Past Affix' Selection of Verbal Stem Allomorphs

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Abstract

We will observe which stem allomorph the affixes, the so-called 'non-past' affix, the past affix, the imperative affix, the negative affix and the voice affix-like verbs, select between the longer and the shorter in Japanese-Yanagawa dialect on the assumption that verbal lexemes may be associated with more than one stem. Observing the phenomenon more closely, we found that the verbal stem forms entertain default implicative relations in the stem dependency hierarchy. We will propose i) an implemented analysis of the past affix and ii) an implementation of the allomorph selections by the 'non-past' affix in Koga and Ono, 2010 as two examples.

1 Introduction

It has been believed that there are 'many morphological groups' of verbs with apparently 'irregular conjugations' in the dialects and old languages of Japanese, differently from standard Japanese (except for the strong base verbs /k(o)/ 'come' and /s/ 'do' with 'irregular conjugations'). One of them is those of the so-called 'vowel /e/-final' base verbs in Japanese-Yanagawa dialect, as you will see in the two top-most lines of Table 2 in contrast with their standard counterparts, as given in Table 1.

Table 1: Verbal forms in standard Japanese

stems 'meaning'	'-Non-past' 'if'	'-Past'	'Imper'	'-not'	'-cause'
n(e) 'sleep'	ne-ru	ne-ta	ne-ro	ne-nai	ne-sas(e)
tab(e) 'eat'	tabe-ru	tabe-ta	tabe-ro	tabe-nai	tabe-sas(e)

The verbal stems of the 'non-past' forms and the /(r)eba/-conditional forms of the verbs in this group in the dialect are not the same as those of the past, imperative,

negative and causative forms. The latter are the stem forms with vowel /e/ at its final like /ne/ 'sleep', as are in standard, and the former are the stem forms with the final vowel /e/ absent and vowel /u/ present in the place like /n-u/ 'sleep'. If we see this phenomenon more closely, it will turn out that the 'irregular conjugations' of the strong base verbs /k(o)/ 'come' and /s/ 'do' in standard as well as Japanese-Yanagawa dialect are similar to some extent to those of the 'vowel /e/-final' base verbs in the dialect. The phenomenon 'irregular conjugations' in standard Japanese has been ignored in the literature maybe because it has been supposed that there cannot be any scientific research of them and that they are a vexing but minor problem. As mentioned at the beginning of this section, if we expand the scope of our morphological research to dialects and old languages of Japanese, it will be more important to have a scientific research of the selections of verbal stem allomorphs of the so-called 'vowel /e/-final' base verbs and the strong base verbs /k(o)/ 'come' and /s(e)/ 'do' in Japanese-Yanagawa dialect.

We will observe the phenomenon of Japanese-Yanagawa on this paper, and will show an implemented analysis of the past affix and an implementation of the allomorph selections by the 'non-past' affix as two examples. The framework is an HPSG-like morpho-syntax in conjunction with Optimality Theoretic morphological accounts with the uses of surface constraints.

The current study is presented on this paper in such an order as follows: After quickly seeing Koga and Ono's, 2010 observation and their assumption in section 2.1, we will argue for Koga and Ono's, 2010 plural stem assumption, using the data from an old Japanese and from another Japanese dialect in section 2.2. Then, we will observe the phenomenon of the selections of verbal stem allomorphs by affixes in Japanese-Yanagawa dialect in section 2.3. We observe the phenomenon more closely on further specific assumptions, and will show a finding that the stems selected by affixes in the paradigm of each verb are dependent in section 2.4. In section 3, we first confirm an assumption in morphology for the agglutinative language Japanese in section 3.1, and then will present an implemented analysis of the past affix in section 3.2 and an implementation of stem selections by the 'non-past' affix in section 3.3.

2   The phenomenon

2.1   Koga and Ono's, 2010 assumption of plural stem allomorphs

Koga and Ono, 2010 observed that both the so-called 'non-past' tense morpheme and the conditional /(r)eba/ select the shorter stem allomorph of each verbal lexeme if it is associated with two in Japanese-Yanagawa dialect, as given in the left-most column of Table 2.
The plural stem allomorph assumption was proposed in Aronoff, 1994, and has been assumed since then in the literature, for example, in Bonami and Boyé, 2002 and Bonami and Boyé, 2006. Each lexeme of the strong base verbal lexemes /k(o)/ 'come' and /s(e)/ 'do' and the so-called 'vowel /e/-final' base verbal lexemes like

Table 2: Verbal forms in Japanese-Yanagawa dialect

stems 'meaning'	'-Non-past' 'if'	'-Past'	'Imper'	'-not'	'-cause'
n(e) 'sleep'	*ne-ru *ne-reba *n-u *n-eba n-u-ru n-u-reba	ne-ta *n-ta *[nda] *n-ita	ne-ro *n-e	ne-N *n-aN	ne-sas(e) *n-as(e)
tab(e) 'eat'	*tabe-ru *tabe-reba *tab-u *tab-eba tab-u-ru tab-u-reba	tabe-ta *tab-ta *[tanda] *tab-ita	tabe-ro *tab-e	tabe-N *tab-aN	tabe-sas(e) *tab-as(e)
ki 'wear' oki 'wake'	ki-ru ki-reba oki-ru oki-reba	ki-ta oki-ta	ki-ro oki-ro	*ki-N ki-raN ?oki-N oki-raN	ki-sas(e) oki-sas(e)
k(o) 'come'	*ko-ru *ko-reba *k-u *k-eba k-u-ru k-u-reba	*ko-ta k-ita	*ko-ro /k-e/ [ke:]	ko-N *k-aN	ko-sas(e) *k-as(e)
s(e) 'do'	*se-ru *se-reba *s-u *s-eba s-u-ru s-u-reba	*se-ta s-ita	se-ro *s-e	se-N *s-aN	?se-sas(e) s-as(e)
sin 'die'	sin-u sin-eba	/sin-ta/ [sinda]	sin-e	sin-aN	sin-as(e)
yob 'call'	yob-u yob-eba	/yob-ta/ [yonda]	yob-e	yob-aN	yob-as(e)
kak 'write'	kak-u kak-eba	/kak-ita/ [kaita]	kak-e	kak-aN	kak-as(e)
hanas 'talk'	hanas-u hanas-eba	hanas-ita	hanas-e	hanas-aN	hanas-as(e)

/n(e)/ and /tab(e)/ in Japanese-Yanagawa dialect is assumed to be associated with two stem allomorphs, as here written with parentheses for the verbal lexemes.

