

## PHONOLOGY

## On Deriving Three Types of *Onbin* Changes in Japanese Verbs

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### 1. Introduction

In this paper we would like to focus on the process of deriving three types of *onbin* (sound euphony) in modern Japanese verbs, i.e. *I-onbin*, *Hatsu-onbin* and *Soku-onbin*.<sup>1</sup> Especially, running back over the most fundamental question of whether these *onbin* changes constitute a natural class, we will investigate whether it is possible to formalize them as a single process. What does *onbin* really do? To ask this question is our central task.

Needless to say, previous studies have not entirely neglected these questions.<sup>2</sup> Komatsu (1981), for example, claims on the basis of verbal accentuation that the primary function of *onbin* changes is to unite two different morphemes (i.e. the root and suffix of a verb) into one as if they were originally one lexical item. Although we are not going to argue against such a functional viewpoint, what we will try to do in this paper is account for the *onbin* changes from a formal point of view. By this we mean that we try to account for *onbin* phenomena in terms of word structure whose constituents are segments, morae and syllables. Our ultimate objective is to construct a unified *onbin* rule using these constituents.

### 2. Previous analyses

#### 2.1. Tsujimura (1996)

Let us first look at the analysis proposed by Tsujimura (1996) partly because it relies on a traditional (i.e. a generative phonological) approach and partly because it helps us know how *onbin* changes should be tackled without recourse to a functional viewpoint. Before considering her analysis, we first have to show three types of *onbin* changes that will be discussed here. In modern Japanese they typically take place when the past (or perfect) auxiliary /ta/ attaches to the adverbial form of a verb ending in *-i* (cf. Tsujimura (1996: 43)).<sup>3</sup>

#### (1) a. *I-onbin*

kaki + ta → kaita “wrote”	saki + ta → saita “bloomed”
tsugi + ta → tsuida “poured”	katsugi + ta → katsuida “shouldered”

#### b. *Hatsu-onbin*

yobi + ta → yonda “called”	asobi + ta → asonda “played”
nomi + ta → nonda “drank”	tanomi + ta → tanonda “asked”

#### c. *Soku-onbin*

mati + ta → matta “waited”	tati + ta → tatta “stood”
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kaeri + ta → kaetta “returned” magari + ta → magatta “bent”

Let us now turn to Tsujimura’s analysis of these changes. One of the most remarkable characteristics of her analysis is that in the underlying representations, it does not assume the inflectional ending /i/ for the adverbial form of verbs, as demonstrated below (cf. Tsujimura (1996: 43)).<sup>4</sup> Through (2) to (4) the left side of the arrow indicates the input (or underlying) representation, and the right the output (or surface) representation.

(2) *I-onbin*

kak + ta → kaita “wrote”      tsug + ta → tsuida “poured”

(3) *Soku-onbin*

kat + ta → katta ‘bought’      kaer + ta → kaetta “returned”

(4) *Hatsu-onbin*

yob + ta → yonda “called”      nom + ta → nonda “drank”

Tsujimura assigns three different *onbin* rules to each *onbin* change (Tsujimura 1996: 44-54).

(5) Rules for *I-onbin*

a. t → d / g + \_\_\_\_

b. φ → i / velar consonant \_\_\_\_ + alveolar stop

c. velar consonant → φ / \_\_\_\_ i + alveolar stop

(6) Rule for *Soku-onbin*

r → t / \_\_\_\_ + ta

(7) Rules for *Hatsu-onbin*

a. b, m → n / \_\_\_\_ + ta

b. t → d / n + \_\_\_\_

Note that three subrules in (5) apply in that order. As for the examples in (2), (5b, c) apply to /kak + ta/ and (5a, b, c) to /tsug + ta/. We demonstrate the derivation of the latter word in (8a). Rule (6) applies to /kaer + ta/ in (3) and changes its root-final /r/ to /t/, yielding a consonant geminate /tt/ called “*soku-on*” (see (8b)). The other example in (3), i.e. /kat + ta/, is not subject to (6) because a consonant geminate or *soku-on* can be given rise automatically from the underlying representation. The subrules in (7) apply to (4) in this order, yielding a nasal consonant /n/ called “*hatsu-on*” with the concomitant voicing assimilation (see (8c)).

