Evidence for the Use of Word Boundaries in Tonological Rules: An Autosegmental Approach

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0. In this paper, I am concerned with the use of word boundaries in Tonological Rules, in particular, with the use of word boundaries in the fast speech of the Tokyo Dialect and the Tsushima[1] Dialect of Japanese. The main purpose of this paper is to show the evidence for the use of word boundaries in Tonological Rules, which opposes Hasegawa's ideas.[2] In her paper, "Evidence against the use of word boundaries in Tonological Rules: An Autosegmental Approach to the Fast Speech of the Tokyo Dialect of Japanese", Hasegawa pointed out that the use of word boundaries in Tonological Rules is not needed in applying the rules to the fast speech of her Tokyo Dialect of Japanese, while Haraguchi insists on the necessity of the use of word boundaries.[3]

Haraguchi is the first person who developed the theory into Japanese Dialects, and he dealt with words and a few examples of phrases in deliberate speech of Japanese, while Hasegawa used Haraguchi's theoretical framework in her paper, and applied it to the fast speech of the Tokyo Dialect. This means that she tried to extend the theory to the phrase level, since a fast speech involves phrases as well as words. In fact, she has shown her evidence against the use of word boundaries by using some phrases in a fast speech of the Tokyo Dialect.

In this paper, examining Haraguchi's approach and Hasegawa's by using some examples of the fast speech in the Tokyo Dialect and the Tsushima Dialect, I show that the use of word boundaries is indispensable even for the fast speech of these dialects, which is the opposite of Hasegawa's opinion. The rest of this paper consists of the following sections: In sections I, II, the Tonological Rules are introduced, following Haraguchi, in section III, the difference between Haraguchi's approach with the use of word boundaries and Hasegawa's without the use of word poundaries will be shown, and in section IV, the evidence for the use of word boundaries will be shown using the Tokyo Dialect and the Tsushima Dialect.

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1) Tsushima is one of the islands in Nagasaki prefecture in Japan.
2) Hasegawa (1979)
3) Haraguchi (1977: p. 31), (1979: p. 129)

I. In the theory, a tonal level is independent of a phonological level, and the relation between them can be shown like in (1):

(1) C V C V C V C V ..... Phonological level
L H L ..... tonal level

Given this dual structure, we need a mechanism to connect the tonal level with the phonological level. The mechanism consists of two processes: a small number of language particular processes and a number of universal conventions. *Tone Association Rules*, *Tone Alternation Rules*, *Star Shift Rules* belong to the former, and *well-Formedness Conventions* and *Universal Tone Association Conventions* belong to the latter. Some of these conventions and Rules are discussed in the following; First of all, we assume the *well-Formedness Condition* (*WFC*): (Haraguchi, 1979: p 125)

(2) (i) a. All tones are associated with some tone-bearing units.
b. All tone-bearing units are associated with some tones.
(ii) Association lines may never cross.

Tone Association Rules (*TAR*) for Japanese are formalized as follows: (Haraguchi, 1977: p. 9 ff.)

(3) ## Q V
H

(i) where Q is the maximal sequence of phonological segments which contains no $\overset{*}{V}$.
(ii) where the dotted line indicates the structural change (SC) of the rule.

And the operation of (3) is expressed informally:

(4) a. If a string has at least one $\overset{*}{V}$, associate the H tone of the basic tone melody with the leftmost $\overset{*}{V}$;
b. If it has no $\overset{*}{V}$ (i. e., if it is unaccented), associate the H tone of the basic tone melody with the rightmost V.

The following examples show how the above association rule works:

(5) a. / kokoro–made /
H L
'heart–even'

b. / miyako–de /
H L
'city–in'

c. / inoti /
H L
'life'

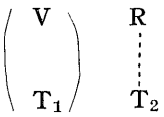
The Universal Tone Association Convention[1] (*UTAC*) are shown as follows:

(6) (i) a. All tones should be associated with at least one tone-bearing unit, and conversely, all tone-bearing units should be associated with at least one tone in the tone melody.

b. No association lines should cross.