2.2 An argument for the assumption of two allomorphs for the so-called 'vowel-/e/ final' base verbs and the strong base verbs

Before we observe the phenomena in question, we will argue for Koga and Ono's, 2010 assumption of plural stem allomorphs in this section since the assumption is crucial to the current study.

If we assume that general grammar of Japanese, maybe with different surface constraints added for particular dialects and old Japanese, should be the core of all the possible particular grammars of Japanese, the grammar of Saga western dialect to propose here, if it is deep enough, should at least suggest an idea to a crucial phenomenon of stem selections in another dialect or an old Japanese if there is any. There is such a crucial phenomenon found in Old Japanese. The so-called 'vowel /e/-final' base verbs and the strong base verbs have two kinds of 'non-past' forms, differing in whether they occur prenominally or not, as in (a) examples non-prenominally and in (b) examples prenominally from (1a) to (4b) in contrast with those having only one kind of 'non-past' forms, as in (5a) and (5b).

(1) a. onna   nageki **nu**   to   te,   ... [Ise]
       woman crying sleep [Non-past] Comp [*fin*] saying, ...
       'The woman ..., saying that she will sleep, crying.'

   b. hitori **nuru**   yo   [Noun Phrase] [Shui]
       alone sleep [Non-past] night
       'a night when I sleep alone'

(2) a. ringo **tabu**   wakaki haoto   wa tooki koto
       apple eat [Non-past] young   tooth sound Top distant event
       'Now the sound of biting an apple at my teeth was far away in the past.'[1]

   b. sake-nado   **taburu**   tsuide   ni, ... [Noun Phrase] [Fukisho]
       rice wine-etc. eat [Non-past] next one for
       '... in addition to having rice wine, for example.'

(3) a. kumo i   tachi **ku**   mo, ... [ki chuu]
       clouds staying standing come [Non-past] even if, ...
       'Even if clouds come staying and standing, ...'

   b. kari nakite **kuru**   koro, ... [Tsurezure]
       geese crying come [Non-past] time, ...
       '... when geese come (here) singing.'

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[1]This is a haiku, which is a 5-7-5 syllabled-verse, taken from Asahi-Haidan, 2007. Old Japanese is often used in haiku.

(4) a. kaze fukamu   to **su**.   [ki tyuu]
   wind is going to blow Comp [*fin*] do [Non-past]
   'Wind is going to blow.'

  b. onna mo shite mimu to te **suru**   nari [Tosa]
   woman too doing try Comp [*fin*] saying do [Non-past] is.
   'It is the case that she will do it saying that she, who is a woman, also
   tries to do that.'

(5) a. ... mazushiki hito wo tomeru hito to **nasu**.
   ... poor   people Acc rich people as make [Non-past],
   [Tsurezure]
   ...
   '(He) makes poor people to become rich one.'

  b. {**nasu**, *****nasuru**} sube mo nashi
   do [Non-past]   way too is not
   'There is no way to do.'

The verb in the examples (5a) and (5b) /nas/ 'do' is a consonant-final base verb.
The non-prenominal 'non-past' forms of the so-called 'vowel /e/-final' base verbs
and the strong base verbs take the pattern of the shorter verbal allomorph (like /n/
'sleep', /tab/ 'eat', /k/ 'come' and /s/ 'do') plus the 'non-past' affix /(r)u/, as in the
(a) examples. Koga and Ono, 2010 analyze the 'non-past' affix as the tense exple-
tive. The shorter allomorphs of these kinds of verbs like /n/ 'sleep', /tab/ 'eat', /k/
'come' and /s/ 'do' are thus motivated at least in the old Japanese. Their prenomi-
nal counterparts, on the other hand, take the pattern of the shorter verbal allomorph
plus /u/ + /ru/. Koga and Ono, 2010 propose an analysis of the former part of this
sequence, /u/, as an allomorph of the tense expletive /u/ and the latter part /ru/ as
another occurrence of the tense expletive /ru/. See section 3.3 for an implemented
analysis of the tense expletive /(r)u/ in Japanese-Yanagawa dialect. My specula-
tion to the doubled occurrences of the tense expletive is that the prenominal verbal
tensed forms are the longer if there are two in order for their audibility immediately
before the matrix head noun in the middle of sentences, whereas their clause-final
counterparts are the shorter because of the easy detectability at the finals of sen-
tences.

  Such a natural question may occur to the doubled tense expletive analysis by
Koga and Ono, 2010 as follows. May the doubled occurrences of the tense exple-
tive contract into lighter ones in another dialect with a smaller prosodic minimality
since a repetition of the same expletive, or one with least contribution in meaning,
may be too much in the dialect? Actually, this prediction is born out in Saga west-
ern dialect. Yanagawa and the western part of Saga are distant only 40km. The
dialects of the two communities are mutually intelligible to each other. The second
occurrence of the doubled tense expletive /u/+/ru/ in the so-called 'vowel /e/-final'
base verbs and the strong base verbs only obligatorily contracts into the glottal stop

or the beginning part of the consonant geminate in Saga western dialect, whereas the rest of the underlying final /ru/ contract into the latter part of the immediately preceding vowel lengthened, as given in Table 3.[2]

Table 3: 'Non-past' forms ending underlyingly with /ru/ in Japanese-Saga western dialect

stems meaning	'-Non-past' [s-final]	'-Non-past'-time	Japanese-Yanagawa
n(e) 'sleep'	nuʔ	nuttoki	nuru
tab(e)	tabuʔ	tabuttoki	taburu
ki 'wear'	kiː	kiːtoki	kiru
oki 'wear'	okiː	okiːtoki	okiru
k(o) 'come'	kuʔ	kuttoki	kuru
s(e) 'do'	suʔ	suttoki	suru
ir 'need'	iː	iːtoki	iru
ur 'sell'	uː	uːtoki	uru
er 'choose'	eː	eːtoki	eru
or 'break'	oː	oːtoki	oru
ar 'is'	aː	aːtoki	aru