(8) a. tsug + ta → tsug + da → tsugi + da → tsuida “poured”

b. kaer + ta → kaetta “returned”

c. yob + ta → yon + ta → yonda “called”

Although Tsujimura’s analysis is worthy of notice in that it eliminates functional interpretation of *onbin* changes and presents a couple of phonological rules in order to

account for *onbin* changes, there are still some problems to be answered with her analysis; namely, it does not provide us principled explanations of why the inflectional ending /i/ is not in the underlying representation and is inserted afterward in (5b), why a velar consonant should be deleted as in (5c), why /t/ is altered to [t] in (6) and so on. But the major problem of her analysis is that the rules she proposes fail to reveal the close relationship lying behind those *onbin* changes. In fact, they give the impression that they exist independently and that each of them describes quite different phenomena. On the contrary, we assume, unlike Tsujimura (1996), that *onbin* changes should be regarded as one phonological phenomenon. All these reasons lead us to the conclusion that we cannot adopt Tsujimura's analysis here. Thus, in the next subsection, we will survey Kubozono (1995) as an alternative to her analysis.

## 2.2. Kubozono (1995)

It has to be said first that the basis line of Kubozono's analysis is not particularly distinct from traditional ones; that is, he also regards *I-onbin* as the deletion of the stem-final consonant and *Hatsu-* and *Soku-onbin* as the deletion of the stem-final vowel.

### (9) a. *I-onbin*

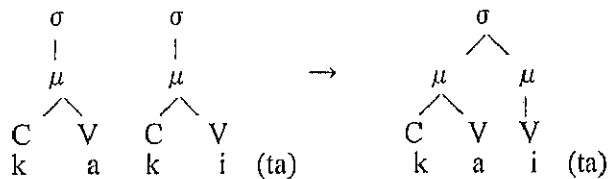
CVCV (kaki) + ta → CVV (kai) + ta "wrote"

### b. *Hatu-* and *Soku-onbin*

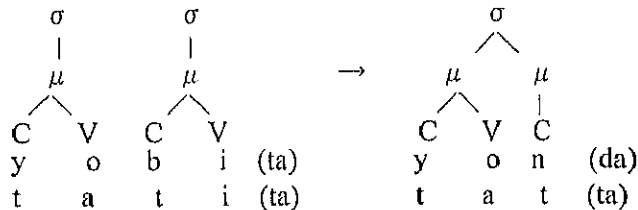
CVCV (yobi, tati) + ta → CVC (yon, tat) + ta "read, stood"

What makes Kubozono's analysis different from others' is that he identifies *onbin* changes with the creation of a heavy syllable. He relies on a non-linear approach with respect to syllable structure and demonstrates how each *onbin* change produces a heavy syllable (CVV or CVC) (Kubozono (1995: 232-233)).

### (10) a. *I-onbin*



### b. *Hatsu-* and *Soku-onbin*



Apart from somewhat minor questions of how the stem-final consonant /b/ and /t/ in

/yobi (ta)/ change to [n] and [d] respectively, Kubozono's approach has succeeded in integrating three different *onbin* changes into one for the first time under the name of "Heavy Syllable Construction (HSC)," though HSC is actually divided into two sub-rules in (10).

Kubozono points out that HSC deeply penetrates into Japanese language. In (11), for example, the underlined light syllables changes to the heavy ones by eliminating their following consonant (Kubozono (1995: 233)).

(11) kawi → kai "shell"    toworu → tooru "to pass"    akaki → akai "red"

HSC can also be seen when we read "figures" and "days" in Japanese. For example, though the figures 2 and 5 are read as [ni] and [go] separately, they tend to be read as [ni:] and [go:] with long vowels when they are with other figures such as 6, as shown in (12a). Likewise, the vowel in [ka] "Tuesday" is lengthened when preceded or followed by other days like [nichi] "Sunday" and [getsu] "Monday", as shown in (12b).

(12) a. 2,5,6 [ni:, goo, roku]

b. 日, 月, 火 [niti, getsu, kaa] "Sunday, Monday, Tuesday"

It is evident at least from (11) and (12) that HSC has a rationale independent from *onbin* changes.

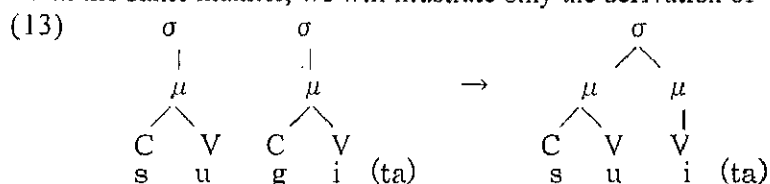
The above observations appear to be enough to convince us that the goal of *onbin* changes is to make heavy syllables, and to attain this goal, the rules in (10) are highly effective. Yet, this is not the end of the story because there still remains an unsolved question; that is, which rule, (10a) or (10b), should apply to a given input? In fact, it is impossible, as they stands, to determine whether we should delete the stem-final consonant or the stem-final vowel. It goes without saying that such a question arises from the fact that both (10a) and (10b) have the same input structure.

