CHAPTER 3

PITCH ACCENT

3.1 INTRODUCTION TO CHAPTER 3

This chapter discusses the placement of pitch accent in the Standard dialect, and its connection to HVD. The interaction between pitch accent placement and devoicing has been noted in earlier works (Sakuma 1928; Bloch 1950; McCawley 1968; Vance 1987), and experimentally verified (Sugito & Hirose 1988; Kondo 1997; Tsuchida 1997; and Kitahara 1997, 1998).

§3.2 begins with a presentation of the basic facts surrounding pitch accent in the dialect. Example sentences from the current study are included in the discussion, including examples of both the proposed underlying location of tones and the actual pitch contour. These representations are set within the framework of Pierrehumbert & Beckman (1988), hereafter P&B, perhaps the most comprehensive characterization of the phonological and phonetic instantiation of pitch accent in Tokyo Japanese to date. Their analysis has been upheld by various studies involving phrasal (e.g. Kiritani et al. 1991; Maekawa 1994; Maekawa et al. 1995) and lexical pitch characteristics (Warner 1997).

Pitch data from the current data set is then presented in §3.3. First, further experimental verification of the devoicing of accented vowels in the current data is presented, along with a representative production. Second, productions displaying a shift of accent in order to deaccent a vowel so it can be devoiced without conflict are exemplified. Although exhaustive checks of pitch placement have not yet been made for this data set, both strategies appear to have been widely used. (A second strategy for avoiding the devoicing of accented vowels is the deaccenting of the token reported on in Kitahara 1997, 1998. This strategy has not yet been verified for the current data set.)

Finally, §3.4 summarizes this chapter.

3.2 PITCH ACCENT IN STANDARD MODERN JAPANESE

Japanese has long been considered a pitch accent language (McCawley 1968: 135~136). While stress in language like English (in McCawley's terms, stress-accented languages) is marked by the placement of primary, secondary, and even tertiary stress, in Standard Modern Japanese non-compound words there is at most one accent on a word.[1] While stress in languages like English can involve increases in loudness, duration and pitch (Roach 1991, Ch. 10), stress on accented Japanese words is marked by a pitch excursion from high to low associated with the accented vowel. However, unlike true tone languages such as Thai or Mandarin Chinese, the high-to-low pitch excursion associated with a Japanese accented syllable is only a marker of the location of accent; there are no contrasting pitch patterns forming minimal pairs.

3.2.1 INTONATION CONTOUR CHARACTERISTICS

As noted in Vance (1987) discussions of Standard Modern Japanese pitch contour characteristics must account for several characteristics.

At the word level, some lexical items are said to be lexically accented. This lexical accent has been described as a rapid fall from a relatively high pitch to a relatively low pitch, while other lexical items lacking this fall are said to be unaccented (Bloch 1950; Martin 1952; McCawley 1968). In addition, words begin with low pitch unless the 1st mora of the word is accented or is a heavy syllable (Hattori 1954).

The possible accent assignments for the current study's token/clitic combinations—accented on the 1st mora, accented on the 2nd mora, or unaccented—have been exemplified as below.

1st mora accent	2nd mora accent	unaccented
ki chi to	ki shi ka	ku chi to
H L L	L **H** L	L H H

Figure 3.1 Possible accent locations for lexical items in the Standard dialect.

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[1]There are many dialects that do not have lexical accent tones, only phrasal tones (e.g. the dialect of Ibaraki Prefecture reported on in Kiritani et al. 1991).

Notice the difference in accent between the token accented on the 2nd mora, *kishi* ‘comb’, and the unaccented token *kuchi* ‘mouth’. The distinguishing feature between these two tokens in older frameworks is the pitch fall on the following syntactic particle in the case of the accented *kichi.* If the final mora of a token is accented, the pitch on the following clitic will be lower; if the token is unaccented, it will stay higher.

Previous proposals accounting for the observed accent locations include the tonal algorithms of McCawley (1968, 1977), the autosegmental tone assignment of Haraguchi (1977), and the combination autosegmental/prosodic assignment of Poser (1984)—see P&B pp. 7~13 for discussion of each. These have been superseded by the tonally underspecified P&B framework, which will be utilized in the next section.

3.2.2 EXAMPLE PRODUCTIONS FROM THE CURRENT STUDY

The pitch accent characteristics discussed above can be seen in the following productions. These productions are presented within the tonally underspecified P&B analysis, and include representative productions from the current data set.

The first example is that of an unaccented lexical item, the token *kuchi* ‘mouth’ from the current study. The following is the prosodic structure of the carrier sentence and the tones as predicted by the P&B analysis.