If the glottal stop or the first half of a consonant geminate is weaker than the second half of a lengthened vowel, then such a speculation will be possible to Koga and Ono's, 2010 analysis as follows: The second occurrence of the doubled tense expletive in Saga western dialect is obligatorily the least sound of the three possible sounds deriving from the underlying form of the final occurrence of the tense expletive /ru/, i) the glottal stop ʔ or the first half of a consonant geminate (CC), ii) the second half of the lengthened vowel, (V)ː, and iii) the syllabic nasal N. Here the prosodic minimality of the tensed verbal forms in Japanese-Saga western dialect is one heavy syllable [σ_{heavy}] (in contrast with that in Japanese-Yanagawa dialect, two syllables [σ σ]). That is, in order for the prosodic minimality, the morpho-syntactic component of grammar is motivated to 'generate' those 'non-past' forms with the doubled tense expletive. And yet, the verbal forms exceed the prosodic minimality. Here economy works, and the verbal forms contract to the minimum of one heavy syllable with the glottal stop or the first half of a consonant geminate filling its coda least to satisfy the prosodic minimality. The first occurrence of the tense expletive of /u/-/ru/ is enough to obtain the semantic function of the tense expletive. Note that this explanatory-adequate explanation to the obligatory occurrence of the consonant geminate or the glottal stop in Saga western dialect is made possible by Koga and Ono's, 2010 analysis of the doubled occurrences of the tense expletive. See Koga and Ono, 2010 for arguments against analyses of the

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[2]You can find a native speaker's utterances of 266 'non-past' verbal forms of Saga western dialect at the URL of http://theoreticallinglab.isc.saga-u.ac.jp/research_topics.html.

intermediary /u/ i) as the phonological insertion, ii) as a part of the stems or iii) as the phonological alternation from /e/ to /u/.

2.3 Selections of stem allomorphs by affixes

Now we provide a further phenomenon on which stem each of the other affixes (or the past tense morpheme, the imperative morpheme, the voice morphemes and the negative morpheme) selects, the shorter or the longer, as was given in the 2nd left most column to the right most column in Table 2. For example, the past tense affix selects the longer ones for the so-called standard vowel /e/-final base verbal lexemes and the shorter ones for the strong /k/ and /s/ base verbal lexemes. The negative affix selects the longer ones for all the verbal lexemes as well as the voice verbal affixes, for example, the causative affix, do. Here we regard ?/se-sas(e)/ 'do-cause' as grammatical, sounding a little bit odd, as in (6a), as supported by the fact that the sequence ?/nes-se-sas(e)/ [heat-do-cause] 'cause (him) to heat (it)' is preferred to the shorter one */nes-s-as(e)/, if the verbal stem, consisting of one Chinese character ending with /tsu/ plus the light verb /s/ 'do' like /netsu-s-u-ru/(phonetically realizing as [ness-u-ru]), as in (6b).[3]

(6)   a. si-taka   koto ba   {?se-sase, s-ase}-ta
           do [prp]-want thing Acc {do [base]-cause, do [base]-cause}-Past

           '(We) let (him) do things that (he) wants to do.'

       b. {?[nes-se-sase-ta], *[ness-ase-ta]   [fast   speech]}
           {?/netsu-se-sase-ta/, */netsu-s-ase-ta/ [slow speech]}
           {heat [base]-cause-Past}

           '(We) let (him) heat it.'

2.4 A closer observation on further specific assumptions

If we look closer at the phenomenon in Section 2.3 on such assumptions as will be given in the paragraphs following this paragraph, a novel description will be found that the verbal stems entertain default implicative relations in a stem dependency hierarchy, as will be specified below.

   We assume that the verbal lexemes of the so-called 'vowel /e/-final' base verbs and the strong base verbs are associated with two stem allomorphs. One allomorph is the basic stem, and the other allomorph is the stem derived from the basic one. The two allomorphs of each verbal lexeme are classified into four with the specifications of two dimensions: i) derivationhood and ii) length. The specifications of the dimensions of derivationhood and length determine whether the affix in question is able to select the stem allomorph. This idea is formalized as follows:

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[3]The fact that the voice affixes prefer to select the shorter allomorph for the verbal lexeme /s(e)/ 'do' may be relevant to the fact that the strong base verb /s(e)/ is also the light verb syntactically combining with the verbal noun, as in /benkyou s-ase-ru/ (or benkyou s-as-u-ru in Japanese-Yanagawa dialect) 'study do-cause-Non-past'.

Each stem has a morphological feature of STEMS, consisting of two features, 1) SFORM and 2) LENGTH as well as the features of syntax and semantics. The SFORM specification indicates whether the stem is the basic form, *basic*, or the form adjusted with a vowel eliminated from the basic form or added to the basic form, *vwl_adjstd*. The LENGTH specification indicates whether the stem is the longer or the shorter. For the so-called 'vowel /e/-final' base verbal lexemes, the longer are the basic ones and the shorter are the derived ones, which are the same as the basic ones except with the final vowel /e/ absent. For example, the allomorph /ne/ of the verbal lexeme /n(e)/ 'sleep' is analyzed as in Figure 1.

$$
\begin{bmatrix}
morpheme \\
\text{PHON} \quad \langle \text{NE} \rangle \\
\text{STEMS} \quad
\begin{bmatrix}
stems \\
\text{SFORM} \quad basic \\
\text{LENGTH} \quad longer
\end{bmatrix} \\
\text{SYNSEM} \quad
\begin{bmatrix}
synsem \\
\text{CATEGORY}
\begin{bmatrix}
cat \\
\text{HEAD}
\begin{bmatrix}
v \\
\text{VFORM} \quad bse
\end{bmatrix} \\
\text{COMPS} \quad \langle \rangle
\end{bmatrix}
\end{bmatrix}
\end{bmatrix}
$$
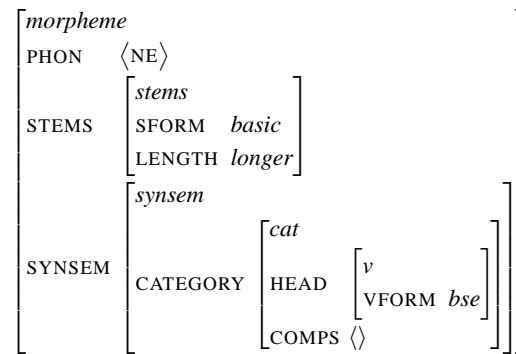
Figure 1: An analysis of the allomorph of the verbal lexeme, /ne/ 'sleep'

