribute to the expected judgment more than male respondents do in the overall data and the nondevoiced data (Tables 29 and 48, respectively). In the Kinki data, on the other hand, male respondents contribute more in the devoiced data (Table 61) and female respondents do more in the nondevoiced data (Table 62), and the overall results show that the gender of the respondent is not a significant factor.

In other words, female voice and female respondent are promoters and contribute to the expected judgment when gender is a significant factor in the Tokyo data, while there is no such consistency in the Kinki results. The greater sensitivity by women in the Tokyo results parallels many such production and perception findings in sociolinguistics in general (e.g. Chambers 1995) and it confirms the idea put forth earlier that "standardness"

is the overwhelming concern in the Tokyo speech area (rather than solidarity).

5.4.2. Age of the respondent

In the Tokyo data, the youngest and the oldest groups (18-22 and 40-49 years old) can be combined statistically (a demoter), as can the two groups in the middle (23-29 and 30-39 years old, a promoter). This is a typical "age-graded" sociolinguistic pattern, as shown in Table 32. The Tokyo devoiced results show an even clearer age-graded pattern, with the youngest and oldest groups with a lighter weight, and with the 23 to 29 year old group with a heavier weight, as shown in Table 51. Twenty-three to twenty-nine year old respondents in this study are generally those who have graduated from college and started graduate studies or have several years of work experience or both. The devoiced data show that those respondents, who need to learn standards of social behavior to be accepted as members of the adult society, most sensitively perceived devoicing. The nondevoiced data, on the other hand, show exactly opposite results. The group of 23 to 29 year olds is the only demoting group, as shown in Table 52. The overall results show an age-graded pattern, but it is rather weak because of these opposite results for the devoiced and nondevoiced data.

The opposite results in the devoiced and nondevoiced data are also shown in palatal consonants preceding devoiceable vowels, as discussed in an

earlier section. Just as with those palatal consonants, the opposite results are interpreted as a case in which the respondents tend to make the judgment 'Tokyo' when they hear a devoiceable vowel regardless of whether it is devoiced or nondevoiced. In other words, the Tokyo results show an age-grading pattern in their tendency to make the judgment 'Tokyo' when they hear a devoiceable vowel in both devoiced and nondevoiced data, and the group of 23 to 29 year olds is the strongest promoter.

The results with the Kinki data, in contrast, do not show such an age-grading pattern. In the overall results, only the youngest group is a demoter, and all the other age groups were conflated, as shown in Table 33. The weight of the promoting age group is 0.506, very close to 0.5; that is, the respondents in the promoting group did not strongly make the expected judgment. The separate results of the devoiced data and the nondevoiced data are more complicated and show no specific pattern (Table 65 and 66, respectively), although some age groups can be combined based on statistical reasoning.

5.5. Speaker's identity

I did not take the factor group of the identity of the speaker into account in the multivariate analysis, as explained in an earlier chapter. Instead, I am going to show the frequency and percentage of responses for each speaker and describe the observations made during the experiment. It is probably reasonable to look at the frequencies and percentages of all tokens, instead of

the tokens with devoicing variation only, to reflect the respondents' general perception about the speakers. Tables 67 and 68 show the results of all of the tokens eliminating the responses 'Don't know' for the Tokyo data and for the Kinki data, respectively.

Table 67 Results by speaker (Tokyo, all types of tokens)

Speaker	Expected	Unexpected	Total
I	396 (88.00)	54 (12.00)	450 (100)
N	270 (87.38)	39 (12.62)	309 (100)
F	187 (74.21)	65 (25.79)	252 (100)
E	325 (74.03)	114 (25.97)	439 (100)
K	458 (71.56)	182 (28.44)	640 (100)
G	240 (71.01)	98 (28.99)	338 (100)
L	358 (67.17)	175 (32.83)	533 (100)
B	317 (65.63)	166 (34.37)	483 (100)
J	197 (65.02)	106 (34.98)	303 (100)
D	507 (63.14)	296 (36.86)	803 (100)
H	226 (61.41)	142 (38.59)	368 (100)
A	206 (62.61)	123 (37.39)	329 (100)
C	26 (60.47)	17 (39.53)	43 (100)
M	212 (45.01)	259 (54.99)	471 (100)
Total	3925 (68.13)	1836 (31.87)	5761 (100)