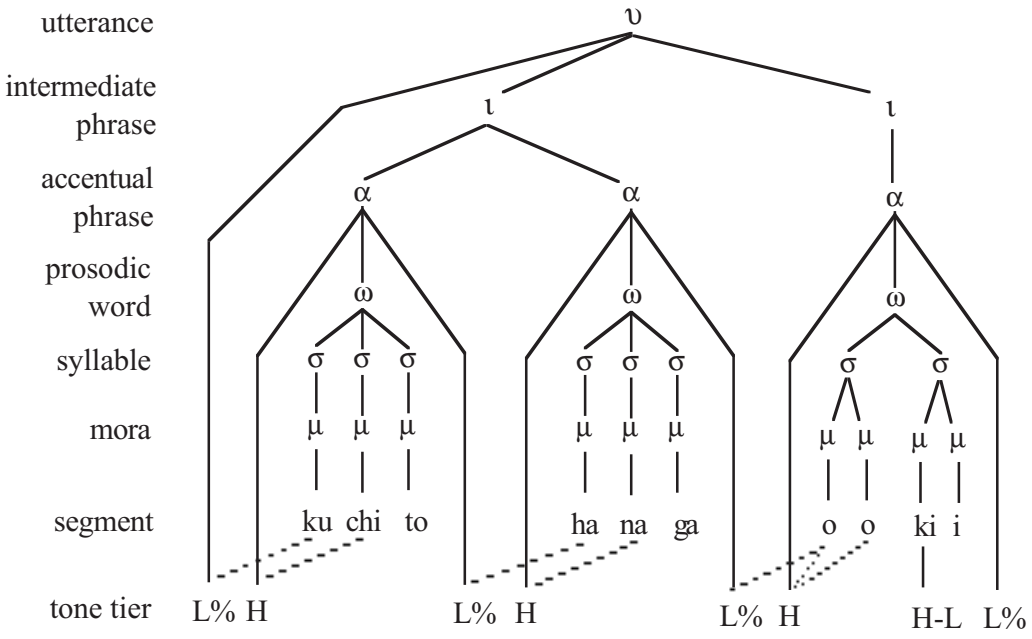

Figure 3.2 Tone representation in the P&B framework; 1st lexical item unaccented.

The most significant feature of the P&B framework is the sparse specification of tones—cf. McCawley (1968, 1977) or Haraguchi (1977) where tones spread to all tone-bearing unites. The tones of the P&B system include an utterance-initial L% boundary tone[2], an accentual phrase-initial H tone, an accentual phrase-final L% boundary tone, and an utterance-final L% boundary tone found in declaratives or an utterance-final H% boundary tone found in interrogatives (not shown above).

P&B's proposed tonal attachments can also be seen in Figure 3.2 above. The utterance- and accentual phrase-initial L% tones attach to the 1st mora of each accentual phrase unless, as will be seen in Figure 3.4 below, that attachment is blocked by a lexical pitch accent tone on the 1st mora of accentual phrase. The accentual phrase-initial H generally attaches to the 2nd mora of each accentual phrase. In addition, with lexical items containing a long 1st syllable (i.e. a 2-mora syllable), such as *ookii* 'big' in Figure 3.2 above, the accentual phrase-initial H

[2]The '%' denotes a boundary tone, a tone that triggers some sort of local pitch adjustment—see P&B pp. 11~13 for discussion.

spreads to the 1st mora of the initial long syllable as well. See P&B Chs. 2 and 5 for discussion and justification.

Finally, note that the lexical accent attached to the 3rd mora *ki* of the adjective *ookii* at the end of the utterance. In the P&B framework, the sharp fall in pitch that marks lexical accent (§3.2.1) is accounted for by means of a H-L complex tone (see P&B §5.4, pp. 121~126 for discussion). This H-L sequence was also used by Haraguchi (1977: 50~52, §5.1), and is supported by the work of Pierrehumbert (1980) and Yip (1987). However, as will be seen, it appears that at least in some cases one participant in the current study utilized a simplex H tone for marking lexical accent. This will be discussed in conjunction with the next example production.

The placement and underspecification of tones can be seen in the following example from the current data set. The first panel gives the waveform, the middle panel gives the waveform filtered at 1 kHz in order to show only the voicing activity clearly, and the bottom panel gives the pitch trace generated from the filtered signal with a 5 ms FFT-Combination algorithm after the signal was downsampled to 10 kHz. The location of the tones that are specified in Figure 3.2 above have been superimposed on the pitch contour.