The other stem /n/ is analyzed as having the same feature specifications as the basic one except for [PHON *<n>*] and [STEMS [SFORM *vwl_adjstd*] [LENGTH *shorter*]]. For the strong base verbal lexemes, the shorter /k/ 'come' and /s/ 'do' are the basic ones and the longer are the derived ones, specifically the former with the vowel /o/ occurring at the final and the latter with the vowel /e/ occurring there. For example, the allomorph /ko/ of the verbal lexeme /k(o)/ 'come' is analyzed as in Figure 2.

$$
\begin{bmatrix}
morpheme \\
\text{PHON} \quad \langle \text{KO} \rangle \\
\text{STEMS} \quad
\begin{bmatrix}
stems \\
\text{SFORM} \quad vwl\_adjstd \\
\text{LENGTH} \quad longer
\end{bmatrix} \\
\text{SYNSEM} \quad
\begin{bmatrix}
synsem \\
\text{CATEGORY}
\begin{bmatrix}
cat \\
\text{HEAD}
\begin{bmatrix}
v \\
\text{VFORM} \quad bse
\end{bmatrix} \\
\text{COMPS} \quad \langle \rangle
\end{bmatrix}
\end{bmatrix}
\end{bmatrix}
$$

Figure 2: An analysis of the allomorph of the verbal lexeme, /ko/ 'come'

We could assume a morphological rule associating basic stem forms to their vowel-adjusted ones with the use of relevant thematic vowels added or with the final vowel

absent. We leave it for a future research. We stipulate the two stem forms for each verbal lexeme in our current proposal. We can develop our analysis of different allomorphs stated in different signs, following Bonami and Boyé, 2006 to make lexemes containing their associated allomorphs.

On the basic-and-derived plural stem assumption in our proposal, if we look closer at the phenomenon in Table 2, it will turn out that the verbal stems entertain default implicative relations in such a stem dependency hierarchy as given in Figure 3.

| the stems for the past affix and the infinite complementizer |

$\#[...]_i e\# \rightarrow \#[...]_i \#$ $\#s\# \rightarrow \#se\#$ $\longrightarrow$ longer

| the stems for the tense expletive | | the stems for the imperative affix |

$\#k\# \rightarrow \#ko\#$

| the stems for the negative affix |

| the stems for the voice affixes |
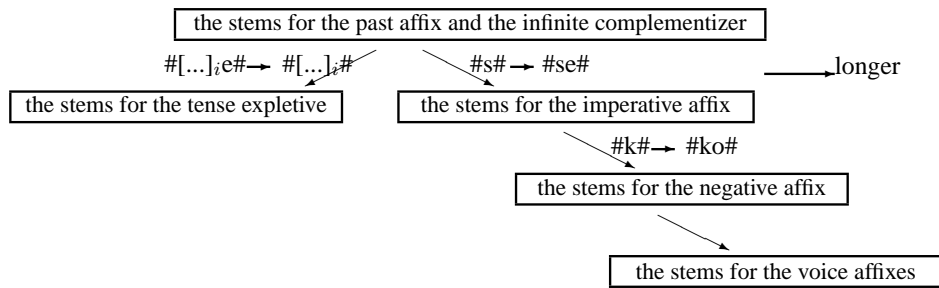
Figure 3: The verbal stem dependency of Japanese-Yanagawa dialect

The stems for the marked tense, or the past tense, and for the infinitival complementizer, or the tense interpretation dependent on that of the matrix clause, are placed at the top node. The stems for the unmarked tense, or the tense expletive, are placed at the node immediately lower than the top. In parallel, a t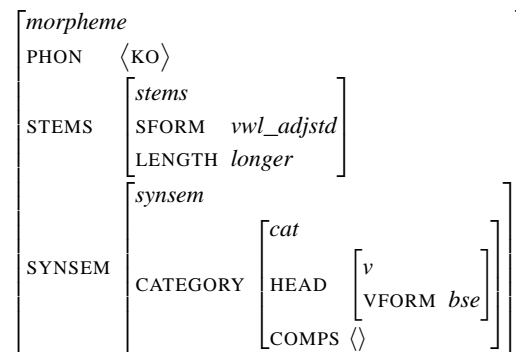ree of the stems for the relation-argument relations is placed immediately lower than the top. Each local relation between the affix at a node and the affix at its immediately lower node can describe either 1) one between a relation (R) for the higher node and its argument (A) for the lower node like one between negation for R and causative for A, as in /ne-sase-N/ ([$_{Negative}$ [$_{Voice}$ [$_{Verb}$ ne] sase] N]) [sleep-cause-not] 'do not let (him) sleep', or 2) one between a marked element (M) for a higher note and its unmarked element (UM) for the lower node like one between the past tense for M and the tense expletive for UM.

With an affix and a verbal lexeme given, the verbal stem allomorph to be selected is the same as that for the affix at the immediately higher node unless otherwise specified at the node in the given hierarchical structure. Even for the apparent 'irregularity' of the strong base verbal lexeme /k(o)/ 'come', the hierarchy discovers its implicative relation, i.e., the fact that the shorter stem /k/ 'come', which is the basic stem, is selected by the past affix, the 'non-past' affix and the imperative affix, as in [kee] (underlyingly /k-e/) 'Come', whereas the longer stem /ko/ 'come' is selected by the negative affix and the voice affixes. Note that if an affix A describes a relation or an unmarked element and another affix B describes its argument of the relation or its marked element for the unmarked element, then the stems for the affix B will be equal to or longer than those for the affix A. My

speculation for an agglutinative language like Japanese is that the more deeply embedded or marked the affix is, the longer or at least equally lengthened verbal stem allomorph will be selected in order for the audibility of the verbal stem.

