

[Forum]**Accentedness and *Rendaku* in Japanese Deverbal Compounds**

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Abstract: It has been pointed out that deverbal compounds in Japanese are divided into two categories: the Argument Type (i.e. the first element is the internal argument of the second one) and the Adjunct Type (i.e. the first element modifies the second one). The former tends to be accented and resist *rendaku*, while the latter tends to be unaccented and undergo *rendaku*, but the difference is less noticeable in longer compounds. First, this study provides a comprehensive analysis of these compounds by using a database and verifies the tendencies which have been pointed out in previous studies. Another goal of this study is to discuss why the Argument and Adjunct Types differ in accentedness. It is shown that the difference between the two arises even when *rendaku* is irrelevant or when the accentedness of the second element is the same: therefore, the occurrence of *rendaku* and the accentedness of the second element are not sufficient factors. As an alternative, this study points out that the lexical category of the whole compound affects accentedness. In some aspects of Japanese word formation, nominal words are more likely to be accented than verbal or adjectival ones. Therefore, the fact that the Argument Type compound, which often denotes an instrument or a person, tends to be accented can be analyzed as one of the manifestation of the relationship between lexical category and accentedness.*

Key words: Japanese, deverbal compound, accentedness, *rendaku*, lexical category

1. Introduction

In Japanese deverbal compounds, verb stems (*ren'yōkei*) appear as the second element. They can be roughly divided into two categories according to the

* A shortened version of this paper was given to the 133rd meeting of the Linguistic Society of Japan held at Sapporo Gakuin University on 18–19 November, 2006. I would like to express my sincere gratitude especially to Shin-ichi Tanaka for his constant guidance and valuable advice. Also, I have greatly benefitted from the comments of various people. In particular, I am very grateful to Rika Aoki, Yuki Asahi, Sayoko Hirai, Ayat Hosseini, Shigeto Kawahara, Wan-Yu Lin, Kohei Nishimura, Akiko Okumura, Bum-Ki Son, Xiaoyan Xie, and two anonymous reviewers for their many insightful suggestions. I would also like to thank the audience members at the meeting of the Linguistic Society of Japan for their helpful comments. Special thanks go to Jennifer Hansen for proofreading this paper. I am also greatly indebted to Jeffrey Heinz for insightful comments and stylistic improvement. Needless to say, all remaining errors and inadequacies are my own.

grammatical relationship between the first element and the second element. In Standard Japanese, whether the first element is the internal argument of the verb or modifies the verb can cause differences in terms of accentedness (i.e. accented or unaccented) and the morpho-phonological process called *rendaku* (sequential voicing).¹ The aims of this paper are to carefully examine these differences with a comprehensive corpus study and to better understand the factors that contribute to whether the compounds are accented or not. With regard to the first goal, this paper finds strong statistical support for earlier observations. Regarding the second goal, the analysis reveals that the lexical category of the deverbal compound is an important factor in determining whether it has an accent or not. Let us briefly review the accentual system and *rendaku* in general before considering deverbal compounds in detail.

1.1. Preliminaries

There is a vast amount of literature on accent pattern in Japanese, such as McCawley (1968), Haraguchi (1977), Higurashi (1983), Poser (1984), Kubozono (1997), and Tanaka (2001). It has been argued that Japanese is a pitch-accent language, and the pitch pattern is predictable based on accentedness (i.e. whether a word has the accent or not) and the location of the accent. If a word carries accent on a non-initial syllable then the initial mora and morae which follow the accented syllable have a low tone (L), and the remaining morae have a high tone (H) (e.g. *yama-za'kura* 'wild cherry tree' LHHLL). If a word carries accent on the initial syllable then the initial mora has a high tone and other morae have a low tone (e.g. *ka'makiri* 'mantis' HLLL). In contrast, if a word is unaccented, the initial mora has a low tone and the remaining morae have a high tone (e.g. *tamago-gata* 'oval' LHHHH). Although these generalizations suggest that the tone pattern of unaccented words is the same as those which carry accent on the final syllable (e.g. *hanasi* 'talk' LHH), attaching of the case particle *-ga* reveals the difference: *-ga* has a high tone in the former case, while it has a low tone in the latter case (e.g. *tamago-gata ga* 'oval (nominative)' LHHHHH vs. *hanasi ga* 'talk (nominative)' LHHL).

Accentedness and the location of the accent, if any, are unpredictable in simplex nouns. If a word has n syllables, $n+1$ patterns are possible: n accented patterns and one unaccented pattern. For example, two-syllable words have three patterns, such as *a'me* 'rain', *yama* 'mountain', and *mizu* 'water'. In contrast, verbs are classified into only two types: accented or unaccented (e.g. *tabe'ru* 'eat, present', *nozomu* 'wish, present'). The location of the accent is predictable; for instance, the accent is on the penultimate syllable in the present tense and it is on the syllable which contains the antepenultimate mora in the past tense (e.g. *tabe'ru* 'eat, present', *ta'beta* 'eat, past').