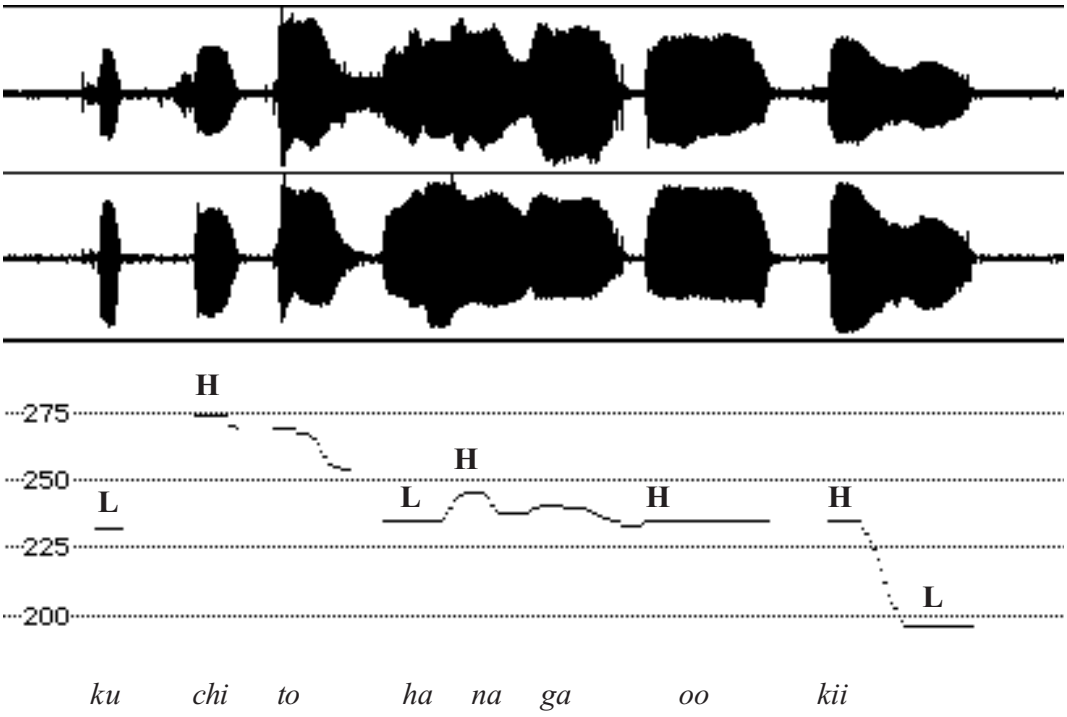

Figure 3.3 Representative production of *kuchi* ‘mouth’ sentence, participant HK.

The effects of the tone placement and underspecification can be seen on the pitch contour. The initial low pitch of the 1st two accentual phrases can be seen on the *ku* of *kuchi* ‘mouth’ and the *ha* of *hana* ‘nose’. This initial low pitch is not seen with the long mora *oo* of *ookii* ‘large’ at the beginning of the 3rd accentual phrase. The underspecification of the clitics *to* (the 3rd mora) and *ga* (the 6th mora) can be seen in the interpolation of the pitch contour from the preceding H tones to the following L% tones. Also, the rapid pitch drop associated with the lexical accent on the *ki* of *ookii* can be seen at the end of the utterance. Finally, the gradual lowering of the pitch range across the domain of the utterance know as declination can be seen in the pitch range associated with the H tones—each H occurs at a lower pitch than the one preceding it, with the exception of the last H that is part of the H-L complex tone. The last two H tones occur at the same pitch, showing the cancellation of declination by the fact that accent H tones are manifest at a higher pitch than phrasal H tones (Poser 1984; P&B).

For a token accented on the 1st mora, the association of tones will produce the following structure.

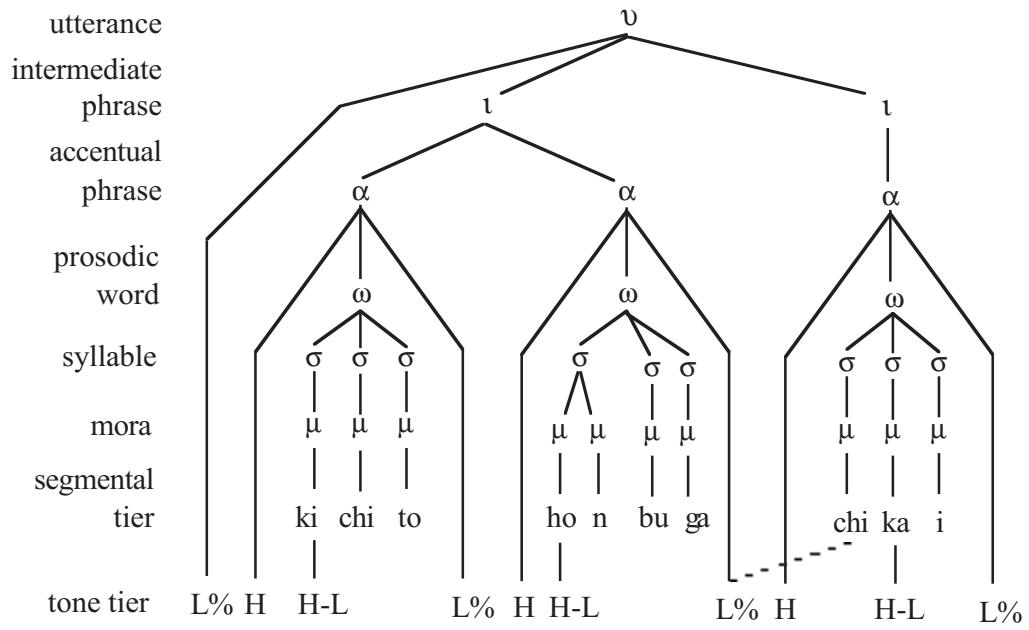

Figure 3.4 Tone representation in the P&B framework; 1st lexical item accented on the 1st mora.

In order to account for the high pitch found on initially-accented tokens, P&B (p. 127) state that the accent H-L tone on the 1st mora prevents the association of the accentual phrase initial L% tones to the 1st mora of both *kichi* and *honbu*. Even though it is not linked to any segmental material, instead remaining at the phrasal boundary, the initial L% was demonstrated by both Poser (1984) and P&B to be observable in the pitch trace even when imperceptible. However, in the data from the current study that was looked at, no evidence of an initial L% tone was found when followed by a pitch accent tone. This can be seen in the following production.