The vowel /e/ deletion for the so-called vowel /e/-final base verbs and the additions of the vowels /o/ and /e/ for the strong base verbs in the proposal are well motivated. In other words, we can find explanations to how the verbal forms with basic stems plus affixes are avoided. We can find an explanation to why the imperative form */s-e/ 'do-Imperative' is avoided as follows: Assume that the imperative form /...-e∼i∼ro/ '...Imperative' will be inappropriate without distinct audibility between the verbal stem and the affix in question, for example, if the verbal stem consists of one consonant, and the POA (place of articulation) of the final consonant and the tongue position of the initial vowel of the imperative affix /e∼i∼ro/ are not far away. On this assumption, the imperative form */s-e/ 'do-Imperative' will be correctly predicted NOT to have distinct audibility between its verbal stem and the affix and to be inappropriate since the POA of the consonant /s/ and the tongue position of the vowel /e/ are close. Thus, the imperative form */s-e/ 'do-Imperative' is avoided.[4] Similarly, we can find an explanation to why the negative form */k-aN/ 'come-not' is avoided. The negative affix, which is a derivational (adjectival) affix in Japanese, is the deepest embedded except for the voice affixes, and start selecting the longer allomorph for the verbal lexeme /k(o)/ 'come' at this embedded level.

Furthermore, we can easily explain how the other stem of each of the strong base verbal lexemes derives from the one-consonant stem by assuming that the thematic vowels (or the vowels added to produce stem forms) are /e/ and /o/ in the dialect (and also Japanese) as well as usual in the linguistics of India-European languages. As pointed out by Koji Ono (personal communication), the thematic vowel close to the final consonant will be added at its final in the stem formations. The tongue position of the vowel /o/, [back +, high -], is close to that of the consonant /k/. The tongue position of the vowel /e/, [back -, high -], is close to that of the consonant /s/. Thus, it is very natural to assume that the verbal stem allomorphs of the verb lexeme 'come' are the basic /k/ and the derived /ko/, and the verbal stem allomorphs of the verbal lexeme 'do' are the basic /s/ and the derived /se/.

There is also a plausible speculation found to why the stems for the past affix and the complementizer affix are at the top of the stem dependence hierarchy, i.e., are analyzed as the most implicative stems. The past affix and the infinitive complementizer affix are more basic in the grammar of the family of Japanese and its dialects than any other stem-selecting affix among the 'non-past' affix, the conditional affix, the imperative affix, the negative affix and the voice affixes. This is supported by the fact that phrases of the past affix and the infinitive complementizer are selected as the morphological complement by the biggest number of other

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[4]On the other hand, the imperative form /k-e/ 'come-Imperative', phonetically realizing as [ke:], is correctly predicted to have distinct audibility since the POA of the consonant /k/ and the tongue position of the vowel /e/ are far away.

lexemes, for example, the conditional affix /ra/, the benefactory verb /moraw/ 're-ceive' than phrases of the other affixes are. This is also supported by the highest frequency of the stems for the past affix and the complementizer affix in language use.

Suppose another hierarchical structure as in Figure 4, which is the opposite hierarchy of Figure 3, is assumed, which will be rejected soon.
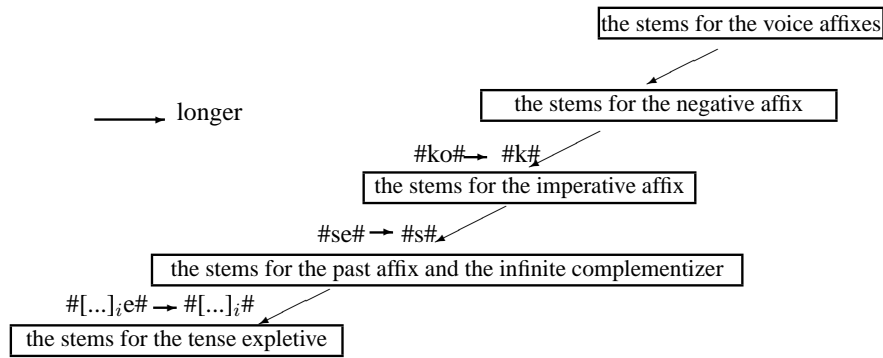
Figure 4: The verbal stem dependency of Japanese-Yanagawa dialect: undesirable one

The stems for the voice affixes, the most predicative verbal stems, were analyzed as the top of the hierarchy. On this assumption, the deletions of the vowels /o/ and /e/ for the strong base verbs cannot be well motivated. In other words, we cannot find explanations for why and how the verbal forms with basic stems plus affixes are avoided. We will not be able to find any explanation to the fact that */ko-i/ (*/ko-ro/), including the hypothesized basic stem form, was not preferred to /k-e/ [ke:], including the hypothesized derived stem form, in the dialect, and to the fact that */se-ta/ 'do-Past', including the hypothesized basic stem form, was not preferred to /s-ita/ 'do-Past', including the hypothesized derived stem form. This undesirable situation would not occur if the basic stems of the strong base verbs were analyzed as the shorter ones, /k/ and /s/, as assumed in our proposal.

3 Analyses of affixes

3.1 Derivational and inflectional affixes of the agglutinative language

We assume that every morphological phrase is identified with a morpheme or a morphological phrase for its non-head daughter and another morpheme for its head daughter. The head feature principle in syntax in HPSG with the morphological feature STEMS included holds true in Japanese.[5] In other words, morphemes in

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[5]One difference is that the PHON value of a morphological phrase is not only a list of two PHON values of the non-head daughter and the head daughter, but a concatenation of them.

our proposal are words in HPSG. The assumption is motivated in the agglutinative language Japanese and its dialects since affixes and affix-like verbs, which are mostly historical remnants of verbs, are distinct from lexemes, and attach to lexemes always at their finals, differently from inflections in India-European languages. For example, Sag, 2012 uses the morphological function of the preterite (past) tense for its inflection in English as follows:

$F(\text{unction})_{preteritie}(\text{take}) = \text{took}$,

$F_{preterite}(\text{buy}) = \text{bought}$, ...,

$F_{preterite}(x) = x\text{-ed}$, where x is otherwise.