Accent location of the verb stem in deverbal compounds is controversial

¹ Accent pattern can vary in different dialects in Japanese. To the best of my knowledge, very little has been written on the accent pattern of deverbal compounds in other dialects.

because there are three theoretical possibilities; for example, *ta'be* (penultimate), *tabe'* (final), and *tabe_{acc}* (underspecified) are possibilities for the case of 'eat'. This study tentatively adopts *tabe_{acc}*, where accent location is underspecified, because there seems to be no independent evidence to support *ta'be* or *tabe'*.

Next, noun compounds are accented in most cases, and the location of the accent is determined by several factors (Kubozono 1997, Tanaka 2001). For example, some compounds place accent on the syllable which is adjacent to the word boundary (e.g. *minami* + *amerika* → *minami-a'merika* 'South America'), while others preserve the accent of the second element (e.g. *hōwa'ito* + *tyokore'eto* → *hōwaito-tyokore'eto* 'white chocolate').

Rendaku (sequential voicing) has also been studied in considerable detail (see Motoori 1822, Lyman 1894, Yamada 1904, Ogura 1910, Nakagawa 1966, McCawley 1968, Otsu 1980, Vance 1987, Takayama 1999, Rosen 2001, Itō and Mester 2003, Irwin 2005, 2009). It is a morpho-phonological process which voices the initial voiceless obstruent of the non-initial element of a compound (i.e. [A] in Table 1). Therefore, when the initial segment of the non-initial element is a voiced obstruent or a sonorant, *rendaku* is irrelevant in the first place (i.e. [C] in Table 1). In addition, if the second element already includes a voiced obstruent, *rendaku* is blocked in general (Lyman's Law: Lyman 1894) (i.e. [D] in Table 1).² On the other hand, some compounds do not undergo *rendaku* even if the second element includes no voiced obstruent (i.e. [B] in Table 1).

Table 1. Application of *rendaku*

[A] <i>Rendaku</i> occurs. (e.g. <i>a'o+so'ra</i> → <i>ao-zo'ra</i> 'blue + sky; blue sky')
[B] <i>Rendaku</i> is possible but does not occur. (e.g. <i>ku'ro +ku'mo</i> → <i>kuro-kumo</i> 'black + cloud; dark clouds')
[C] <i>Rendaku</i> is irrelevant. (Initial segment = voiced obstruent or sonorant) (e.g. <i>pe'rusya + ne'ko</i> → <i>perusya-ne'ko</i> 'Persia + cat; Persian cat')
[D] <i>Rendaku</i> is blocked by Lyman's Law. (e.g. <i>tori + kago</i> → <i>tori-kago</i> 'bird + cage; bird cage')

1.2. Research topics

Let us now return to deverbal compounds again. They are divided into two types based on the grammatical relationship between the first element and the second element (Kageyama 1993, Ito and Sugioka 2002, Sugioka 2002). In one type, the first element is the internal argument of the verb stem (e.g. *tume* + *kiri_{acc}* → *tume-ki'ri* 'nail + cutting; nail clipper'). The other type is the case where the first

² Lyman's Law has very few exceptions, such as *nawa-ba'sigo* 'rope ladder', *buN-ziba'ru* 'to bind something violently', and *syoo-zaburoo* 'Syoozaburoo (first name)' (Otsu 1980, Haraguchi 2000). See Note 9 for predictors of exceptionality for *X-saburoo* forms.

element modifies the verb stem (e.g. *usu* + *kiri*_{acc} → *usu-giri* ‘thin + cutting; thinly sliced’). Let us call the former the Argument Type and the latter the Adjunct Type. The Argument Type can be further divided into three subgroups: (a) ‘direct object + transitive verb’, (b) ‘subject + unaccusative verb’, and (c) ‘complement + intransitive verb’ (Kageyama 1993). Since accentedness and *rendaku* are not necessarily uniform among different subgroups, this survey only analyzes (a), which is the most frequent subgroup according to Kageyama (1993).³

It has been argued that the Argument and Adjunct Types show different tendencies in accentedness and *rendaku* (Kawakami 1953, 1984, Kindaichi 1976, Okumura 1984, Sato 1989, NHK 1998, Akinaga 2001, Ito and Sugioka 2002, Sugioka 2002). Put simply, deverbal compounds of the Argument Type are more likely to be accented and resist *rendaku*, as compared to the Adjunct Type, which is more likely to be unaccented and undergo *rendaku*. For example, *tume-ki’ri* ‘nail clipper’, where the first element *tume* ‘nail’ is the direct object of the second element *kiri*_{acc} ‘cut’, has the penultimate accent and resists *rendaku*. In contrast, *usu-giri* ‘thinly sliced’, where *usu* ‘thin’ modifies the verb, is unaccented and undergoes *rendaku*.