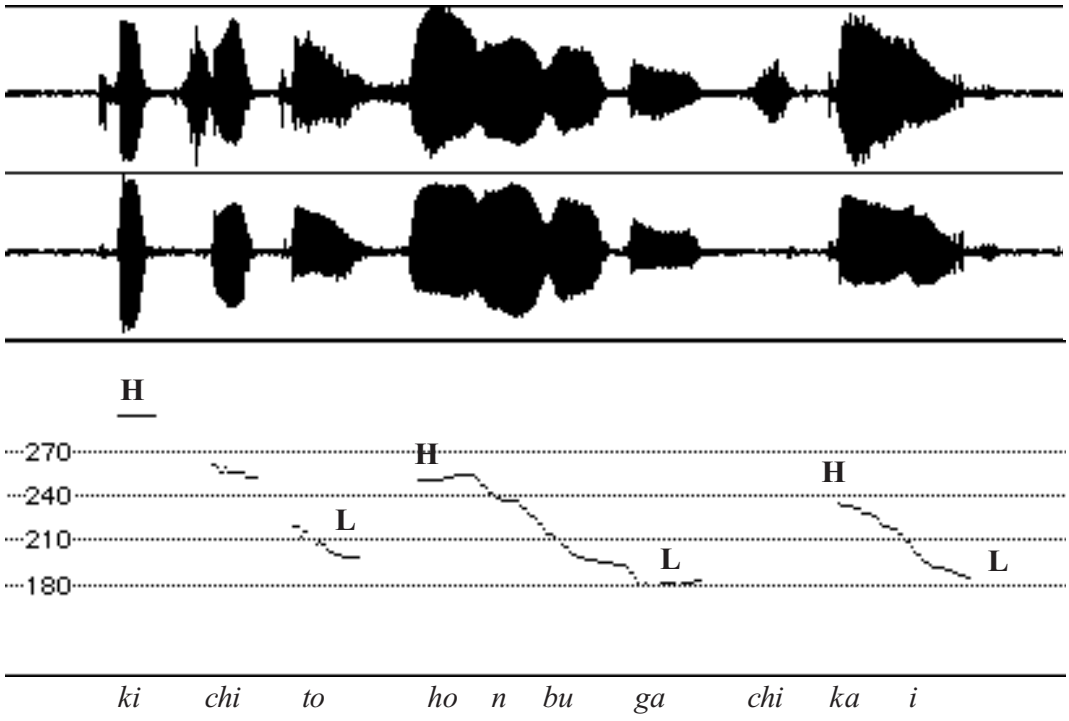

Figure 3.5 Representative production of *kichi* sentence, participant HK. Notice that the pitch associated with the 1st mora of *kichi* is now substantially higher than any other pitch in the sentence. In addition, for this production there is no observable initial low pitch associated with the utterance-initial L%.

Further, the pitch associated with the 2nd mora of *kichi* is midway between the high pitch on the 1st mora *ki* and the low pitch on the syntactic particle *to,* showing the underspecification of pitch on this mora.[3] Likewise note that the 2nd mora *bu* of *honbu* is also midway between the H tone on *hon* and the L tone on *ga*. According to P&B's framework, these should both be L tones with a corresponding valley in the pitch contour. The actual contour observed therefore argues against the complex H-L accent tone posited by P&B, at least for this speaker for this sentence.

Finally, the association of tones involving a token accented on the 2nd mora would produce the following structure.

[3]In most other repetitions of this sentence, this participant accented the 2nd mora of this token, with devoicing dependent on whether or not accent was present.

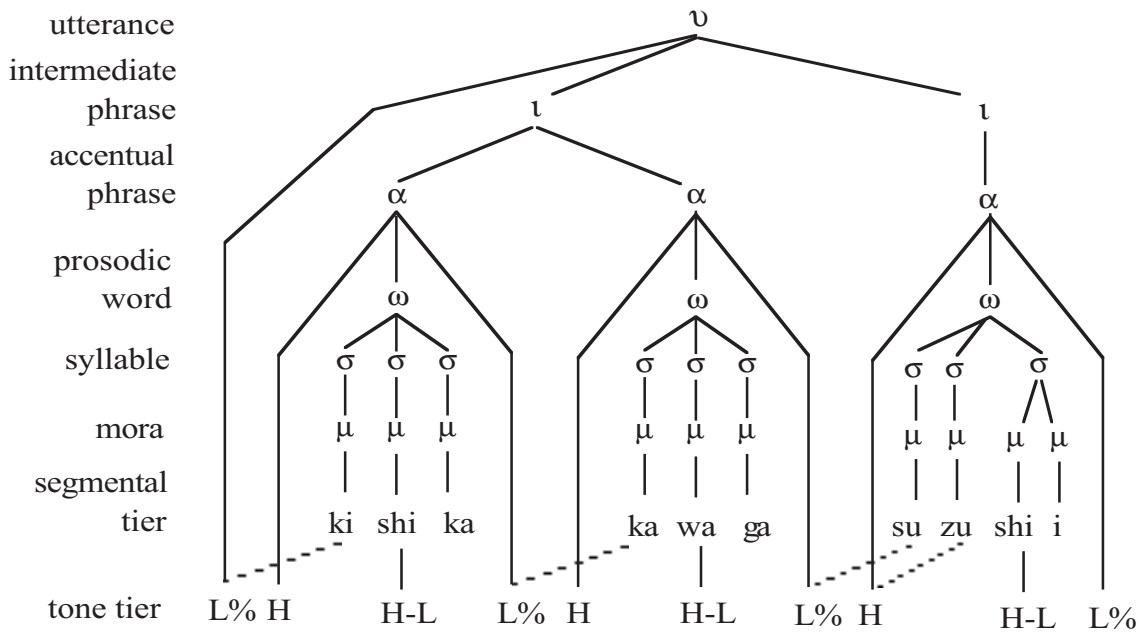

Figure 3.6 Tone representation in the P&B framework; 1st lexical item accented on the 2nd mora.