(ii) To guarantee (i), perform the following processes:

a. If a domain contains only one free tone, or if it contains only one free tone to the right (or left) of a bound tone, the free tone should be associated with every free tone-bearing unit or every free tone bearing unit on the same side of the bound tone. I. e.,

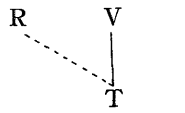


(where R is the maximal sequence of free tone-bearing units, and T is a free tone. // indicates that this is a mirror image process.)

b. If a domain contains no V to the right (or left) of a bound V, if it contains at least one free tone, the free tone should be associated with the bound tone-bearing unit. I. e.,

(where Q is the maximal sequence of free tones.)

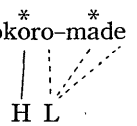
c. If a domain contains at least one V to the right (or left) of a bound tone and if there is no free tone, associate the bound tone with the remaining free tone-bearing units. I. e.,



(where R is the maximal sequence of free tone-bearing units.)

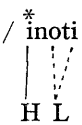
(6iia) applies to (5a) and (5c), associating the free tone, L, with the tone-bearing units on the right side of the bound tone, H. (6iib) operates on (5b).
This is illustrated in (7):

(7) a. / kokoro-made /



b. / miyako-de /

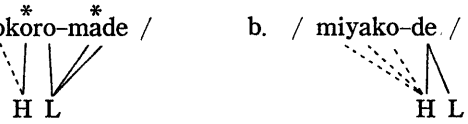
c. / inoti /



(5a) and (5b)are further subject to (6iic) whose operation is illustrated in (8):

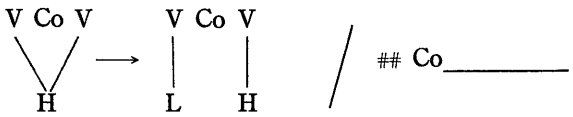
1) Haraguchi (1977: p. 11)

(8) a. / kokoro-made / b. / miyako-de /

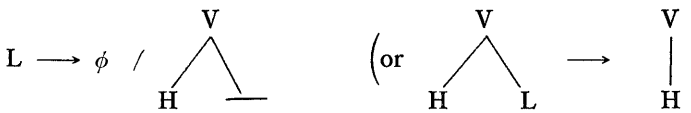


We need the rules (9) and (10) to have the correct surface forms for (8):

(9) *Initial Lowering Rule (ILR)*[1]

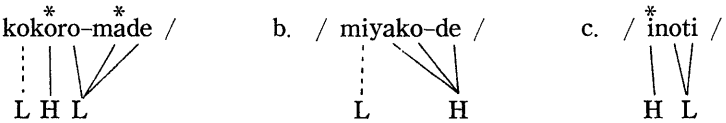


(10) *Tone Simplification Rule (TSR)*[2]



These rules, (9) and (10), change (8a) and (8b) in the following way, deriving the correct surface forms. ((7c) is repeated as (11c)).

(11) a. / kokoro-made / b. / miyako-de / c. / inoti /



We also need the following rules to get the correct surface forms for words with a devoiced high vowel in fast speech:

(12) *High Vowel Devoicing (HVD)* (Hasegawa, 1979)

$$\begin{bmatrix}+\text{syll}\\+\text{high}\end{bmatrix} \longrightarrow [-\text{voice}] \;/\; \begin{bmatrix}-\text{syll}\\-\text{voice}\end{bmatrix} \_\_\_\_ \begin{bmatrix}-\text{syll}\\-\text{voice}\end{bmatrix}$$

(13) *Voiceless Vowel Deletion (VVD)* (Hasegawa, 1979)