However, these phonological differences do not tend to hold in longer compounds: both types are likely to be accented and undergo *rendaku* if the length of the second element is more than two morae (Sato 1989, NHK 1998, Akinaga 2001). For instance, *yasai-zu’kuri* ‘vegetable + making; vegetable growing’ and *niwaka-zu’kuri* ‘sudden + making; hastily made’ are both accented and undergo *rendaku*, although the former belongs to the Argument Type and the latter to the Adjunct Type. In Japanese, two morae compose one foot, and the foot not only plays a crucial role in phonology and morphology in general, but also plays a role in *rendaku* in particular (Poser 1990, Kubozono 1999, Rosen 2001, Irwin 2009). The importance of this unit is also shown in the disappearance of phonological differences in deverbal compounds where the second element is longer than a foot.⁴

Although these tendencies have been noticed in many previous studies (Kawakami 1953, 1984, Kindaichi 1976, Okumura 1984, Sato 1989, NHK 1998, Akinaga 2001, Ito and Sugioka 2002, Sugioka 2002), a comprehensive corpus-based analysis has not yet been done. This study first offers a comprehensive analysis of the phonology of deverbal compounds based on the database developed by Amano and Kondo (1999). After presenting the survey methodology in Section 2, Section 3 presents the results, which verify the tendencies discussed in previous studies. This paper then analyzes why the Argument and Adjunct Types show different patterns in accentedness. Section 4 establishes that the accent pattern of the second element and the influence of *rendaku* are not sufficient to fully account for the differences between the two types because the corpus study reveals that the Argument Type tends to be accented even if these other two factors are set aside.

³ Accent pattern and *rendaku* may differ among different subgroups. This issue calls for further investigation.

⁴ The author thanks a reviewer for pointing out this issue.

Section 4 hypothesizes that the nominal meaning of Argument Type compounds causes the presence of the accent. As discussed, this hypothesis receives independent support from other types of word formation in which nominal forms tend to be accented. Section 5 offers concluding remarks.

2. Method of Collecting Data

In an effort to be systematic and comprehensive, this study utilizes the database in Amano and Kondo (1999), which is based on a Japanese-language dictionary, *Shinmeikai Kokugo Jiten* (Kindaichi et al. 1989). Amano and Kondo (1999) list the words and compounds in the dictionary with information about the accent (i.e. accented/unaccented, accent location). I extracted deverbal compounds of Argument Type (direct object + transitive verb) and of Adjunct Type (modifier + verb) from this database along with information about the accent pattern and *rendaku*. 2355 deverbal compounds were extracted, where 1305 words belong to the Argument Type and 1050 words belong to the Adjunct Type. I also counted the number of morae of each element in the compounds to investigate effects of word length.

Some detailed notes about the data are in order. First, while deverbal compounds generally show four accent patterns (antepenultimate accent, penultimate accent, final accent, and unaccented), some deverbal compounds exhibit variation in placement of the accent. This study counts each variant as one type. For example, *yuki* + *kaki_{acc}* → *yuki-ka'ki* / *yuki-kaki'* 'snow + shoveling; snow shovel' has two variants, and they are counted as two separate entries.⁵

Second, it is known that the etymological type (i.e. native Japanese / Sino-Japanese / loanword) of the initial element affects the occurrence of *rendaku*.⁶ According to Tamaoka et al. (2009), *rendaku* is less likely to occur if the first element is a loanword. In the deverbal compounds I collected, the initial element is a loanword only in four compounds, but they are irrelevant to *rendaku* as the initial segment of the second element is a sonorant.

3. Results

Table 2 summarizes the relevant information in the deverbal compounds extracted from Amano and Kondo (1999). Since their database is based on a Japanese-language dictionary, the number in the table indicates type numbers, not token numbers. In this table, *a* and *b* represent the mora count of the first and second members of the compounds, respectively. The column of '+Acc' shows the number of accented compounds, and that of '+R' shows the number of compounds which undergo *rendaku*. The percentage of forms exhibiting *rendaku* is calculated by counting the numbers of forms in cases A (forms where *rendaku* occurs) and B (forms where *rendaku* could occur but does not) in Table 1 and using the formula

⁵ *Yuki-ka'ki* is more common than *yuki-kaki'*. The variation in accent pattern is a topic to be studied in future research.

⁶ The author thanks a reviewer for pointing out this potential issue.

$([A]/([A]+[B])) \times 100$ (%). This percentage thus excludes the cases where *rendaku* is irrelevant or is blocked by Lyman's Law (cases C and D in Table 1).