Table 68 Results by speaker (Kinki, all types of tokens)

Speaker	Expected	Unexpected	Total
G	393 (79.88)	99 (20.12)	492 (100)
I	483 (74.31)	167 (25.69)	650 (100)
J	330 (71.58)	131 (28.42)	461 (100)
L	526 (69.67)	229 (30.33)	755 (100)
K	574 (63.64)	328 (36.36)	902 (100)
A	313 (62.98)	184 (37.02)	497 (100)
E	365 (60.83)	235 (39.17)	600 (100)
N	266 (58.21)	191 (41.79)	457 (100)
F	204 (57.79)	149 (42.21)	353 (100)
M	373 (56.52)	287 (43.48)	660 (100)
C	36 (56.25)	28 (43.75)	64 (100)
H	300 (54.05)	255 (45.95)	555 (100)
D	563 (51.79)	524 (48.21)	1087 (100)
B	320 (48.85)	335 (51.15)	655 (100)
Total	5046 (61.63)	3142 (38.37)	8188 (100)

All the speakers but one is judged in the "expected" way in each respondent group. Only the speaker M in the Tokyo data and the speaker B in the Kinki data were judged oddly. The respondents frequently mentioned after the experiment that some speakers sounded conspicuous, some saying that was because of the pitch accent or speech rate, and this caused them to judge these voices as non-Tokyo (for Tokyo respondents) or Kinki (for Kinki respondents). The comment about the accent seems quite natural among Tokyo respondents based on a stereotypical assumption that a non-Tokyo

person is conspicuous when he or she does not change the pitch accent patterns upon visiting Tokyo. However, the respondents' description does not always match the actual pronunciation in the test tape.

Respondents particularly mentioned speaker K as the one most confidently judged as a non-Tokyo person or Kinki person, and actually he is from Kinki. There is no token, however, of the Kinki accent among the words he pronounced. Furthermore, when he devoiced vowels, 53.75% of the Tokyo respondents judged him as Tokyo, although this is a rather weak recognition. His neutral tokens, which are expected to be judged as Tokyo by Tokyo respondents because of lack of clues by pitch accent or voicing variations, were also judged as Tokyo, as expected, at 72.09%. His nondevoiced tokens were judged as 'non-Tokyo,' as expected, by 74.47% of them. Similar respondents descriptions of pronunciation, which do not reflect actual facts, were observed in previous studies (e.g., Kerswill 1985). A possible interpretation of these incorrect descriptions by the respondents is that they perceived nondevoicing and judged the speaker as non-Tokyo, but could not verbalize the linguistic fact and simply reported an obvious non-Tokyo feature, non-Tokyo accent.

In contrast, only 31.40% of Kinki respondents judged Speaker K as non-Kinki when he devoiced vowels while 65.24% judged his nondevoiced tokens as Kinki. As seen in the overall results by token types, it seems that Kinki respondents did not use devoicing as efficiently as Tokyo respondents

to judge whether or not a speaker is from Kinki. From another perspective, it can be said that Kinki respondents can tell this speaker is from the same region as theirs in spite of the Tokyo feature.

Speaker M, on the other hand, was heavily judged in the unexpected way; fewer than 50% of Tokyo respondents gave the expected responses. His nondevoiced tokens were judged as non-Tokyo by only 27.93% of Tokyo respondents while his devoiced tokens were judged as Tokyo by 84.44% of them. Just as Speaker K for the Kinki respondents, Speaker M is judged as Tokyo regardless of the presumed Kinki feature in his pronunciation. The two speakers K and M illustrate cases in which respondents can tell whether or not the speaker is from their own area accurately in spite of non-local features in his or her pronunciation. The reason is not clear. Their results indicate, at least, that they may have some stronger factor, such as voice quality, as suggested by Laver and Trudgill (1979), than different pitch accent patterns and devoicing variations.

Laver and Trudgill (1979) discuss the possibility that voice qualities of extralinguistic, paralinguistic, and phonetic features are social markers, which signal such membership as regional affiliation, social class, and age. They give a number of examples from previous studies, and also point out that attitudinal variation depends on phonological environment, whose importance varies in different social groups, and that the variation is not a conscious process.