Let us examine some concrete examples to make sure that the above argument is not off the point. We first look at the contrast between [tsuida] (</tsugi + ta/) "poured" and [totta] (</tori + ta/) "took." The former is easy to derive from the underlying /tsugi + ta/ by deleting the root-final consonant /g/. The latter, however, should not undergo the same derivational process; otherwise, it would lead the wrong output \*[toita] instead of [totta] by deleting /r/ in /tori + ta/. But, since their underlying forms /tsugi + ta/ and /tori + ta/ have the same segmental sequence (i.e. CVCV + /ta/), it would not be inappropriate for both to be subject to the same rule (10a), yielding [tsuida] and \*[toita], both of which never violate "Heavy Syllable Construction" proposed by Kubozono (1995).

Let us focus on rule (10b) now, where the underlying root-final vowel is deleted. Although it is evident that [tonda] "flew" and [totta] "took," for example, is derived

from the inputs like /tobi + ta/ and /tori + ta/ by (10b), there is no way within Kubozono's framework to predict that /b/ in /tobi +ta/ becomes [n], while /r/ in /tori + ta/ becomes [t]. The former is the case of *Hatsu-onbin* and the latter *Soku-onbin*, but the rule (10b) cannot tell us how this difference arises.

Another problem concerning Kubozono (1995) is that rule (10a) wrongly applies to verbs whose roots end in a certain vowel (i.e. /i/ or /e/).<sup>5</sup> Typical examples of such verbs are [sugita] (</sugi + ta/) "passed" with the root-final /i/ and [hareta] (</hare + ta/) "cleared up" with the root-final /e/. The application of (10a) to these examples results in generating incorrect outputs like \*[suita] and \*[haeta]. Since both are derived in the same manner, we will illustrate only the derivation of \*[suita] below.



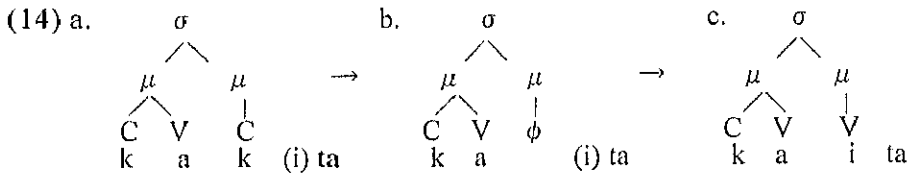
As is clear from (13), there is always a risk that rule (10a) gives rise to incorrect phonetic representations, and what is worse, Kubozono's analysis cannot avoid such a risk by any means. The reason for this is that Kubozono's analysis has no means to distinguish between verbs with a root-final consonant and those with a root-final vowel. In other words, Kubozono (1995) fails to restrict the application of rule (10a) to the former type of verbs.

### 3. An Alternative

As we have shown above, the main problem with Kubozono (1995) is that it freely deletes a root-final consonant with respect to *I-onbin* and a root- or stem-final vowel with respect to *Hatsu-* and *Soku-onbin*, resulting in generating incorrect outputs. In this section we try to overcome this problem in terms of one deletion rule that eliminates a root-final consonant, but not a root-final vowel under certain circumstances. By presenting such a rule, we do not run into trouble when deciding which rule, (10a) or (10b), should apply as Kubozono (1995) does.

#### 3.1. *I-onbin*

Let us first consider *I-onbin*. Our basic assumption about *I-onbin* and the other two *onbin* changes as well is that the inflectional ending /i/ should be treated as separate from the root. As will be seen later, with this assumption we can manage to unify three *onbin* changes into one at least from a structural point of view. The derivation of *I-onbin*, thus, should be the one in (14), where the inflectional ending /i/ is separately described in the underlying representation. We take the case of [kaita] (</kak + (i) ta/) "wrote."



(14b) is obtained by deleting the root-final consonant /k/ in (14a) with the concomitant deletion of the C in the skeleton tier; the  $\phi$  in (14b) indicates the empty or the deleted position. What should be done next is fill the empty position with some substantial segment because  $\phi$ , as it stands, does not surface as a phonetic form. The optimal candidate for it is considered the inflectional ending /i/, which is supposed to move leftward to the site dominated by  $\phi$ . This naturally causes the  $\phi$  to change to V (vowel) because /i/ in question is a vowel. Following these procedures, /kak + (i) + ta/ finally can attain the correct output [kaita].