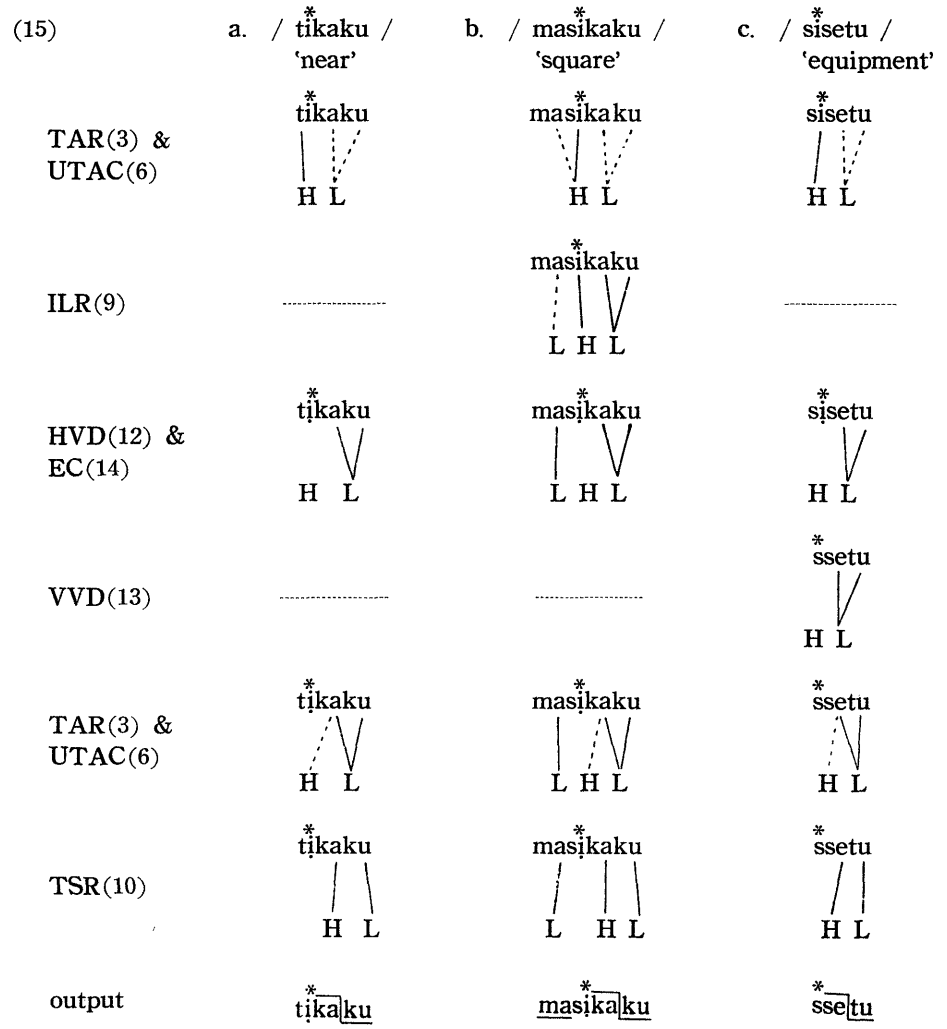
$$\begin{bmatrix}+\text{syll}\\-\text{voice}\end{bmatrix} \_\_\_\_ \phi \;/\; \begin{bmatrix}\text{Ci}\\-\text{voice}\end{bmatrix} \_\_\_\_ \begin{bmatrix}\text{Ci}\\-\text{voice}\end{bmatrix}$$

(14) *Erasure Convention for Association Lines (EC)* (Haraguchi, 1977 : p. 55)
If a tone-bearing unit V is turned into an element which cannot carry a tone by some phonological process (such as Devoicing Rules, Deletions, Glide Formation, etc.), then the association line drawn between a tone

1) Haraguchi, (1977: p. 17)
2) Ibid., p. 19.

and the element in question will automatically be erased.

A tone associated with the vowel which eventually becomes voiceless by (12) or subsequently deleted by (13) will be left unassociated. And whenever a free tone appears, *TAR* (3) and *UTAC* (6) are automatically triggered. This process is described in the following (Ç= −voice) : (Hasegawa, 1979)



II. Let us apply these rules to (16), which is an example of phrases :

(16) a. kosui-de ## *oyogu
lake-in swim
'swim in the lake'

b. *umi-de ## *oyogu
sea-in swim
'swim in the sea'

(17) a. kosui-de ## oyogu

TAR & UTAC: H L H L

ILR: L H L L H L

TSR: L H L H L

output: ko|sui-de ## o|yo|gu

b. umi-de ## oyogu

TAR & UTAC: H L H L

ILR: H L L H L

output: u|mi-de ## o|yo|gu

The outputs of (17) are not the correct surface forms for (16). The correct surface forms for (16) are (18):

(18) a. ko|sui-de ## o yo|gu

b. u|mi-de ## o yo gu

In order to get the correct surface forms for (16) as in (18), Haraguchi provides the following two rules: *Initial Lowering Rules (Revised)* (*ILRR*) and *the Downdrift Rules* (*DDR*): (Haraguchi, 1977 : p. 29 ff.)