Some possible influencing factors in my data are (i) vowel length, (ii) pitch contour in a single vowel, and (iii) other quality of sounds. Horii (1982) suggests that vowels in a one-mora word (with a suffix) and in word final position tend to be longer in Kinki dialect, and it is widely known that the Kinki pronunciation has a rising or falling pitch contour within a single vowel while the Tokyo one does not commonly have such a contour (Tahara et al. 1998, Warner 1997, Kokugogakkai 1980, Makimura 1979). Finally, Maeda (1977) and Horii (1982) state that consonants are pronounced less deliberately in Kinki than in Tokyo. Horii gives such examples of deletion of [sh] and weakening of [sh] to [h]. I notice that /s/ is not perceived sometimes by non-native speakers of Japanese when a Kinki person devoices sentence-final /u/ as in /desu/ (copula). When I prepared the test tape, I selected words which were pronounced most 'Tokyo-like' to my ears to eliminate other non-Tokyo features. I may not have done a perfect job, however, because of phonetic differences that I could not detect or could not avoid due to limited samples despite having detected them. Those differences can be a possible topic to investigate in the future. The final chapter summarizes these detailed results.

6. Conclusion

In this study I conducted a perception experiment, using vowel devoicing, which is a common allophonic phenomenon in Japanese. Perception experiments focusing on features at the allophonic level have rarely been conducted. The object of this study, vowel devoicing, is popularly believed to occur less frequently or not at all in the Kinki dialect, although empirical studies show that it occurs as frequently, at least in the most general devoicing environments, as in the Tokyo dialect. Because of this mismatch between popular belief and the facts of devoicing in the two regions, one could not predict what local reactions to devoicing and nondevoicing might be. In my experiment, Tokyo and Kinki respondents were asked to judge whether or not the speakers on a test tape were from the same region as their own, and the results were examined to show how phonological factors (devoicing and environments) and the social factors of both speakers and respondents (gender and age) would affect judgments. In the analyses of the results, devoicing as well as the Tokyo pitch accent were treated as Tokyo features while nondevoicing as well as the Kinki pitch accent were treated as Kinki features. The comparison was based on the working hypothesis that a speaker who devoices vowels or uses the Tokyo pitch accent is more likely to be judged as a Tokyo (or non-Kinki) person while a speaker who nondevoices

vowels or uses the Kinki pitch accent is more likely to be judged as a non-Tokyo (or Kinki) person.

The results confirmed this hypothesis. They suggest that the voicing variants of a devoiceable vowel control the judgments by both Tokyo and Kinki respondents about where a speaker is from, supporting the idea that a low-level linguistic variant can have social meaning, as in other sociolinguistic studies. The results of this study can be said to have moved the field from suprasegmental but phonemic features (pitch accent patterns) as in Warner (1997) into allophonic features, and show that such lower level features can be recognized and used as clues in making judgments.

Vowel devoicing is not noticed in natural conversation; consequently, the respondents could confidently identify some speakers as Tokyo or Kinki but could not describe the linguistic features of those speakers accurately as the basis for their judgments. Instead they attributed their judgments to such recognizable features as phonemic differences as in pitch accent patterns.

Another finding similar to those in other sociolinguistic studies is that Tokyo results show an age-graded pattern and greater sensitivity by female respondents. The age group of 23 to 39 gave more expected judgments than younger or older age groups. Since that age group has finished school and gone to work in the wider society, the results by age, as well as by gender, match the well-known greater middle-age and female sensitivities to the linguistic 'norm' of the community.

Other significant and insignificant factors turned out to be ones reported in some of the earlier literature on devoicing production; the factors that interact with devoicing judgment variation, such as the position of devoiceable vowels in terms of morpheme boundary, tend to be significant, while the factors for which no such previous interaction had been reported, such as the position of devoiceable vowels in terms of moraic position, were insignificant.

Interesting findings in this study, however, are not simply based on the respondents' use of devoicing and nondevoicing in making their judgments. Both Tokyo and Kinki respondents seem to use obviously covert knowledge in identifying the best phonological environments for vowel devoicing in production, assuming that the vowel in those environments should be devoiced whether they actually were or not. These results suggest that the respondents do not solely rely on the linguistic information presented to them but use some prior knowledge of how likely vowels are to be devoiced in production.