Although the derivation in (14) shows all we attempt to propose about *I-onbin*, there still remain three questions unanswered about it. First, why must the root-final consonant /k/ be deleted to get (14b)? As to this question, we just follow the unimpeachable claim about Japanese language that no obstruent sustains  $\mu$  (mora) which immediately dominates it, except for the coda nasal and the first part of a geminate (i.e./Q/). This is why the obstruent /k/ in (14a) should be removed to form an empty segment  $\phi$ , even though it stands in the coda position. The second question is why in (14c) the inflectional ending /i/ moves to the position  $\phi$ . To this question two answers are given. One is that by doing this the suffix /i/ can fill the melody tier below  $\phi$ , which in turn is replaced with V because the /i/ is a vowel. Recall that a segment V is the most appropriate to sustain a mora. The other reason is that the leftward movement of /i/ enables us to change the light syllable /ka/ to the heavy syllable /kak/ in (14b). Note that this construction of a heavy syllable is our version of “Heavy Syllable Construction” proposed in Kubozono (1995). However, unlike his analysis, ours assumes that heavy syllable should be formed by moving the suffix /i/ to the root-final position in melody tier, not by deleting the root-final consonant as in (10a).

The third question about (14) is also concerned with the inflectional ending /i/; that is, does it move to the root-final position without fail? Needless to say, the answer is ‘No,’ because if there is no consonant-deletion, there arises no empty segment, and therefore no landing site for /i/. For example, when the desiderative auxiliary /tai/ “want” is added to /kaki/ (the adverbial form of the /kaku/ “write”), no deletion of the root-final consonant takes place, and hence, there is no leftward movement of /i/ as shown in [kakitai] “want to write.”<sup>6</sup> Furthermore, there are cases in which the inflectional ending /i/ does not appear in the first place. Such cases

include [mita] “saw” and [hareta] “cleared up” whose root ends in a vowel in the underlying representation like /mi + ta/ (not \*/mi + i + ta/) and /hare + ta/ (\*/hare + i + ta/). Since there is no inflectional ending in these words, there should be no movement of the ending. As will be clear below, *Hatsu-onbin* ([tonda] “flew”) and *Soku-onbin* ([hasitta] “ran”) do not trigger /i/-movement, either. And this is why we parenthesize the ending /i/ in (14a) and (14b) to show that it is optional.

We have to mention one more thing about *I-onbin*, namely, the voicing assimilation like /t/ → /d/ in [tuid̥a] (< /tugi + ta/) “poured” and [sinoid̥a] (< /sinogi + ta/) “protected.” This assimilation generally takes place when a voiceless consonant (/t/ in /ta/) is preceded by a voiced one (/g/ in /tug/), as shown in (15).

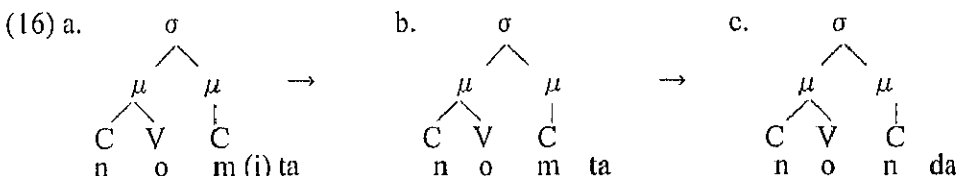
$$(15) \quad \begin{array}{ccccc} \text{tu} & \text{g} & +(\text{i}) & \text{t} & \text{a} & \rightarrow & \text{tug} & +(\text{i}) & \text{d} & \text{a} \\ & & & [+vd] & [-vd] & & & & [+vd] & \\ & & & \text{└───┬───┘} & & & & & & \\ & & & & \uparrow & & & & & \end{array}$$

After the voicing assimilation, *I-onbin* rule just like (14) applies which deletes the root-final consonant (i.e. /g/) and moves /i/ to the left empty position created by the deletion, yielding the correct output [tuid̥a].

Before ending this section, let us recapitulate the argument about *I-onbin* given above. Our main proposal is that a root-final consonant that is unable to sustain a mora should be deleted and the inflectional ending fills the resulting empty position. This proposal makes it possible not only to confine the deleted consonant to a certain obstruents like /k/ and /g/, but also to give an answer to the fundamental question of why *I-onbin* is called as such rather than *A-onbin* or *O-onbin*, for instance; the only possible element that can be moved to the unfilled root-final position is the suffix /i/ adjacent to the position.

### 3.2. *Hatsu-onbin*

Though the basic idea of *Hatsu-onbin* is the same as that of *I-onbin*, the difference between the two is that the former does not eliminate the root-final consonant, while the latter does. This implies that the inflectional ending /i/ cannot move anywhere, because the potential position to which it can move is filled by the original consonant. To confirm the implication, let us consider [nonda] (< /nom + (i) + ta/) “drank.”