(19) *Initial Lowering Rule (Revised)* (*ILRR*)

V Co V → V Co V / [+pause] Co ____

H → L H

(20) *The Downdrift Rule* (*DDR*)

a. ## CV CV CV ## CV CV CV CV ##

L H L H L

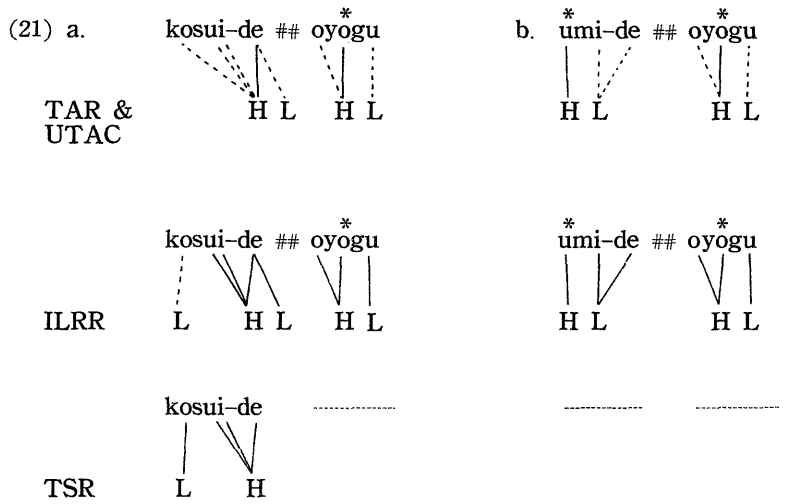
a'.

b. ## CV CV CV [+pause ##] CV CV CV CV ##

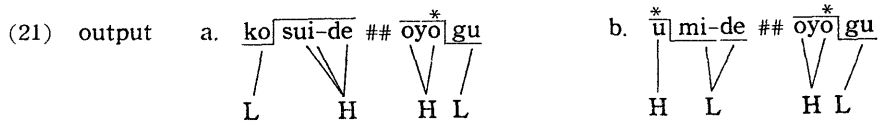
L H L L H L

b'.

Notice that the role of [+pause] in (19) is crucial for getting the correct surface forms for (16): If we apply (19) *ILRR* to (16), the process will be shown as follows:

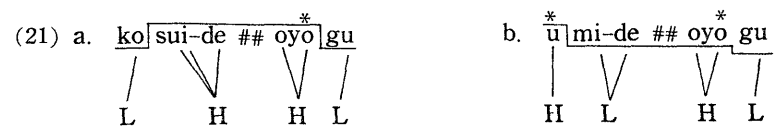


If there is no pause between *kosui-de* and *oyogu*, and also between *umi-de* and *oyogu* when we apply (19) *ILRR* to (16), the H tone for the initial *o* in *oyogu* of (16a) and (16b) is not lowered. Thus we have the following outputs for (16):



These are still not the correct surface forms for (16), however. We need another rule, *The Downdrift Rule* (*DDR*): *DDR* (20a) lowers a H tone to a L tone when its preceding phrase ends with an L. The H tone lowered to a L tone is not really a L tone: Rather it is a mid (M) tone.[1)]

Thus the final output for (16) becomes like (21):



1) Haraguchi (1977: p. 30)

III. Let us examine the difference between Haraguchi and Hasegawa;

(22) is borrowed from Hasegawa (1979).

(22) a. *ṭikaku no ## *ie
near house
'the house near by'

b. tokei no ## *ṭikaku
clock near
'near the clock'

c. *ssetu ga ## rippada
equipment-sub. excellent
'the equipment is excellent.'

d. rippana ## *ssetu
excellent equipment
'excellent equipment'

If we follow Haraguchi's analysis, (22) has the following surface forms, and these forms are correct.