The influencing features of the consonants that precede devoiceable vowels and the ones that follow them also suggest a combination of sources of information in making judgments. For the preceding consonant, [-continuant] (as well as back consonants in the Tokyo data) is a feature promoting the expected judgments. For the following consonant, on the other hand, [+continuant], generally, promotes perception of devoiced vowels

and, therefore, judgment of 'Tokyo' and 'non-Kinki' regardless of actual devoicing. It seems that the respondents pay attention to the continuancy of the preceding and following consonant, take the best environments for vowel devoicing into account, and assume the vowel is devoiced based on such continuancy. Thus, the results illustrate the reasonable coordination of the perception of linguistic information with utilization of knowledge of vowel devoicing in production.

The results of this study also show some differences between Tokyo and Kinki respondents. The Tokyo results clearly show the use of devoicing or nondevoicing in making judgments, while the Kinki ones show similar tendencies but more weakly. The weak tendencies in the Kinki results can support the speculation that vowel devoicing occurs as frequently in the Kinki dialect as in the Tokyo dialect, at least in the most general devoicing environments and that is why devoicing variation is not efficient as a criterion for Kinki respondents to make judgments. In other words, the Tokyo respondents made their judgments based only on the stereotype that they devoice vowels more frequently.

Comparison of the Tokyo and Kinki results of the tokens by different pitch accent patterns also reveals differences. Both dialects have prestige in the local areas, but the Tokyo pitch accent does not immediately induce the judgment 'Tokyo' for Tokyo people while the Kinki pitch accent overwhelmingly causes the Kinki people to make the judgment 'Kinki.'

These results suggest that the Tokyo accent does not work well in maintaining 'solidarity' among people in the region although it has prestige as standard, compared to the Kinki accent.

From the speakers' point of view, the results show that they can make a Tokyo person believe they are from Tokyo by using both Tokyo pitch accent and devoicing (and from non-Tokyo by using the Kinki pitch accent and nondevoicing) while they can less easily make a Kinki person believe that they are from Kinki by using nondevoicing (and from non-Kinki by using devoicing).

In spite of these differences, I have shown statistically that Tokyo and Kinki people perceive devoicing and nondevoicing of vowels and use that feature to make judgments on whether a speaker is from the same region as theirs. The results show similar patterns on certain points as other sociolinguistic and phonological studies and support the idea that devoicing variants, which are allophonic and not consciously produced or perceived in natural conversations, can determine such judgments, although their criteria in making judgments do not reflect actual production of vowel devoicing in Tokyo and Kinki. The results also seem to illustrate nicely that the respondents utilize covert knowledge about devoicing in production (based on the preceding and following segments) as well as the voicing status of the vowels themselves.

Now the next natural questions are how devoicing and nondevoicing are distributed and how phonological and social factors affect their variation in the Kinki dialect. The results of this study match the suggestion that vowel devoicing occurs in the most general environments as frequently in the Kinki dialect as in the Tokyo dialect, about 80%, based on the very limited tokens in previous studies, and that nondevoicing occurs in other environments more frequently in the Kinki dialect. It is necessary to collect more controlled comprehensive natural data and examine vowel devoicing in order to determine the factors that determine its distribution and variation in non-Tokyo dialects before such a comparison of vowel devoicing in the Tokyo and non-Tokyo dialects can be completed.

Without that comprehensive study, however, it is clear that vowel devoicing is a covert regional stereotype in Japanese. It interacts not only with the social categories of age, gender, and region, moreover, but also with such subtle linguistic clues as promoting and demoting linguistic environments, suggesting that, like other advances in the general area, sociophonetics is of considerable concern to studies of variety perception as well as production.

APPENDICES

Appendix I List of the subjects for recording

Speaker ID	Gender	Hometown (Prefecture)	Dialect Region
A	F	Hyôgo	Kinki
B	F	Yamaguchi	Chûgoku
C	M	Tochigi	North Kantô
D	F	Hyôgo	Kinki
E	F	Kyoto	Kinki
F	M	Ibaragi	North Kantô
G	F	Miyagi	South Ôu
H	M	Okayama	Chûgoku
I	F	Osaka	Kinki
J	F	Osaka	Kinki
K	M	Hyôgo	Kinki
L	M	Aichi	Tôkai
M	M	Chiba	East-west-south Kantô
N	M	Wakayama	Kinki

Based on Hirayama et al. (1992):
East-west-south Kantô includes the Tokyo metropolitan area. South Ôu and Tôkai are in the north and in the west of Kantô, respectively. South Ôu, North Kantô, East-west-south Kantô, and Tôkai belong to the Eastern dialects. Chûgoku and Kinki belong to the Western dialects. Chûgoku is in the west of Kinki.