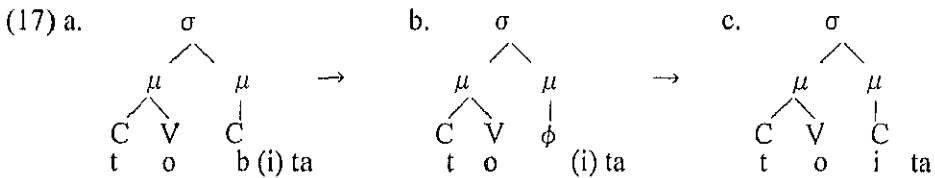
Why is the root-final consonant deleted in *I-onbin*, but not in *Hatsu-onbin*? We can find the answer if we pay attention to the difference of the sustainability of mora by a consonant. That is, in *I-onbin* the consonants in question are obstruents like /k/



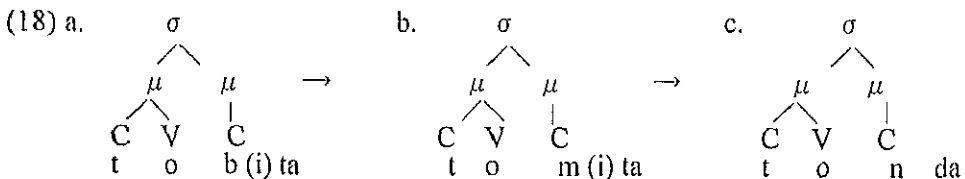
and /g/ which cannot sustain a mora by themselves, while in *Hatsu-onbin* they are nasals (or sonorants) which can sustain one. Hence, the nasal /m/ in (16) need not be deleted and remains the original position throughout the derivation. On the other hand, the parenthesized /i/ does not surface in (16c), because otherwise, it would attach to /m/ and produce the light syllable /mi/. Recall that we consider the important objective of *onbin* changes as creating a heavy syllable, not a light syllable. We thus eliminate the /i/ in (16b) to retain the heavy syllable /nom/ in the output.

Another phonological change to keep in mind in (16) is the reciprocal assimilation in (16c); /t/ turns to /d/ and /m/ to /n/ at the same time. The former change is caused by the voicing assimilation called *Rendaku* "sequential voicing," which spreads [+voiced] of /m/ to /t/, whereas the latter is brought about by Place-assimilation of /t/ to /m/ under the feature geometrical theory.<sup>8</sup>

Lastly, we should make a brief reference to rule ordering between the reciprocal assimilation just mentioned and the consonant deletion in (16). From the discussion given above it is evident that the former should precede the latter. If the ordering were reversed, the ill-formed output would be produced, as demonstrated in (17), where \*[toita] instead of [tonda] "flew" is derived from /tob + (i) + ta/ in the same manner as (14).



Therefore, we presume that the reciprocal assimilation should apply before the deletion of root-final consonant, as shown in (18), though the latter does not apply here by chance.<sup>9</sup>



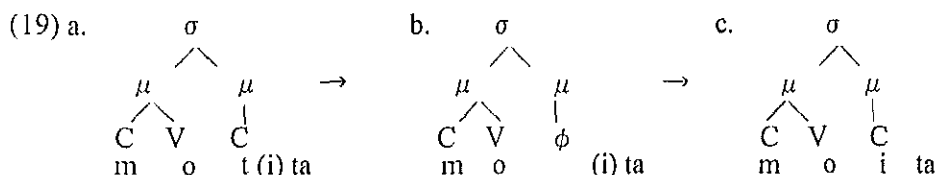
In (18b) the reciprocal assimilation turns /b/ and /t/ into /n/ and /d/, respectively. Since the resultant nasal can support a mora and thus remains in its original position, the suffix /i/ cannot move anywhere, ending up deleted.

It is indeed hard for anyone to deny the reciprocal assimilation in (18), but some might question how /b/ turns to /n/ in (18b), because these two consonants appear to be quite different in character. One possible option to answer this question is to follow Davis and Tsujimura's hypothesis, according to which the rule called "Nasal Linking"

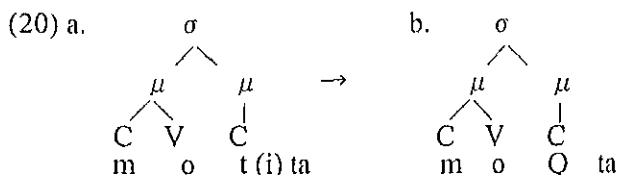
(or “Nasalization” in our terms) applies before the reciprocal assimilation and turns /b/ in (18a) to intermediate /m/. Note here that it is not implausible at all to assume such an intermediate consonant for /b/ because it corresponds to /b/ in every aspect of phonological features except for the value of [nasal]; /m/ has [+nasal], while /b/ has [-nasal]. After the application of Nasalization, /m/ in question gives [+voiced] to /t/ to generate /d/, which in turn gives a Place feature like [+coronal] to /m/ to generate /n/.<sup>10</sup>

### 3.3. *Soku-onbin*

Lastly, we will observe the derivational process of *Soku-onbin*, which appears typically in [motta] “carried” (</mot + (i) ta/) and [tatta] (</tat + (i) + ta/) “stood.” One problem we have to address first is that these examples appear to be counterexamples to the analysis we have developed above. To illustrate this, let us examine how [motta] is derived. The root-final consonant /t/ in (19a) is deleted as usual, because it cannot sustain a mora due to the fact that it is an obstruent. After that, the suffix /i/ is moved to the deleted site, resulting in the wrong output \*[moita].