(23) a. *ṭika]ku no ## *ie

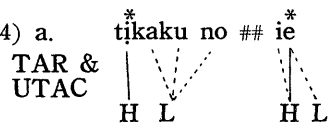
b. to]kei no ## *ṭika]ku

c. *sse]tu ga ## rippada

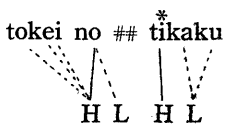
d. ri]ppana ## *sse]tu

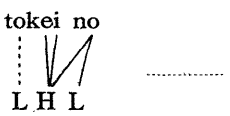
And their derivational processes are shown like (24):

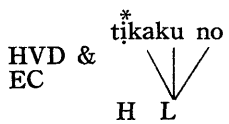
(24) a.

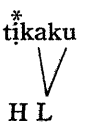


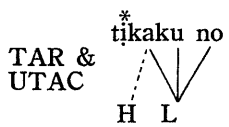
b.

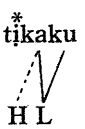


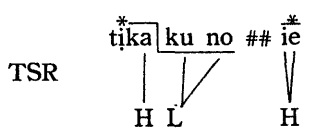


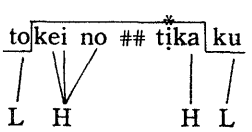


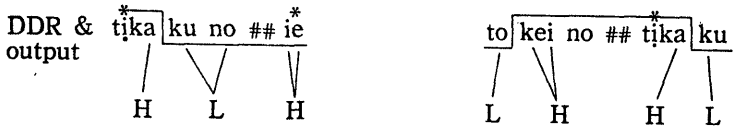












On the other hand, Hasegawa proposed different surface forms for (22); (22) has the following surface forms in her fast speech:

(25) a. tika ku no ## ie　　b. to kei no ## tikaku

c. sse tu ga ## rippada　　d. ri ppana ## ssetu

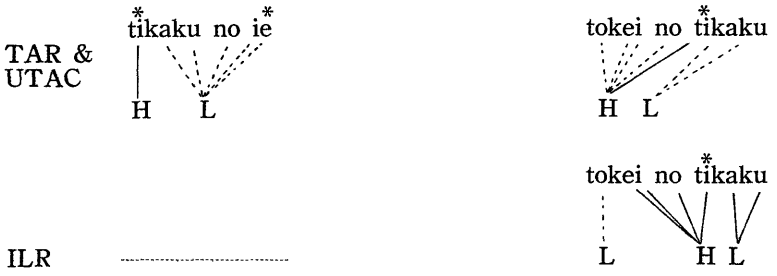
The surface forms by Haraguchi and the ones by Hasegawa are different from each other in that in Haraguchi, tika in (23b) tikaku and sse in (23d) ssetu have H tone whereas in Hasegawa they are L tones:

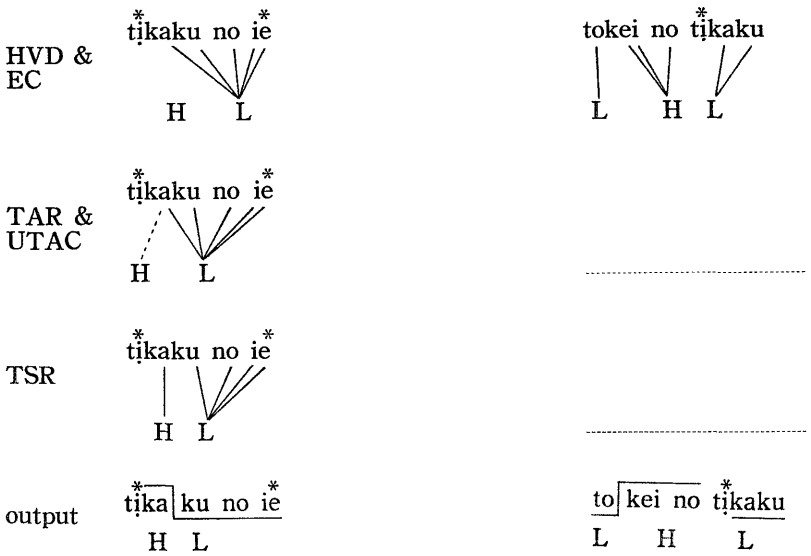
Haraguchi: tika ku ..... (23b)　　sse tu ..... (23d)