Note that while the L% tones associate to the 1st mora of each of the 1st two accentual phrases, the accent tones on the 2nd mora block the association of the phrase-initial H.

The pitch contour across the 1st accentual phrase is expected to rise up from a low pitch on the 1st mora to a higher pitch on the 2nd mora, and then fall again and remain low until the following accentual phrase. Again, this structure is reflected in the production of the token accented on the 2nd mora that is given below.

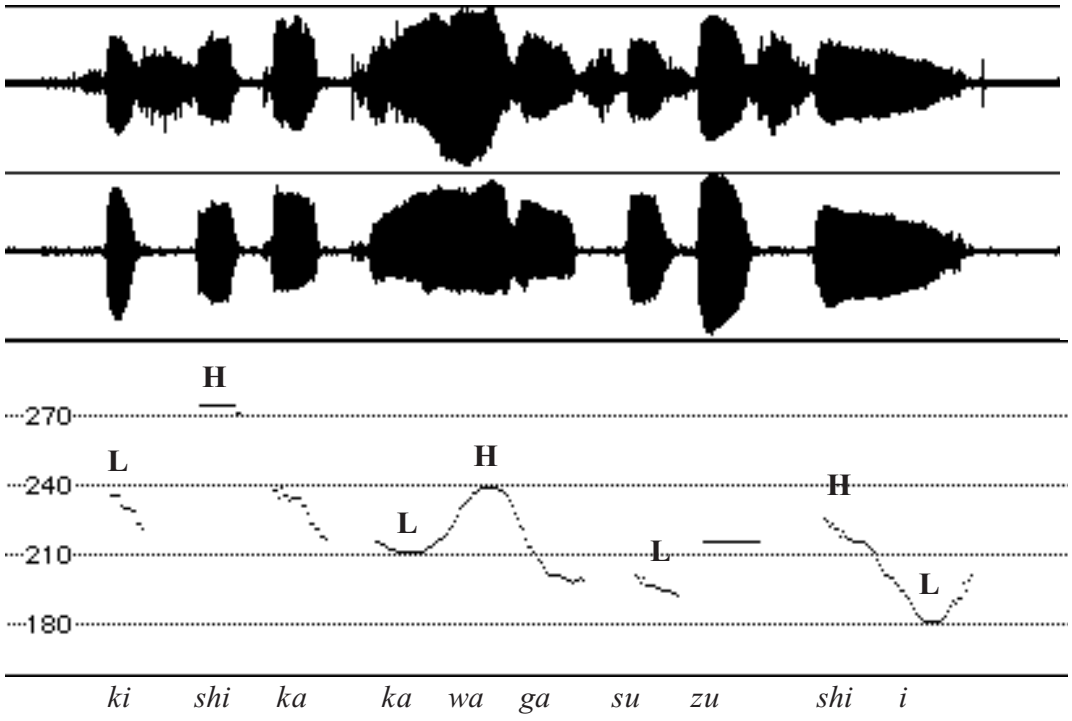

Figure 3.7 Representative production of *kishi* sentence, participant HK.

The high pitch associated with the accent H-L tone can be seen on the 2nd mora of *kishi,* with the low pitch on the 1st mora and following syntactic particle being associated with the utterance-initial and accentual phrase-final L%, respectively.

In this production, it can be seen that the pitch drops much more quickly after the accent tone on the 2nd mora of both *kishi* and *kawa*. This is much more in line with the H-L accent tone posited by P&B.

Note in particular the range of the contour associated with the syntactic particle in Figures 3.3, 3.5 and 3.7 above. It can be seen that the pitch across the clitic following the target lexical item can be used to determine the location of the lexical accent, even if the lexical item contains both devoiced vowels and the pitch of the lexical item cannot be observed directly (Sugito 1966, 1969, 1971; Sugito & Hirose 1988; Kitahara 1997, 1998).

In all 3 examples given above, the clitic is underspecified for tone. The actual pitch contour across the clitic is an interpolation of the tone associated with the surrounding morae. The difference in the value of the pitch and the degree of pitch fall across the clitic will depend, for a large part, on how many morae separate the surrounding H and the L% tones.

In Figure 3.2 above, the lexical item is unaccented. The H tone is associated with the 2nd mora of the lexical item, and the L% tone is associated with the 1st mora of the following lexical item. This results in a pitch fall of local mid-range across the clitic (Figure 3.3).

In Figure 3.4 above, the lexical item is accented on the 1st mora. What appears to be a simplex H accent tone is associated with the 1st mora of the lexical item, and the L% tone will be associated with the phrasal boundary since its linking to the following mora is blocked by the location of the lexical accent on the 1st mora of the following lexical item. This results in a pitch fall of local low range across the clitic (Figure 3.5).

Finally, in Figure 3.6 above, the lexical item is accented on the 2nd mora. What appears to be a complex H-L accent tone is associated with the 2nd mora of the lexical item, and the L% tone is associated with the 1st mora of the following lexical item. This results in a pitch fall of local low range across the clitic (Figure 3.7), but the average pitch across the clitic is slightly higher than the average pitch range across the clitic in the case of an initial mora accent (Figure 3.5). The actual low peak in this portion of the pitch contour is reached on the 1st mora of the following lexical item, not on the clitic itself as in Figure 3.5.