On the other hand, Japanese has a distinctive past affix (i)ta. For every morpheme, including allomorphs of a verbal lexeme x, $F_{past}(x) = x\text{-(i)ta}$ in Japanese, where phonological changes occurring over the morpheme boundary are left to phonology and stem selections are left to morphology. Since this analysis does not distinguish the derivational affixes (or the affix-like voice verbs) from the inflectional affixes, e.g., /(i)ta/ 'Past', the grammar of Japanese and its dialects will be much simpler, as will be clarified in the research of the voice affixes of Japanese and its dialects.

3.2   An implemented analysis of the past affix

The analyses of affixes' selections may or may not be the same from dialects to dialects. Take an example of the past affix /(i)ta/. Since the past affix selects the identical morphemes of identical verbal lexemes from standard Japanese to its dialects in general, the selection by the past affix should be stated in the core components of grammar. The analysis we propose is stated in the COMPS specification of the past affix. The stem forms that the past affix selects are those of [STEMS [SFORM *basic*] [LENGTH *longer*]] if the verbal stem is the so-called vowel /e/-final verb and those of [STEMS [SFORM *basic*] [LENGTH *shorter*]] if the verbal stem is either of the strong base verbs /k/ 'come' and /s/ 'do'. The largest common feature specifications of the stem forms that the past affix selects are [STEMS [SFORM *basic*]]. The past affix is thus analyzed as specifying its morphological complement as having the morphological specification of [STEMS [SFORM *basic*]] as well as the specifications in syntax and semantics, as formalized in Figure 5.

The feature COMPS in our proposal is the morphological one. The past affix /(i)ta/ can select, for example, /ne/ for the verbal lexeme /n(e)/ 'sleep', as in Figure 6, but NOT /n/, which has the morphological specification of [STEMS [SFORM *vwl_adjstd*]], as supported by the ungrammaticality of */n-ta/ or *[nda] 'sleep-Past'.[6]

---

[6]The boundaries of verbal stems and affixes in Japanese-Yanagawa dialect as well as standard are basically either C#V or V#C, but NOT C#C or V#V. The concatenations of the 'vowel /e/-final' base verbs and the strong base verbs are like /ne-ta/ 'sleep-Past', /k-ita/ 'come-Past' and /s-ita/ 'do-Past' in the dialect. There is one difference between the dialect and standard. The past verbal form of the verbal lexeme /s(i)/ is /si-ta/ in standard Japanese since the negative form in the dialect is /se-N/, whereas that in standard is /si-nai/. See Nakamichi, 1999 for the so-called 'sound convention' of Japanese, as in the phonetic form /oyoida/ of the underlying sequence /oyog/ plus /(i)ta/, which is an exception of affixation.

Figure 5: An analysis of the past affix /(i)ta/

$$
\begin{bmatrix}
morpheme \\
\text{PHON} & \langle \text{(I)TA} \rangle \\
\text{SYNSEM} &
\begin{bmatrix}
synsem \\
\text{CATEGORY} &
\begin{bmatrix}
cat \\
\text{HEAD} &
\begin{bmatrix}
t \\
\text{TFORM } past
\end{bmatrix} \\
\text{COMPS} &
\left\langle
\begin{bmatrix}
sign \\
\text{STEMS} &
\begin{bmatrix}
stems \\
\text{SFORM } basic
\end{bmatrix} \\
\text{SYNSEM} &
\begin{bmatrix}
synsem \\
\text{CATEGORY} &
\begin{bmatrix}
cat \\
\text{HEAD} &
\begin{bmatrix}
v \\
\text{VFORM } bse
\end{bmatrix} \\
\text{COMPS } \langle \rangle
\end{bmatrix}
\end{bmatrix}
\end{bmatrix}
\right\rangle
\end{bmatrix}
\end{bmatrix}
\end{bmatrix}
$$

Figure 6: An analysis of the past form /ne-ta/ 'sleep-Past'

$$
\begin{bmatrix}
phrase \\
\text{PHON} & \langle \boxed{2}\langle \text{NE}\rangle, \boxed{3}\langle \text{TA}\rangle \rangle \\
\text{STEMS} & \boxed{4}\,[stems] \\
\text{SYNSEM} &
\begin{bmatrix}
synsem \\
\text{CATEGORY} &
\begin{bmatrix}
cat \\
\text{HEAD} & \boxed{6}
\begin{bmatrix}
t \\
\text{TFORM } past
\end{bmatrix} \\
\text{COMPS} & \boxed{5}\langle \rangle
\end{bmatrix}
\end{bmatrix} \\
\text{NON\_HD\_DTR} &
\begin{bmatrix}
morpheme \\
\text{PHON} & \boxed{2} \\
\text{STEMS} & \boxed{0}
\begin{bmatrix}
stems \\
\text{SFORM } basic \\
\text{LENGTH } longer
\end{bmatrix} \\
\text{SYNSEM} & \boxed{1}
\begin{bmatrix}
synsem \\
\text{CATEGORY} &
\begin{bmatrix}
cat \\
\text{HEAD} &
\begin{bmatrix}
v \\
\text{VFORM } bse
\end{bmatrix} \\
\text{COMPS } \langle \rangle
\end{bmatrix}
\end{bmatrix}
\end{bmatrix} \\
\text{HD\_DTR} &
\begin{bmatrix}
morpheme \\
\text{PHON} & \boxed{3} \\
\text{STEMS} & \boxed{4} \\
\text{SYNSEM} &
\begin{bmatrix}
synsem \\
\text{CATEGORY} &
\begin{bmatrix}
cat \\
\text{HEAD} & \boxed{6} \\
\text{COMPS} &
\left\langle
\begin{bmatrix}
sign \\
\text{STEMS} & \boxed{0} \\
\text{SYNSEM} & \boxed{1}
\end{bmatrix}
\Big| \boxed{5}
\right\rangle
\end{bmatrix}
\end{bmatrix}
\end{bmatrix}
\end{bmatrix}
$$

3.3 An implementation of the allomorph selections by the 'non-past' affix in Koga and Ono, 2010

Take another example of the 'non-past' affix, or the tense expletive. There are dialectal or historical variations for the so-called 'non-past' verbal forms. The stem forms that the tense expletive selects in the dialect will be those of [STEMS [SFORM *vwl_adjstd*] [LENGTH *shorter*]], as in /tab-u-ru/ 'eat-Non-past-Non-past', if the verbal stem is the so-called vowel /e/-final verb and those of [STEMS [SFORM *basic*] [LENGTH *shorter*]] if the verbal stem is either of the strong base verbs /k/ 'come' and /s/ 'do'. The largest common feature specifications of the stem forms that the tense expletive selects are [STEMS [SFORM *shorter*]]. This is the same in standard and other dialects, and the selection should thus be stated in the core components of grammar.