Hasagawa: tikaku ..... (25b)　　sse tu ..... (25d)

Notice that Hasegawa used (25b) and (25d) as the crucial evidence for her proposal. Her main point is this: If we follw Haraguchi, we have to use word boundaries. This means that we have to apply the tonological rules separately to each word in a phrase. And if we apply these tonological rules to each word in these phrases of (22) individually, we can get (23); but (23) is not the correct surface forms for her: (25) is her correct surface forms. As long as we use the word boundaries, we can not get the correct surface forms (25b) and (25d). Thus in order to get her correct surface forms, she proposed to give up the use of word boundaries in phrases of the fast speech. She treats one phrase or more than one phrase in a fast speech as a word or like a word. That is, she can apply these tonological rules for a word level to a phrase level without adding any extra rule like (19) *ILRR* or (20) *DDR*. She showed that her surface forms for (22), i.e., (25) can obtain by giving up the use of word boundaries. The derivational processes that she proposed are shown in the following:

(25') a. / tikaku no ie /　　b. / tokei no tikaku /





As far as her surface foms we are concerned here, her proposal is correct. However, there are two problems: one of them is whether or not her surface forms are correct, since it is very difficult for me to realize her surface forms. If we have tikaku in (25b) and ssetu in (25d) as she pointed out, the natural surface forms for (25b) and (25d) may be the following forms:

(25b') to ke i no ## tikaku

(25d) ri ppa na ## ssetu

The other one is whether or not her proposal can apply to other examples. If we can apply her proposal to other examples, it is very powerful; if not, it is very trivial. In the following section, we apply her proposal to other examples of the fast speech in the Tokyo Dialect and the Tsushima Dialect of Japanese.

IV. Let us examine how Hasegawa's approach works in the Tsushima Dialect and in the Tokyo Dialect, comparing her approach with Haraguchi's. There are three examples: Each example comes from fast speech of the Tsushima Dialect and the Tokyo Dialect. And each example has the derivational processes by Haraguchi's approach and Hasegawa's. For example, *Example One* involves the Tsushima Dialect (26) and the Tokyo Dialect (27), and each dialect has the derivational processes (26a) and (27a) by Haraguchi's approach and the ones (26b) and (27b) by Hasegawa's.

Example One

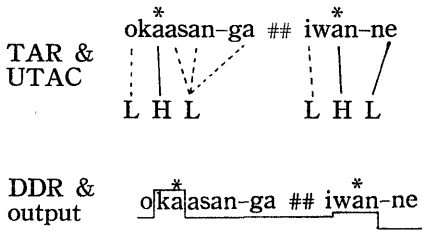
The Tsushima Dialect

(26) / okáasan-ga ## iwán-ne /

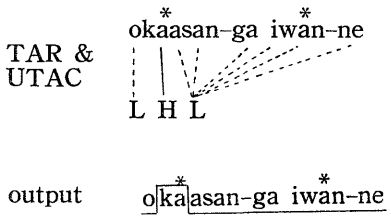
onorific-mother-sub. say-sentential final particle

'Mother, you must say'.

a. Haraguchi:



b. Hasagawa:



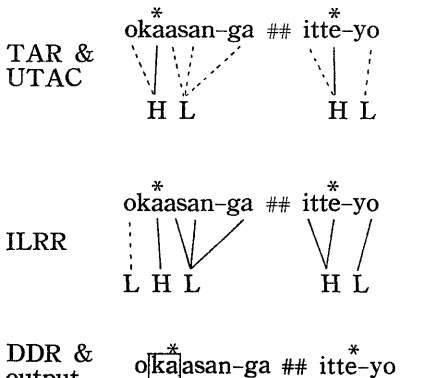
The Tokyo Dialect

(27) / okáasan-ga ## itté-yo /

onorific-mother-sub. say-sentential final particle

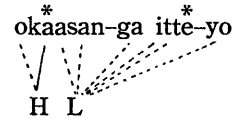
'Mother, you must say.'

a. Haraguchi:

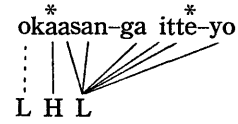


b. Hasegawa:

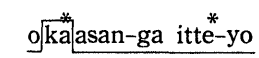
TAR & UTAC



ILR



output



In Example One, the outputs in both (26b) and (27b) are not correct surface forms, while the ones in (26a) and (27a) are correct forms. In Example Two, we also find the same results as in Example. One.