Table 2. Percentage of accentedness and *rendaku*

<i>a+b</i>	Argument Type						Adjunct Type					
	Accentedness			<i>Rendaku</i>			Accentedness			<i>Rendaku</i>		
	+Acc	Total	%	+R	Total	%	+Acc	Total	%	+R	Total	%
2+1	4	5	80%	0	0	—	12	34	35%	4	4	100%
3+1	0	0	—	0	0	—	1	9	11%	2	2	100%
1+2	65	169	38%	59	100	59%	32	113	28%	58	60	97%
2+2	395	689	57%	109	387	28%	58	464	13%	233	240	97%
3+2	29	59	49%	24	39	62%	11	69	16%	22	22	100%
4+2	8	13	62%	7	9	78%	8	36	22%	11	11	100%
1+3	44	57	77%	20	25	80%	47	61	77%	23	25	92%
2+3	198	249	80%	72	115	63%	144	209	69%	80	85	94%
3+3	30	31	97%	12	14	86%	28	28	100%	8	8	100%
4+3	9	9	100%	0	1	0%	13	13	100%	4	4	100%
1+4	6	11	55%	7	9	78%	2	2	100%	1	1	100%
2+4	11	11	100%	2	3	67%	11	12	92%	7	7	100%
3+4	1	1	100%	0	0	—	0	0	—	0	0	—
4+4	1	1	100%	0	0	—	0	0	—	0	0	—
Sum	801	1305	61%	312	702	44%	367	1050	35%	453	469	96%

This table verifies the tendencies which have been pointed out in previous studies. First, consider the influence of Compound Type (i.e. Argument Type/Adjunct Type) and *b* (i.e. the number of the morae in the second element) on accentedness, as shown in Table 3.

Table 3. Influence of Compound Type and *b* on accentedness

<i>b</i> (the number of morae in the second element)	Argument Type			Adjunct Type		
	+Acc	Total	%	+Acc	Total	%
1, 2 μ	501	935	54%	122	725	17%
3, 4 μ	300	370	81%	245	325	75%
Sum	801	1305	61%	367	1050	35%

The percentage of accentedness is 61% for Argument Type compounds, while it is 35% for Adjunct Type compounds. That is, Argument Type compounds are

more likely to be accented than Adjunct Type compounds. Moreover, the percentage of accentedness rises both in the Argument and Adjunct Types when the second element is long (i.e. 54%→81%, 17%→75%, respectively), which makes the effect of the Compound Type less noticeable.⁷

These observations were statistically assessed by a logistic regression analysis using R (R Development Core Team 2009). A logistic regression, rather than a standard regression, was used because the dependent variable—the accentedness of the derived compounds—was binary (i.e. accented vs. unaccented). The independent variables were the Compound Type, *a* (the number of the morae in the first element), *b* (the number of the morae in the second element), and the accentedness of the second element (Acc of 2nd) as well as the interaction of the Compound Type with *a*, and that of the Compound Type with *b* (X_1 - X_6 in Table 4).

Table 4 shows that the Compound Type and *b* have effects on accentedness (Compound Type, *b*; $p < .001$). The interaction terms in Table 4 also show that the influence of the Compound Type is affected by *a* and *b*. On the one hand, the influence of the Compound Type is stronger when *a* is long (type: *a*; $p < .01$). The difference in the percentage of accentedness is 27% when *a* is short (Argument Type: 61%, Adjunct Type: 34%), and it is 30% when *a* is long (Argument Type: 69%, Adjunct Type: 39%). On the other hand, the influence of the Compound Type is weaker when *b* is long (type: *b*; $p < .001$), as shown in Table 3.

Table 4. The results of logistic regression (Dependent variable: accented or unaccented)

	<i>coefficient</i>	<i>p</i>
Intercept	-6.10011	< 2e-16 ***
Compound Type (X_1)	3.04093	1.69e-07 ***
<i>a</i> (the number of morae in the 1st element) (X_2)	0.03046	0.7832 <i>n.s.</i>
<i>b</i> (the number of morae in the 2nd element) (X_3)	2.27595	< 2e-16 ***
Accentedness of 2nd element (X_4)	0.13719	0.1479 <i>n.s.</i>
type: <i>a</i> (X_5)	0.43557	0.0056 **
type: <i>b</i> (X_6)	-1.14527	2.06e-08 ***

(*n.s.*: not significant, **: $p < .01$, ***: $p < .001$)

Next, Table 5 shows the influence of the Compound Type and *b* on the applicability of *rendaku*. The percentage of *rendaku* is 44% for the Argument Type, while it is 96% for the Adjunct Type. Hence the Adjunct Type deverbal compounds more

⁷ Because a word of *n* syllables has *n*+1 different accent patterns (i.e. *n* accented patterns + one unaccented pattern), one may argue that accentedness rises in longer compounds through simple probability. However, most accented compounds have an accent in the antepenultimate position or at the morpheme boundary regardless of the length of the compound. Therefore, the increase of accentedness in longer compounds cannot be accounted for by simple probability.