Differently from that in the dialect and standard, the non-prenominal and prenominal 'non-past' forms in Old Japanese are the shorter stem form plus one occurrence of the tense expletive and the shorter stem from plus two occurrences of the tense expletive, as exemplified in /tab-u/, as in (2a), and /tab-u-ru/, as in (2b) for the example of /tab(e)/ 'eat'. We can implement Koga and Ono's, 2010 selectional analysis of the tense expletive affix /(r)u/ as selecting a verbal base form with its stem [STEMS [LENGTH *shorter*]] or a tense [expletive] phrase in the core components of grammar, as formalized as in Figure 7.
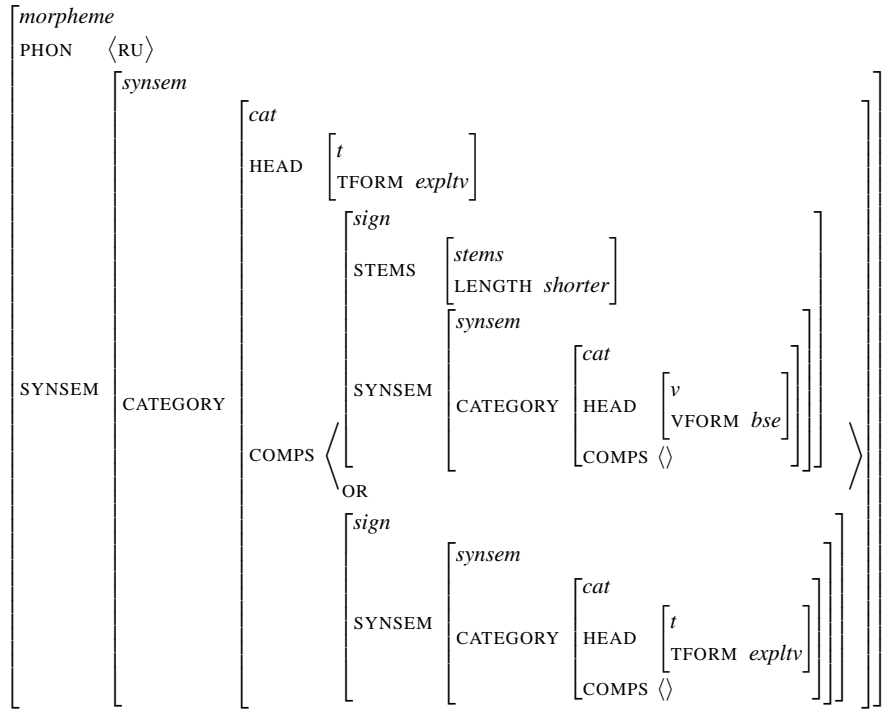

Figure 7: An analysis of /ru/ 'Tense expletive'

The core components of grammar, then, allow candidates */tab#u/, as in Figure 8, and /tab#u#ru/, as in Figure 9, disallowing */tabe#ru/ since the stem /tabe/ is [STEMS [LENGTH *longer*]] for 'eat [Non-past]' in the dialect.

$$
\begin{bmatrix}
\textit{phrase} \\
\text{PHON} \quad \left\langle \boxed{2}\langle\text{TAB}\rangle, \boxed{3}\langle\text{U}\rangle \right\rangle \\
\text{STEMS} \quad \boxed{4}\,[\textit{stems}] \\
\text{SYNSEM} \quad
\begin{bmatrix}
\textit{synsem} \\
\text{CATEGORY}
\begin{bmatrix}
\textit{cat} \\
\text{HEAD} \quad \boxed{6}\begin{bmatrix} t \\ \text{TFORM} \; \textit{expltv} \end{bmatrix} \\
\text{COMPS} \quad \boxed{5}\langle\rangle
\end{bmatrix}
\end{bmatrix} \\
\text{NON\_HD\_DTR}
\begin{bmatrix}
\textit{morpheme} \\
\text{PHON} \quad \boxed{2} \\
\text{STEMS} \quad \boxed{0}\begin{bmatrix} \textit{stems} \\ \text{SFORM} \; \textit{vwl\_adjstd} \\ \text{LENGTH} \; \textit{shorter} \end{bmatrix} \\
\text{SYNSEM} \; \boxed{1}
\begin{bmatrix}
\textit{synsem} \\
\text{CATEGORY}
\begin{bmatrix}
\textit{cat} \\
\text{HEAD} \begin{bmatrix} v \\ \text{VFORM} \; \textit{bse} \end{bmatrix} \\
\text{COMPS} \; \langle\rangle
\end{bmatrix}
\end{bmatrix}
\end{bmatrix} \\
\text{HD\_DTR}
\begin{bmatrix}
\textit{morpheme} \\
\text{PHON} \quad \boxed{3} \\
\text{STEMS} \quad \boxed{4} \\
\text{SYNSEM}
\begin{bmatrix}
\textit{synsem} \\
\text{CATEGORY}
\begin{bmatrix}
\textit{cat} \\
\text{HEAD} \quad \boxed{6} \\
\text{COMPS} \; \left\langle \begin{bmatrix} \textit{sign} \\ \text{STEMS} \; \boxed{0} \\ \text{SYNSEM} \; \boxed{1} \end{bmatrix} \;\middle|\; \boxed{5} \right\rangle
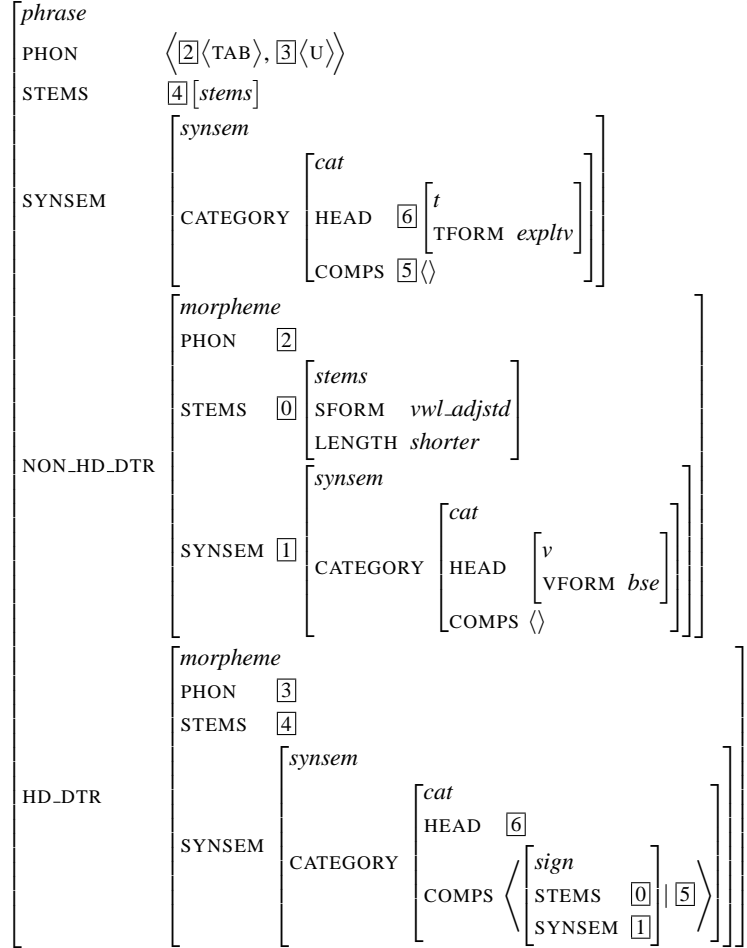\end{bmatrix}
\end{bmatrix}
\end{bmatrix}
\end{bmatrix}
$$