Appendix II The list of the words

By devoicing variation: D=Devoiced ND=Nondevoiced
By accent: K=In the Kinki accent T=In the Tokyo accent N=Neutral

001 atafuta (D)
002 hekichide (D)
003 jifusuru (D)
004 nadeshiko (D)
005 neokisuru (ND)
006 soshishiyô (ND)
007 rikishiwa (ND)
008 pakupaku (D)
009 katsutsumetai (D)
010 kaihisuru (D)
011 taue (K)
012 herikutsumo (D)
013 sekitsui (D)
014 nomisuke (D)
015 asatsukio (D)
016 yasushidono (D)
017 hôchisuru (ND)
018 jimushitsuni (D)
019 tôhitomôhatsuni (D)
020 kazokukana (D)
021 tekipakiyaru (ND)
022 risutokuma (ND)
023 kyôbashini (T)
024 konishisan (D)
025 taberu (T)
026 yasuha (ND)
027 tanpukude (D)
028 atsushidono (ND)
029 kajitsutokajû (D)
030 nanakusa (ND)
031 tabezakari (T)
032 boyakeru (T)
033 inchikina (D)
034 toshichan (D)
035 himeji (K)
036 shakufuwa (D)
037 neokisuru (D)
038 maekake (K)
039 muhitsude (ND)
040 tekipakiyaru (D)
041 tenkitokion (D)
042 pakupaku (ND)
043 mahishi (ND)
044 kyôbashini (K)
045 kochifuite (ND)
046 kyôfuka (D)
047 akusude (D)
048 kinkitokantô (D)
049 kawari (T)
050 masaka (K)
051 shufutoseikatsu (D)
052 kamakura (K)
053 hiroshikun (ND)
054 kaihisuru (ND)
055 michitonosôgû (D)
056 kubetsusuru (ND)
057 boyakeru (K)
058 nansai (T)
059 sanpitsuwa (ND)
060 jifusuru (ND)
061 ninputoakachan (D)
062 mahishi (D)
063 odeko (N)
064 osekihan (ND)
065 semotare (N)
066 dokuha (ND)
067 hatashite (D)
068 potsupotsu (D)
069 tanukikana (D)
070 karupisuwa (D)
071 ninchisuru (ND)
072 genshutowa (D)
073 torihikimo (D)
074 kowai (K)
075 maekake (T)
076 asatsukio (ND)

077 gatapishinaru (D)
078 tabezakari (K)
079 rikishiwa (D)
080 masaka (T)
081 hôchisuru (ND)
082 ninputoakachan (ND)
083 bakufuwa (ND)
084 tamashii (N)
085 kokuhide (ND)
086 katsutsumetai (ND)
087 sekitsui (ND)
088 karupisuwa (ND)
089 kawari (K)
090 ninchisuru (D)
091 michitonosôgû (ND)
092 himeji (T)
093 akushude (ND)
094 kubetsusru (D)
095 tabun (N)
096 soshishiyô (D)
097 osekihan (D)
098 hekichide (ND)
099 pakupaku (D)
100 michihide (ND)
101 shufutoseikatsu (ND)
102 nanakusa (D)
103 tenkitokion (ND)
104 bakufuwa (D)
105 taue (T)
106 genshutowa (ND)
107 kamakura (T)
108 saishusuru (ND)
109 kirikuchini (D)
110 kinkitokantô (ND)
111 oyayubi (K)
112 atafuta (ND)
113 kokuhide (D)
114 pachipachi (D)
115 nisensee (N)
116 senshuka (D)
117 herikutsumo (ND)
118 kowai (T)
119 kyôfuka (ND)
120 konishisan (ND)
121 yasuha (D)
122 henpikana (D)
123 kochifuite (D)
124 kazokukana (ND)
125 taberu (K)
126 gatapishinaru (ND)
127 risutokuma (D)
128 yasushidono (ND)
129 shakufuwa (ND)
130 oyayubi (T)
131 torihikimo (ND)
132 nansai (K)
133 atsushidono (D)
134 tenpusuru (D)
135 hiroshikun (D)
136 dokuha (D)

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