commonly undergo *rendaku* than Argument Type deverbal compounds. Another logistic regression was run, this time with the applicability of *rendaku* as the dependent variable. The results show that the effect of the Compound Type is significant (Compound Type; $p < .001$) (space limitations prohibit presentation of the whole regression table and full discussion). Furthermore, a logistic regression using only Argument Type deverbal compounds shows that the percentage of *rendaku* is also significantly higher in the Argument Type when the second element is more than two morae (b ; $p < .001$). This increase effectively neutralizes any difference between the Compound Types.⁸

Table 5. Influence of Compound Type and n on *rendaku*

b (the number of morae in the second element)	Argument Type			Adjunct Type		
	+R	Total	%	+R	Total	%
1, 2 μ	199	535	37%	330	339	97%
3, 4 μ	113	167	68%	123	130	95%
Sum	312	702	44%	453	469	96%

In summary, the corpus study verifies earlier observations regarding the differences between the Argument and Adjunct Types and shows that these differences tend to be less prominent when the second element is longer.

4. The Difference in Accentedness

The previous section observed phonological differences between the Argument and Adjunct Types: the latter is more likely to be unaccented and to undergo *rendaku* than the former. This section considers why the two types show different patterns with respect to accentedness. First, 4.1 reviews previous studies which attribute the difference to the accentedness of the second element and points out that the difference arises irrespective of this factor. Second, 4.2 examines the hypothesis that *rendaku* is a factor in determining accentedness and argues that the difference in accentedness arises even if *rendaku* is irrelevant or is blocked by Lyman's Law. Lastly, 4.3 hypothesizes that the lexical category of the compound is a factor in predicting accentedness.

4.1. The accentedness of the second element

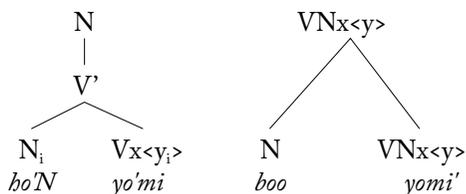
Although many researchers have recognized that Argument type deverbal compounds are more commonly accented than Adjunct Type deverbal compounds, only Sugioka (1996, 2002) and Ito and Sugioka (2002) attempt to determine why. They hypothesize that the cause lies in the accent pattern of the second element.

They argue that the two types of deverbal compounds have the internal struc-

⁸ The percentage of *rendaku* is a little lower in longer compounds in the Adjunct Type (i.e. 97% \rightarrow 95%), but this decrease is not significant statistically according to a logistic regression using only the Adjunct Type data.

tures illustrated in (1), and that the second elements of the compounds have different accentual properties. The examples in (1) are the pair of *hoN* + *yomi*_{acc} → *hoN-yo'mi* 'book + reading; avid reader' (Argument Type) and *boo* + *yomi*_{acc} → *boo-yomi* 'stick + reading; reading in a monotonous voice' (Adjunct Type).

- (1) a. Argument Type b. Adjunct Type



As shown in (1), the second element is a verb in the Argument Type compound, while it is a verbal noun in the Adjunct Type compound. Although both of them are the stem of the same verb, they are morphologically different: verb infinitive in the Argument Type and deverbal nominal in the Adjunct Type. Sugioka (1996, 2002) and Ito and Sugioka (2002) argue that they show different accent patterns as shown in (2).

- (2) The stem of *yo'mu* 'read. present'
- a. Verb infinitive: *yo'mi ni iku* 'go to read'
 - b. Deverbal nominal: *yomi' ga asai* 'reading is shallow'

In (2) above, the verb infinitive has an accent on the penultimate syllable, while the deverbal nominal is final-accented. According to the analysis of Sugioka (1996, 2002) and Ito and Sugioka (2002), the penultimate accent is preserved based on the independently motivated rule in (3a), which applies to the Argument Type compounds. In contrast, they argue that the final accent cannot be preserved in Adjunct Type compounds due to the independently motivated rule in (3c) and these compounds are unaccented.

- (3) a. In a noun compound X#Y, the accent of Y predominates.
 b. If Y is long and final-accented or unaccented, put accent on the first syllable of Y.
 c. If Y is short and final-accented, deaccent the whole compound.
 (McCawley 1977: 272)

To sum up, their analysis is as follows: the difference of internal structure causes the difference in the accent pattern of the second element, which results in the different accentedness of the whole compound.

This analysis predicts that unaccented verbs produce the same pattern in both types of deverbal compounds because verb infinitives and deverbal nominals are both unaccented in unaccented verbs, as summarized in Table 6 (accented verbs are presented for comparison).