Example Two

The Tsushima Dialect

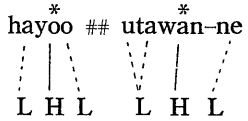
(28) / hayoo ## utawan-ne /

as soon as possible — sing-sentential final particle

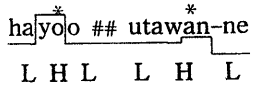
'You must sing as soon as possible.'

a. Haraguchi:

TAR & UTAC

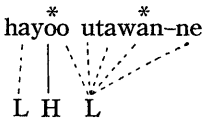


DDR & output

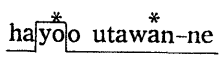


b. Hasegawa:

TAR & UTAC



output



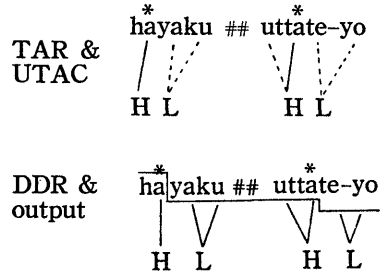
The Tokyo Dialect

(29) / hayaku ## uttate-yo /

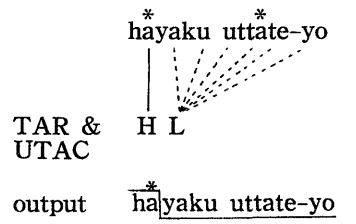
as soon as possible — sing-sentential final particle

'You must sing as soon as possible.'

a. Haraguchi:



b. Hasegawa:



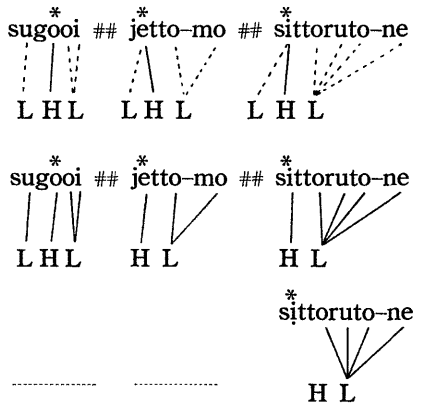
Example Three is more complicated than the other two: even in this case, we find the same results as in the other two, i. e., Hasegawa's approach does not produce the correct surface forms for our data: the outputs of (30b) and (31b) as well as the ones of (28b) and (29b) are not correct surface forms.

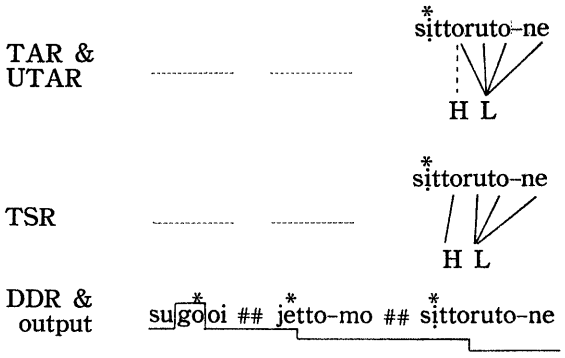
Example Three

The Tsushima Dialect

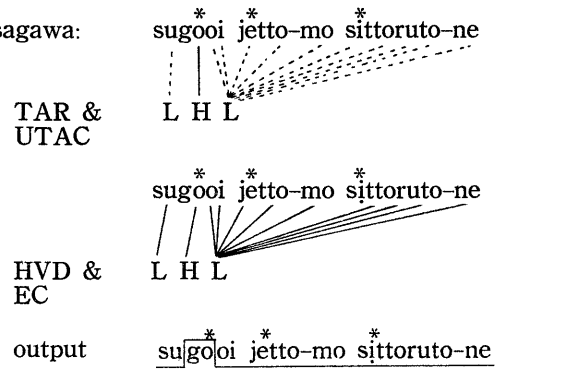
(30) / *sugooi ## *jetto-mo ## *sittoruto-ne
wonderful! jet-even you know-sentential final particle
great!
'It's wonderful! You know even a jet.'