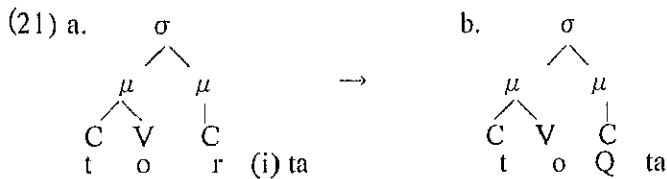


To make this derivation invalid and put *Hatsu-onbin* into motion, we just have to pay attention to the root-final consonant /t/ that is accidentally the same as the onset of the past tense auxiliary /ta/. It could be assumed that this accidental cooccurrence causes the two /t/s to attract each other to create a geminate /tt/. The first /t/ in /tt/ is accompanied by the abrupt suspension of the oral closure and is expressed as /Q/ “*soku-on*” in this paper, so that /tt/ is represented as /Qt/, as in (20).



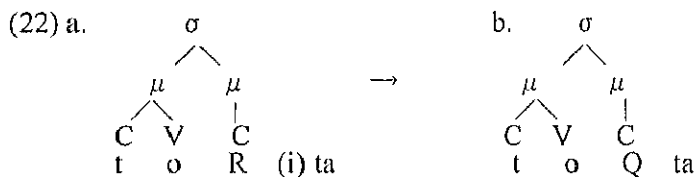
The root-final /t/ and the following /t/ in the auxiliary attract each other to produce a sequence of /tt/ (i.e. /Qt/), which induces the deletion of the suffix /i/ in (20a) because the only position it can move to is already occupied by the /Q/.

Let us turn to verbs with the root-final /t/ such as [totta] (</tor + (i) ta/) “took” and [hasitta] (</hasir + (i) ta/) “ran. Since these verbs have a root-final sonorant rather than an obstruent, the inflectional ending is eliminated for the reason repeatedly mentioned above.



However, the awkward question here is how we can manage to change /r/ in (21a) to the consonant /Q/. To answer this question, we tentatively assume that the /r/ in question totally assimilates to the following consonant to create a geminate /Qt/, like in (21b). Such an assumption is by no means implausible, for it is independently motivated by the fact that in casual speech, the negative forms of verb like /waka<sub>r</sub> + a + nai/ “do not know” and /to<sub>r</sub> + a + nai/ “do not take” often change to [wakannai] and [tonnai] respectively, where the root-final /r/ totally assimilates to the following consonant (in this case /n/) to yield a geminate of /n/.<sup>11</sup> Note that although the geminate of /t/ (i.e. /Qt/) in (21) is phonetically different from that of /n/, both can be regarded as falling under the same group in that their root-final /r/ triggers the total assimilation.

We propose from the observations above that the /r/ at issue is represented as /R/ in this paper, suggesting that it not only sustains a mora but assimilates to the following consonant. Needless to say, such assimilation takes place only under a specific circumstance, that is, when the past tense auxiliary /ta/ attaches to the adverbial form of verb. The derivation in (22) illustrates how /R/ turns to /Q/.

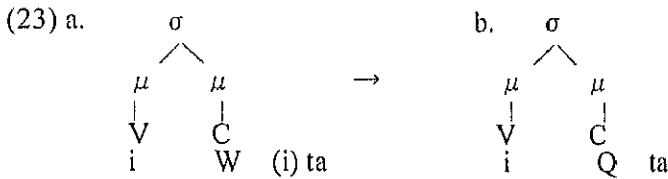


/R/ in (22a), a kind of sonorant, prevents the inflectional ending /i/ from moving to the site occupies by it. What should be done next is to turn /R/ to /Q/. This is attained by assuming that /R/ in (22a) triggers the total assimilation to /t/ in /ta/ after the deletion of /i/. Through this assumption, the correct output [totta] (i.e. [toQta]) “took” can be obtained, as shown in (20b).

The tougher examples of *Soku-onbin* are the past tense forms of [iu] “say” (i.e. [itta] “said”) and [mukau] “go” (i.e. [mukatta] “went”) and the like; if they were derived from /i + (i) ta/ and /muka + (i) ta/ in the manner we have developed thus far, they could not acquire the correct outputs [itta] and [mukatta], because it has been postulated in this paper that *Soku-onbin* occurs only when the root ends in some consonant. Specifically, since the roots of these verbs end in vowels /i/ and /a/ instead of consonants, the rule of *Soku-onbin* shown in (20) does not apply to them as

it stands. It should be noted, however, that the problem posed here holds true for any analysis including Kubozono's, which uses the rule (10b), giving rise to the incorrect outputs \*[ita] and \*[mukata] rather than [itta] and [mukatta].