Table 6. Accent pattern of verb stems

Verb	Verb infinitive	Deverbal nominal	Example
Accented	accented (penultimate)	accented (final)	<i>yo'mu</i> 'read'
Unaccented	unaccented	unaccented	<i>kasu</i> 'lend'

Ito and Sugioka (2002) provide examples which seem to support this prediction: *hito + kai* → *hito-kai* 'person + buying; man buyer (slave merchant)' vs. *matome + kai* → *matome-gai* 'collect + buying; buying in bulk'. In this case, the verb *kau* 'buy' is unaccented, and both *hito-kai* (Argument Type) and *matome-gai* (Adjunct Type) are unaccented.

However, the comprehensive corpus survey implies that this prediction is not correct. Table 7 shows the percentage of accentedness when the second element is an unaccented verb. A logistic regression was run using only the data in which the second elements are unaccented verbs, and it reveals a significant difference between the Argument and Adjunct Types even when the accentedness of the stem is the same (Compound Type; $p < .01$). The pairs in (4) exemplify the cells in Table 7, where *uru* 'sell' and *oku* 'put' are unaccented verbs.

Table 7. Accentedness when the second element is derived from an unaccented verb

Argument Type			Adjunct Type		
+Acc	Total	%	+Acc	Total	%
287	504	57%	165	499	33%

- (4) a. *uru* 'sell'
 i) Argument Type: *hana'* + *uri* → *hana-uri* 'flower + selling; flower vendor'
 ii) Adjunct Type: *kara'* + *uri* → *kara-uri* 'empty + selling; selling short'
 b. *oku* 'put'
 i) Argument Type: *ha'si* + *oki* → *hasi'-oki* 'chopstick + putting; chopstick rest'
 ii) Adjunct Type: *ma'e*+ *oki* → *mae-oki* 'front + putting; introduction'

In summary, the difference in accentedness between the Argument Type and the Adjunct Type deverbal compounds arises irrespective of the accent pattern of verb stems. In other words, the accent pattern of the second element cannot be the only crucial factor.

4.2. The relationship between accentedness and *rendaku*

This subsection examines the influence of *rendaku* on accentedness. It has been observed that accentedness and *rendaku* sometimes tend to distribute complementarily in several types of word formation (Sugito 1965, Okumura 1984, Sato 1989, Tanaka 2005a, b). That is, *rendaku* does not occur when the accent is present (i.e. accented), while *rendaku* does occur when the accent is absent (i.e. unaccented), as exemplified in (5).

- (5) a. Family names: *hu'zita* vs. *yosida* (*ta* 'rice field') (Sugito 1965, Zamma 2005)
 b. First names: *tamasa'buroo* vs. *syoozaburoo* (*saburoo* 'the third son')⁹ (Haraguchi 2000)
 c. Place names: *syoodo'-sima* vs. *sakura-zima* (*sima* 'island') (Tanaka 2005 a: 27-28, Tanaka 2005b: 269)
 d. Sino-Japanese verbs: *kaNsu'ru* 'be connected with' vs. *kaNzuru* 'feel' (*suru* 'do') (Okumura 1984)

This correlation also tends to hold for deverbal compounds. In both the Argument and Adjunct Types, the percentage of accentedness is higher when *rendaku* does not occur, as shown in Table 8 and Table 9. Two types of logistic regression were run: one using only Argument Type data, and the other using only Adjunct Type data. They both show that the applicability of *rendaku* has an effect on accentedness (the alpha level was adjusted to $0.05/2=0.025$ by Bonferroni correction; Argument Type: $p<.001$, Adjunct Type: $p<.025$).

Table 8. Correlation between accentedness and *rendaku* (Argument Type)

	Accented	Unaccented	Sum
+ <i>Rendaku</i>	157 (50%)	155 (50%)	312 (100%)
- <i>Rendaku</i>	274 (70%)	116 (30%)	390 (100%)
Sum127	431 (61%)	271 (39%)	702 (100%)

Table 9. Correlation between accentedness and *rendaku* (Adjunct Type)

	Accented	Unaccented	Sum
+ <i>Rendaku</i>	122 (27%)	331 (73%)	453 (100%)
- <i>Rendaku</i>	10 (63%)	6 (38%)	16 (100%)
Sum	132 (28%)	337 (72%)	469 (100%)

Based on this correlation, one can hypothesize that the presence of *rendaku* causes the absence of an accent. Extracting compounds where *rendaku* is irrelevant or is blocked by Lyman's Law, i.e. [C] and [D] in Table 1, allows us to test this hypothesis. Table 10 shows the percentage of accentedness in such cases; a logistic regression using only the data in which *rendaku* is irrelevant or is blocked due to Lyman's Law shows that the effect of Compound Type is still reliably present ($p<.01$).

⁹ Haraguchi (2000) points out that the occurrence of *rendaku* in *X-saburoo* depends on the number of syllables and morae of the first element *X*.