In this way the overall pitch contour can be used to judge the location of tones that have been assigned either lexically or phrasally despite the presence of devoiced vowels. This will be done in the next section in the discussion of the various methods speakers in this study used to resolve the conflict between pitch accent assignment and vowel devoicing.

3.3 INTERACTION OF PITCH ASSIGNMENT AND DEVOICING

As noted in the §2.2.1 in the discussion of the variables affecting the application of HVD, the devoicing of lexically accented vowels is apparently becoming more common. While some scholars held that accented vowels did not devoice, but instead the location of the accent shifted (e.g. Bloch 1950; McCawley 1968), others held that accented vowels did devoice (e.g. Sakuma 1929). This devoicing of accented vowels is being upheld by contemporary studies using instrumental techniques rather than the researcher's ear (Sugito & Hirose 1988; Kondo 1997; Kitahara 1997, 1998). The fact that both strategies have been reported in the literature implies that the strategy for dealing with the possible devoicing of an accented vowel is highly speaker-dependent. This indication is upheld by the current study, where both devoicing of accented vowels and accent shift have been verified.

3.3.1 DEVOICING OF ACCENTED VOWELS

As discussed in Vance (1987) and references therein, there is a tendency for some speakers to devoice vowels even if they carry accent tone. This has been upheld in recent work by Sugito & Hirose (1988), Kondo (1997), Tsuchida (1997), and Kitahara (1997, 1998). While not as strong for the participants in this study as the deaccenting of tokens presented above, devoicing of accented vowels did occur.

In the case of a devoiced accented vowel, while there is no voicing information in the token itself there is a strong impression of pitch. The heavy frication usually accompanying the devoiced vowel seems to allow the perception of pitch (Meyer-Eppler 1957; Small & Daniloff 1967; Thomas 1969; McGlone & Manning 1979; all as cited by Higashikawa et al. 1996).

Before presenting a devoiced accented vowel, it is helpful to present a voiced vowel to allow a comparison of the pitch contour of the voiced vowel production and the devoiced vowel one. The following figure gives the voiced vowel example for a repetition of the *kushi* 'comb' sentence.

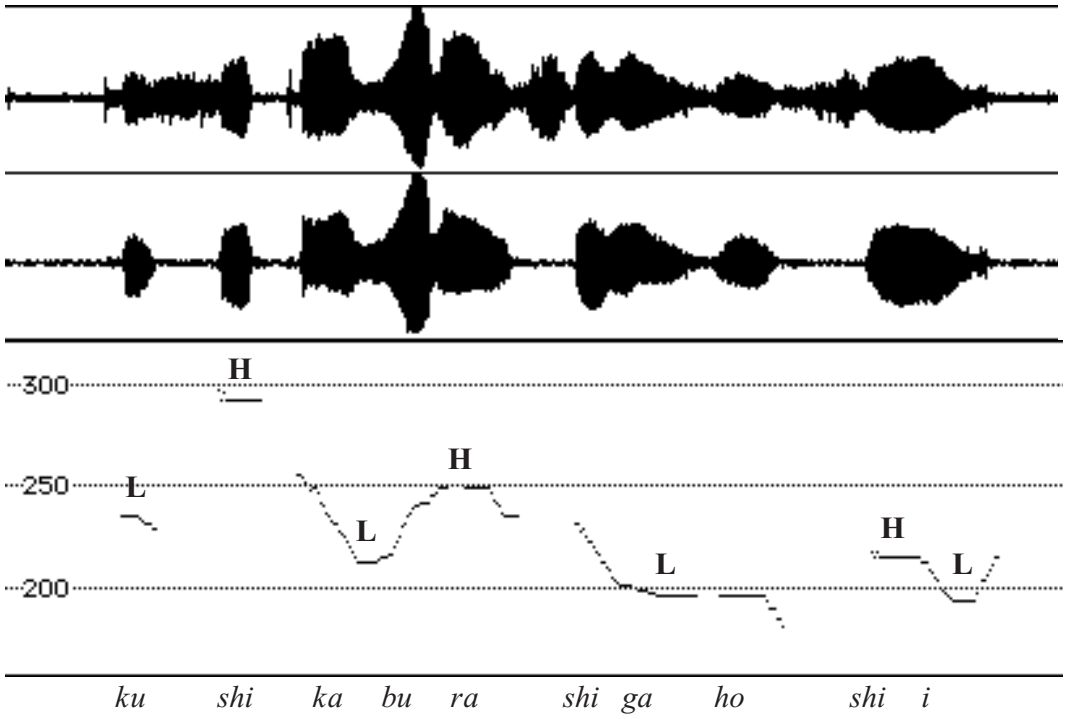

Figure 3.8 Pitch trace of a production containing a voiced accented vowel. The effect of the H-L accent tone attached to the 2nd mora of the token can be seen in the pitch fall across the clitic *ka* ‘or’ in this production. Interpolating across the closure of the [k] of [ka], it can be seen that the pitch falls from its high point at the end of the 2nd mora vowel to the L% boundary tone associated to the 1st mora of the following lexical item *burashi* ‘brush’.

This same fall in pitch across the clitic occurs even when the 2nd mora vowel is devoiced. This can be seen in the following production.