To resolve this predicament, we follow Ito and Mester (1986) and Davis & Tsujimura (1991), assuming that the underlying representations of these verbs are /iW + (i) + ta/ and /mukaW + (i) + ta/, where /W/, like /R/ in (22), can sustain a mora by itself and totally assimilates to the following consonant. Setting up the abstract /W/ for these verbs is not completely ad hoc because it indeed appears in their negative forms like [iw + a + nai] "do not say" and [mukaw + a + nai] "do not go." The reason why the /w/ does not realize in the outputs of /iW + (i) ta/ and /mukaW + (i) ta/ might be that Japanese does not have the sequence of [wi] by chance. The actual derivation of [itta] "said" is demonstrated below.

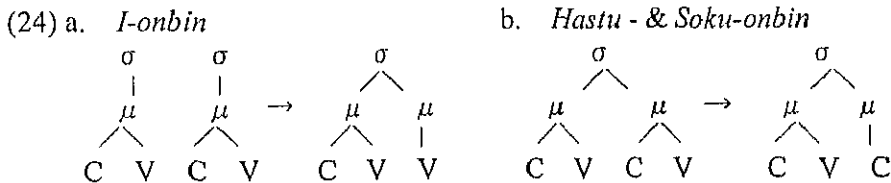


This derivation is basically the same as (22) in that /W/ is a sonorant, can support a mora by itself and does not replaced with the inflectional ending /i/.<sup>12</sup> As a result, /W/ totally assimilates to /t/ in /ta/ to generate [itta] (= [iQta]).

Lastly, we have to mention a true exception to our analysis of *Soku-onbin*, i.e. [iQta] "went" (< /ik + i + ta/). The reason why this verb is exceptional is not only that the root-final /k/ usually triggers *I-onbin* rather than *Soku-onbin*, as shown in (14) but also that such change as /k/ → /Q/ can be observed only in this verb. Thus, all we have to do with respect to it is mark this exceptional behavior in the lexicon. But it should be pointed out that such treatment is needed in any analyses including ours.

#### 4. Conclusion

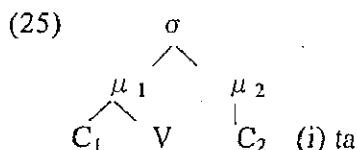
The major task in this paper is to incorporate three types of *onbin* changes (i.e. *I-onbin*, *Hatsu-onbin* and *Soku-onbin*) into one under the name of "*onbin*." The most promising approach that has ever proposed is the one of Kubozono's, which is repeated in (24).



Noticing that both of the derived syllables in (24a) and (24b) are heavy, he supposes

that the role of *onbin* changes is to create a heavy syllable. Although his analysis can be highly evaluated in that it makes it possible to capture *onbin* changes as simple structural change from light to heavy syllable and explains them in a unified way, it has a couple of defects as well. The most serious one is that it cannot determine which rule (i.e. (24a) or (24b)) applies to a given verb, which is obviously caused by the fact that the inputs of both rules are the same. Furthermore, Kubozono's analysis can tell us neither why *onbin* changes takes place only in verbs whose roots end in a consonant nor why *I-onbin* is called as such, and so on.

To address the problems just mentioned, we assume a single, not two, underlying structure of *onbin* changes.



The decision on which *onbin* change takes place depends on the characteristic of the root-final consonant  $C_2$ . *I-onbin* occurs when  $C_2$  is an obstruent which is unable to support the mora  $\mu_2$  and then is deleted. And after the deletion, the inflectional ending /i/ moves to the deleted site. On the other hand, *Hatsu-onbin* and *Soku-onbin* takes place when  $C_2$  can support  $\mu_2$  and thus is not deleted. In this case, the inflectional ending /i/ cannot move leftward because the  $C_2$  is already occupied with a consonant and there is no landing cite of /i/. What makes difference between *Hatsu-onbin* and *Soku-onbin* depends on it that in the former,  $C_2$  changes to a nasal by partial assimilation, and in the latter, it changes to /t/ by total assimilation. In addition to these, the structure description of the rule (25) can tell us why *onbin* changes in Japanese language occur in verbs whose roots end in consonant.