Table 10. Cases where *rendaku* is irrelevant or is blocked due to Lyman's Law

Argument Type			Adjunct Type		
+Acc	Total	%	+Acc	Total	%
370	603	61%	235	581	40%

Table 10 shows that the difference of accentedness between the Argument and Adjunct Types still holds, setting aside the effect of *rendaku*. Like the accent pattern of the second element, the occurrence of *rendaku* is not sufficient to explain the observable difference in accentedness between the Argument and Adjunct Types. The two pairs in (4), which begin with vowels (and which are therefore irrelevant to *rendaku*), also exemplify this argument.

4.3. The lexical category of the whole compound

Subsections 4.1 and 4.2 have shown that the accentedness of verbs and the occurrence of *rendaku* are not sufficient to account for the difference between the two types of deverbal compounds. In this subsection, I suggest another possibility: the lexical category of the whole compound.

It has been pointed out accentedness depends on the lexical category of the word in some aspects of Japanese word formation (Kawakami 1984, Sato 1989, Akinaga 2001). Specifically, nominal words tend to be accented. For example, Sino-Japanese binoms (i.e. words which are written in two Chinese characters) whose length is two syllables and three morae tend to be initial-accented when they are nominal, while they tend to be unaccented when they are verbal (Akinaga 2001, Ogawa 2004).¹⁰ This contrast is exemplified by the pairs in (6). In particular, the pair of *saNka* 'paean' vs. *saNka* 'oxidation', which are identical in segmental sequence, is especially notable.

- (6) a. Nominal meaning: *saNka* 'paean', *sa'doo* 'tea ceremony', *ko'kka* 'nation'
 b. Verbal meaning: *saNka* 'oxidation', *idoo* 'movement', *hukki* 'comeback'

Second, in some cases, an identical suffix belongs to two different lexical categories, which can cause difference in accentedness (Kawakami 1984, NHK 1998, Sato 1989). Although such suffixes have been found separately in previous studies, they can be generalized according to their lexical category. Like the first example in (6a), if the suffixed words are nominal, they are accented. On the other hand, they are unaccented if they are adjectival. For example, four suffixes in (7a–d) are accented in (i), where they are nominal. In contrast, the adjectival forms are unaccented in (ii).¹¹

¹⁰ According to Ogawa (2004), a Sino-Japanese word *X* is 'verbal' if a verbalized *X-suru* 'do *X*' is grammatical, and otherwise it is 'nominal'. *X-suru* has three allomorphs (i.e. *X-zuru*, *X-su* and *X-jiru*), but it is not necessary to take them into account because they are not attached to binoms.

¹¹ If a word is adjectival, it can co-occur with an adverbial phrase (e.g. **subara'siku/subarasi'i*

- (7) a. *-siki* ‘ceremony, formula, method’
 i) *nyuugaku/siki* ‘entrance + ceremony; entrance ceremony’
 buNsi/siki ‘molecule + formula; molecular formula’
 ii) *zidoosiki* ‘automatic + method; automatic’
 b. *-neNsei*¹² ‘year + life’
 i) *rokuneNsei* ‘six + year + life; sixth grade’
 ii) *taneNsei* ‘many + year + life; perennial’
 c. *-zyoo* ‘letter, state’
 i) *syoota’izyoo* ‘invitation + letter; invitation card’
 ii) *hoosyazyoo* ‘radiation + state; radial’
 d. *-hu’u* ‘wind, style’
 i) *kisetu’huu* ‘season + wind; seasonal wind’
 ii) *nihonhuu* ‘Japan + style; Japanese style’

Returning to deverbal compounds, the Argument and Adjunct Types have different lexical categories (Sugioka 1996, 2002, Ito and Sugioka 2002). Argument Type deverbal compounds are nouns, denoting actions, phenomena, agents, instruments, properties, places and time (e.g. *mono-kaki* ‘thing + writing; writer’). On the other hand, Adjunct Type deverbal compounds are predicates and function as a verb or an adjective, denoting actions or states (e.g. *basiri-gaki* ‘running + writing; jotting down’). Therefore, the fact that the Argument Type deverbal compounds are more likely to be accented than Adjunct Type ones is consistent with the two examples given in (6) and (7).

In addition, the examples in (8), where accentedness differs within Argument Type, support this correlation between lexical categories and accentedness. In these five pairs, (i) is accented, while (ii) is unaccented although the second element is the same verb stem and the first element is the object of the second element in both cases.