a. Haragachi:





b. Hasagawa:



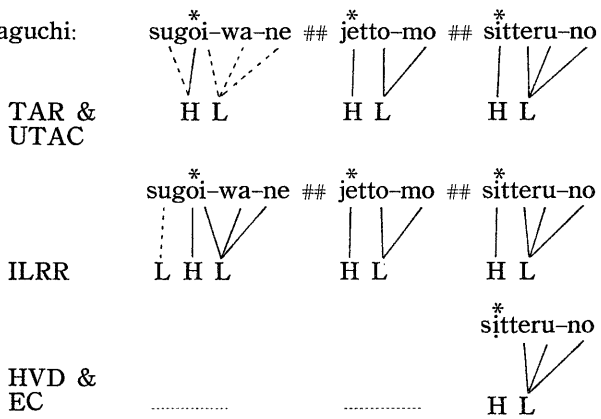
The Tokyo Dialect

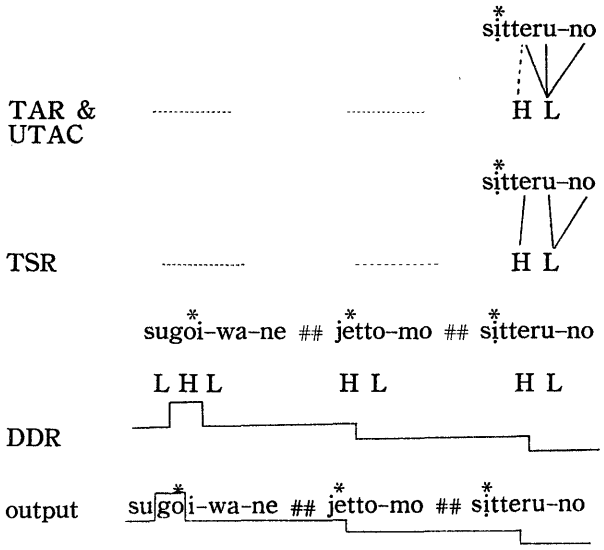
(31) / sugoi-wa-ne ## jetto-mo ## sitteru-no /

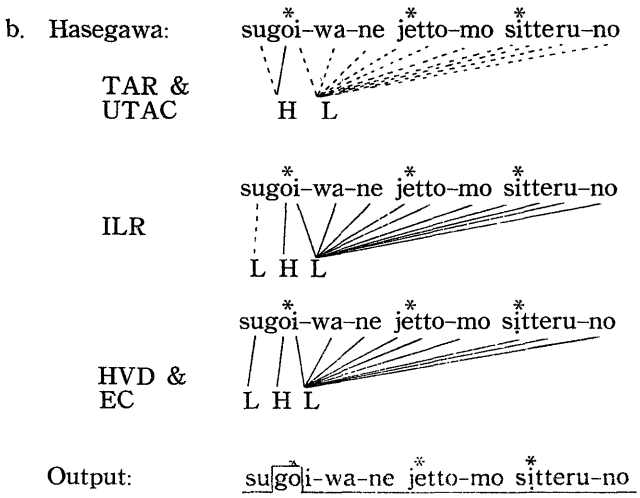
wonderful-sentential-final particle (for female) — jet-even — (you) know-sentential-final particle

'It's wonderful! You know even a jet.'

a. Haraguchi:







As all these examples show, the use of word boundaries is indispensable for the description of phrases even in the fast speech of the Tsushima Dialect as well as the Tokyo Dialect. Applying the tonological rules to each word in phrases individually, we can get correct surface forms for the fast speech of the Tsushima Dialect and the Tokyo Dialect. If we follow Hasegawa's approach, we need some device for having correct surface forms for these dialects.

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N. B. The first draft of this paper was written as a term paper for *Ling. 651, Advanced Linguistic Analysis* (Fall, 1981) at the Department of Linguistics, the University of Hawaii, which was instructed by Dr. Irwin Howard.

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