#### NOTES

<sup>1</sup> *I-onbin* names after the process in which the root-final consonant is deleted and the inflectional ending /i/ remains after the suffixation of the past tense auxiliary /ta/, like /kak-i + ta/ → [kaita] "wrote". *Hatsu-onbin*, on the other hand, changes the root-final consonant to a nasal (i.e. "hatsu-on") with subsequent deletion of the inflectional ending /i/, like /nom-i + ta/ → [nonda] "drank." *Soku-onbin* also eliminates /i/ and alters the root-final consonant to /t/, yielding a geminate /tt/ or /Qt/ in this case (/Q/ is called "soku-on" in Japanese), like /kaer-i + ta/ → [kaetta] (or [kaeQta]) "returned." It should be noted, however, that these *onbin* changes are not limited to verbs. Nouns are also subject to such changes; /tukitai/ → [tuitai] "the first day of a month" (*I-onbin*), /kudari/ → [kudan] "the said" (*Hatsu-onbin*), /hoosi/ → [hossi] "monk" (*Soku-onbin*) (cf. Kindaichi (1976)). As for adjectives, they are subject to another type of *onbin* changes, namely, *U-onbin*, by which the

final syllable in an adjective (i.e./ku/) turns to /u/ in its adverbial form, like /yoku/ → [you] “good.” Compared to *onbin* changes in verbs, those in nouns and adjectives are much less productive in modern Japanese, we thus will not take into account of them in this paper.

<sup>2</sup> Yet, the majority of researchers, like Mabuchi (1971), Kindaichi (1992), Sugimoto and Iwabuchi (1994) among others, think that *onbin* changes occur for the convenience of pronunciation.

<sup>3</sup> Besides *ta*, the conjunctive particle *te* also triggers *onbin* changes in (1). Concerning a promising answer to the question of why *ta* and *te* trigger *onbin* changes, see Tsuboi (2001: 203).

<sup>4</sup> Following Shibatani (1990: 224), we suppose that the composition of Japanese verbs is like “Root + Inflectional ending (+Auxiliary) (+Particle).”

<sup>5</sup> Note that the verbs we have observed thus far are the ones with a root-final consonant, not the ones with a root-final vowel. And note also that although the verbs in (1) all have the vowel /i/ before the past tense auxiliary /ta/, but this vowel is not at the root-final position but at the stem-final position.

<sup>6</sup> The same thing can be said when verbs are followed by the auxiliary suffix /masu/ indicating politeness; /kaki/ + /masu/ → [kakimasu] “write-POLITE,” in which there is no deletion of the root-final consonant /k/. What matters here is why the suffixation of the past tense auxiliary /ta/ triggers such deletion while the auxiliaries of /tai/ and /masu/ don’t. Drawing a sharp line between these two kinds of auxiliaries seems impossible at the moment, so we assume the diacritic feature [± *onbin*] for *onbin* changes, giving [+*onbin*] to /ta/ and [-*onbin*] to /tai/ and /masu/. It should be noted that such treatment must be needed whatever analyses we adopt.

<sup>7</sup> The root-final /s/, /t/ or /b/ are exceptions to this statement in that they do not trigger *I-onbin*, though they are obstruents. Apart from /t/ and /b/, which will be discussed later, one of the possible reasons why /s/ does not trigger *I-onbin* ( /kas + (i) ta/ → [kasita] /\*[kaita] “lent”) might be that it is perceived as much higher in the sonority degree than /k/ and /g/ so that it can sustain a mora, just like /n/ and /r/ in coda position. Incidentally, Kubozono (1995) cannot explain the peculiarity of /s/ described here, either.

<sup>8</sup> About “Place,” see Clements (1985), Sagey (1986) and so on. As for “Rendaku,” see Ito & Mester (1986), Tsujimura (1996) among others.

<sup>9</sup> Since Kubozono’s analysis does not take any rule ordering into consideration, there is a great possibility that it leads to the wrong output \*/toita/ from /tobi + ta/, as shown in (17).

<sup>10</sup> This change of /b/ → /m/ → /n/ is also assumed in Kuroda (1969), Komatsu (1981) and Davis & Tsujimura (1991). An alternative is proposed by MacCawley (1968) and Ito & Mester (1986), both of which presume /b/ → /d/ → /n/. In any case, it is obvious that these approaches have one thing in common; i.e. /n/ cannot be derived directly from /b/.

<sup>11</sup> Kindaichi gives a number of other examples including adverbs and nouns in which the root-final /r/ triggers gemination; /sakarī + ni/ → [sakan’ni] “prosperously or actively,” /kudarī + no + (mondai)/ → [kudan’no +(mon’ndai)] “(the matter) at issue” and so on (cf. Kindaichi (1992:

404-405)).

<sup>12</sup> Note that the movement of the suffix /i/ is not always blocked and eliminated. In fact, it surfaces when the auxiliaries like Desiderative /tai/ and Polite /masu/ are attached to the verb /iu/ "say," for example, as in [iitai] "want to say" and [ijimasu] "say-POLITE."

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