- (8) Difference within Argument Type
- a. i) *emoN + kake_{acc}* → *emoN-kake* ‘clothes + hanging; rack for hanging a kimono’
 ii) *zookiN + kake_{acc}* → *zookiN-gake* ‘floorcloth + administering; wiping with a cloth’
 b. i) *rooso’ku + tate_{acc}* → *roosoku’-tate* ‘candle + standing; candlestick’
 ii) *ozeN + tate_{acc}* → *ozeN-date* ‘tray + standing; preparation’
 c. i) *akari + tori_{acc}* → *akari’-tori* ‘light + taking; fanlight’
 ii) *kurai + tori_{acc}* → *kurai-dori* ‘numerical position + taking; putting a decimal point’
 d. i) *goku¹³ + tubusi* → *goku-tu’busi* ‘grain + crushing; idler’
 ii) *hima + tubusi* → *hima-tubusi* ‘time + crushing; killing time’

nyuugaku/siki ‘*wonderfully/wonderful entrance ceremony’ vs. *kanzeN ni zidoosiki* ‘completely automatic’).

¹²The accent pattern of *-neNsei* is not clear.

¹³The accent pattern of *goku* is not clear.

- e. i) *ku'uki + nuki* → *kuuki'-nuki* 'air + pulling out; ventilator'
 ii) *goboo + nuki* → *goboo-nuki* 'burdock + pulling out; pulling a thing out at a stroke'

This difference within Argument Type may seem puzzling, but (i) and (ii) are different in their meaning. As shown in the gloss, the examples in (i) denote instruments or agents (i.e. entities). In contrast, the examples in (ii) refer to actions and sometimes function as a verb with the light verb *-suru* 'do' (e.g. *ozeN-date suru* 'prepare'). Thus, the five examples in (ii) are more similar to Adjunct Type compounds. In addition, the examples in (i) and (ii) in (8a–c) are different in *rendaku*: the latter undergo *rendaku*, while the former do not.¹⁴ The influence of semantic distinction (i.e. entity or action) on *rendaku* has been pointed out in previous studies (Nakagawa 1966, Sato 1989, Suzuki 2008). In conclusion, the lexical category of the whole compound appears to influence the phonological difference between the Argument and Adjunct Types with respect to accentedness.

5. Conclusion

Through an exhaustive search of a large database (Amano and Kondo 1999), this study finds support for previous observations regarding the phonological differences between the Argument and Adjunct Types of deverbal compounds: the former is more likely to be accented and resist *rendaku* than the latter. This paper has also confirmed that the differences tend to be neutralized in longer compounds in favor of accentedness and the application of *rendaku*.¹⁵ Additionally, this paper has examined what factors contribute to the difference in accentedness between the Argument and Adjunct Types. It has been shown that the Argument Type deverbal compounds are more commonly accented than the Adjunct Type deverbal compounds, even after the contributions of the accent pattern of the second element and the occurrence of *rendaku* have been set aside. In other words, these two factors are not sufficient to fully account for the higher rate of accentedness of the Argument Type. This paper hypothesizes that the lexical category is an important factor in determining accentedness. Words which have nominal meaning tend to be accented in some aspects of Japanese word formation, and since Argument Type deverbal compounds are nominal that can explain their higher percentage of accentedness. In summary, the comprehensive corpus study presented in this paper lends strong support to earlier observations, and the statistical analysis revealed an explanatory gap in current theories, 89+ which the aforementioned hypothesis addresses. Finally, the detailed descriptive generalizations presented here open the

¹⁴ *Rendaku* is blocked in (8d) due to Lyman's Law. *Rendaku* is irrelevant in (8e) because the initial consonant of the second element is a sonorant.

¹⁵ The neutralization of the difference in accentedness and *rendaku* can be explained in terms of the foot. Kubozono (1997) and Tanaka (2001) argue that the foot plays an important role in compound accent pattern. With regard to the relationship between the foot and *rendaku*, see Rosen (2001) and Irwin (2009). More detailed examination of the neutralization regarding *rendaku* and accentuation in deverbal compounds is necessary in future studies.

door to future theoretical analyses of the phonology of deverbal compounds in Japanese.

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[Received 16 January 2010;
Accepted 17 January 2011]

【要 旨】

日本語の動詞由来複合語のアクセントと連濁について

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日本語の動詞由来複合語は、「内項タイプ」（前部要素が後部要素の内項であるもの）と「付加詞タイプ」（前部要素が後部要素を修飾するもの）の二種類に分類され、従来、前者は「起伏式アクセント・連濁無し」、後者は「平板式アクセント・連濁有り」という傾向の違いがあり、また後部要素が長い場合その違いが小さくなることが知られてきた。本論文では、データベースの調査によってこの傾向を裏付けた上で、両者のアクセントの違いがなぜ生じるかという問題に焦点をあて、連濁が無関係な場合や後部要素のアクセントパターンが同じ場合でもその違いが生じることから、その二つは決定的要因ではないことを示す。さらに、語形成の中で名詞的意味が動詞的・形容詞的意味よりも起伏式アクセントと結びつきやすい場合があることから、「道具」や「人」などの名詞的な意味になりやすい内項タイプが起伏式になることもその一つの表れとして捉えられることを指摘する。