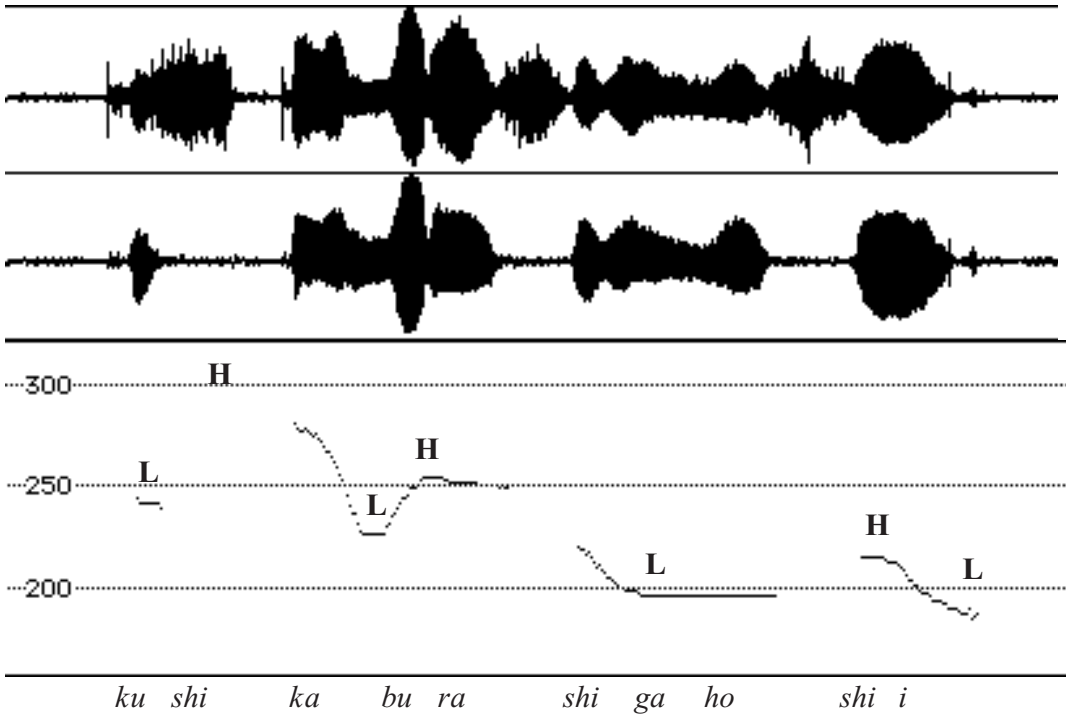

Figure 3.9 Pitch trace of a production containing a devoiced accented vowel.

The lack of voicing of the 2nd mora vowel is evident in the lack of cyclic activity in the filtered waveform (middle panel) and in the lack of pitch contour (bottom panel). Still, it can be seen that the basic pitch pattern of the whole utterance is the same for both productions. The conclusion is that for this repetition, the accent H-L tone is underlyingly attached to the 2nd mora of the token even though that vowel was devoiced.

While participant HK in particular did devoice some accented vowels, as evidenced by pitch contours such as the one above, in many more repetitions she and the other participants of this study shifted the accent tone on the tokens to avoid devoicing an accented vowel.

3.3.2 SHIFT OF LEXICAL ACCENT

As discussed in Vance (1987: 50), another strategy available to speakers to avoid devoicing an accented vowel is to shift the accent to another syllable so that the syllable that normally carries accent can be devoiced without loss of the pitch accent

information. While the tendency to shift accent location may be disappearing for some speakers (e.g. the participants in Kondo 1997 and Tsuchida 1997), it appears to be too strong a statement to say that the pitch shift strategy is no longer used by younger speakers since it can be seen in the current data.

In testament to the individual variation in pitch accent placement seen within this participant group, participant HK in general accented the token *kichi* on the 2nd mora, rather than accenting it on the 1st mora as is standard. (5 other participants generally accented *kichi* on the 2nd mora as well.) This can be seen in the figure below (cf. Figure 3.7 above).

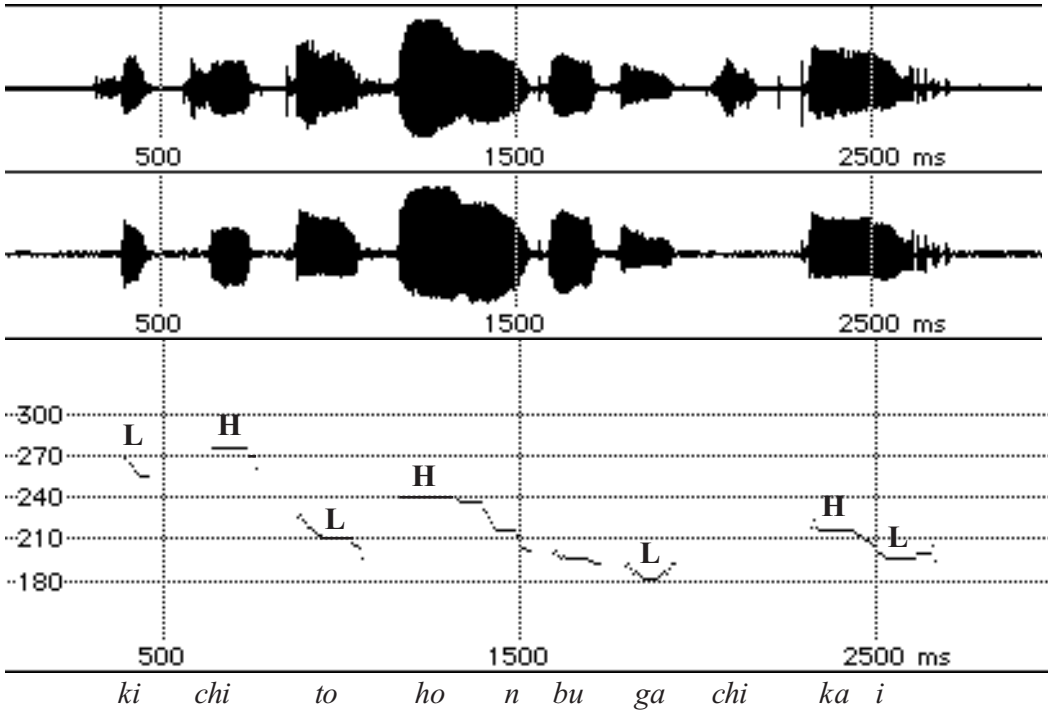

Figure 3.10 Production of *kichi* sentence with voiced accented 2nd vowel, participant HK.

The fact that most repetitions of *kichi* by this participant were accented on the 2nd mora (13 of 18 repetitions) indicates that shifting the accent to the 1st mora is an optional strategy. This accent shift can be seen in the following figure.

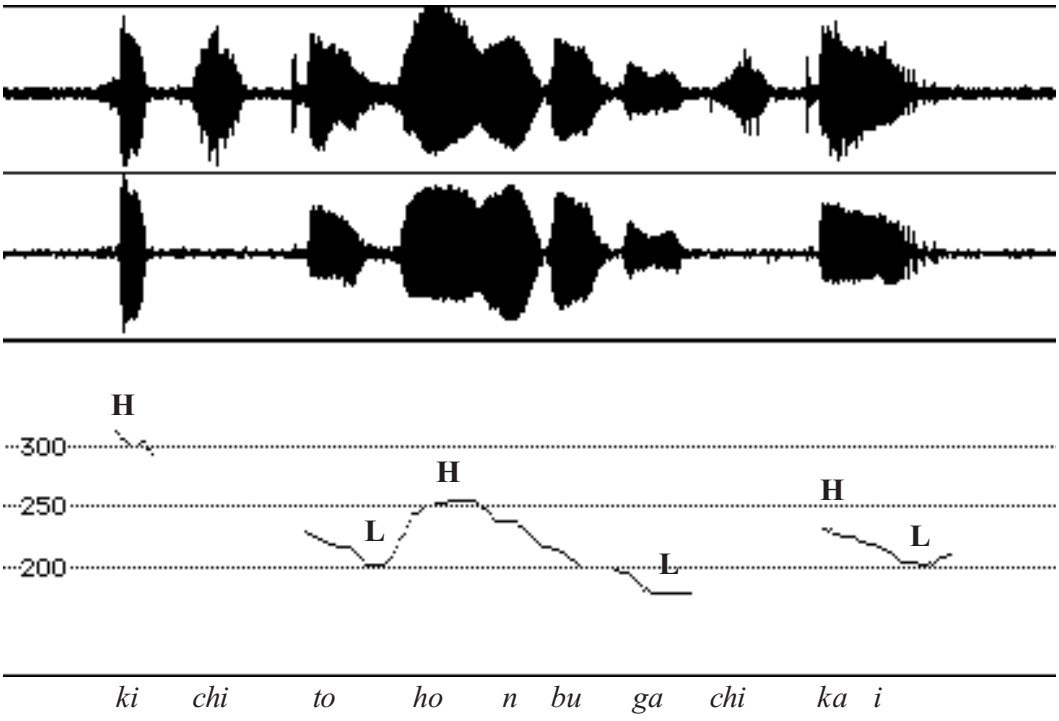

Figure 3.11 Production of *kichi* sentence showing accent shift to 1st mora, participant HK. Again, as in Figure 3.5, the placement of an apparently simplex accent H tone on the 1st mora is evident in the high pitch (≈ 300 Hz) on the 1st mora. Again, a line connecting the pitch on the 1st mora and the clitic *to* could be drawn simply by connecting the two segments, indicating that the 2nd mora is underspecified for tone. Since in most repetitions this participant accented *kichi* on the 2nd mora, evidenced by an accompanying high pitch on the 2nd mora, in the example above the pitch has been shifted to the 1st mora.

The production illustrated in Figure 3.10 shows that the accent shift strategy is stilled used by younger speakers in the Tokyo area. However, from a preliminary analysis of the current data set, it would appear that the devoicing of accented vowels is the more common strategy.

3.4 SUMMARY OF CHAPTER 3

While the results presented in this chapter are preliminary, they do support both the devoicing of accented vowels and shifting the accent to another mora of the target

lexical item. Because in many cases accented vowels did devoice, it is predicted that pitch accent location does not have any significant effect on the rate of vowel devoicing. Therefore checks for effects of pitch accent placement on the application of HVD were not made. In addition, since pitch accent placement has indicated as having no effect on vowel duration (Homma 1981; Beckman 1982), checks for effect of pitch accent placement on token and voicing durations were also not made.

The next chapter will describe the experimental setup of the checks for effects of the variables that were included in the study.