Figure 8: An analysis of */tab#u/ 'eat-Tense Expletive'

An Optimality Theoretic (OT)-constraint-based syntax framework (in which syntax is the 'generator' to map a set of candidates from a given meaning), including violable constraints outside of the core components, similarly to Lee 2004, will be in order. We assume a division of labor among morpho-syntax, phonology and semantics.[7] Here leaving the implementations of the surface constraints for a

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[7]Our implementation does not include semantics, and the implementation of the semantics is left for a future research. Since the meaning of the tense expletive is analyzed as being inherently the identity function, if the 'non-past' tense is cost-free, the meaning of the 'non-past' will be conventionally implicated (Koga and Ono, 2010). The meaning of */tab-u/ 'eat-Tense Expletive', for example, would be $\lambda X \lambda e \lambda t[X(e)(t) \,\&\, t \in Non - past](\lambda X \lambda e \lambda t[X(e)(t)] \,(\lambda e \lambda t[eat'(e)(t)]))$, equivalently $\lambda e \lambda t[eat'(e)(t) \,\&\, t \in Non - Past]$. The semantics of the tense expletive is $\lambda X \lambda e \lambda t[X(e)(t)]$.

$$
\begin{bmatrix}
phrase \\
\text{PHON} & \left\langle \boxed{8}\left\langle \boxed{5}\langle \text{TAB}\rangle, \boxed{6}\langle \text{U}\rangle \right\rangle, \boxed{9}\langle \text{RU}\rangle \right\rangle \\
\text{STEM} & \boxed{10}\begin{bmatrix}stem\end{bmatrix} \\
\text{SYNSEM} & \begin{bmatrix}
synsem \\
\text{CATEGORY} & \begin{bmatrix}
cat \\
\text{HEAD} & \boxed{12}\begin{bmatrix}t \\ \text{TFORM} & expltv\end{bmatrix} \\
\text{COMPS} & \boxed{11}\langle\rangle
\end{bmatrix}
\end{bmatrix} \\
\text{NON\_HD\_DTR} & \begin{bmatrix}
phrase \\
\text{PHON} & \boxed{8} \\
\text{STEM} & \boxed{0}\begin{bmatrix}stem\end{bmatrix} \\
\text{SYNSEM} & \boxed{7}\begin{bmatrix}
synsem \\
\text{CATEGORY} & \begin{bmatrix}
cat \\
\text{HEAD} & \boxed{2}\begin{bmatrix}t \\ \text{TFORM} & expltv\end{bmatrix} \\
\text{COMPS} & \boxed{1}\langle\rangle
\end{bmatrix}
\end{bmatrix} \\
\text{NON\_HD\_DTR} & \begin{bmatrix}
morpheme \\
\text{PHON} & \boxed{5} \\
\text{STEM} & \boxed{3}\begin{bmatrix}stem \\ \text{SFORM} & vwl\_adjstd \\ \text{LENGTH} & shorter\end{bmatrix} \\
\text{SYNSEM} & \boxed{4}\begin{bmatrix}
synsem \\
\text{CATEGORY} & \begin{bmatrix}
cat \\
\text{HEAD} & \begin{bmatrix}v \\ \text{VFORM} & bse\end{bmatrix} \\
\text{COMPS} & \langle\rangle
\end{bmatrix}
\end{bmatrix}
\end{bmatrix} \\
\text{HD\_DTR} & \begin{bmatrix}
morpheme \\
\text{PHON} & \boxed{6} \\
\text{STEM} & \boxed{0} \\
\text{SYNSEM} & \begin{bmatrix}
synsem \\
\text{CATEGORY} & \begin{bmatrix}
cat \\
\text{HEAD} & \boxed{2} \\
\text{COMPS} & \left\langle\begin{bmatrix}sign \\ \text{STEM} & \boxed{3} \\ \text{SYNSEM} & \boxed{4}\end{bmatrix} \Big| \boxed{1}\right\rangle
\end{bmatrix}
\end{bmatrix}
\end{bmatrix}
\end{bmatrix} \\
\text{HD\_DTR} & \begin{bmatrix}
morpheme \\
\text{PHON} & \boxed{9} \\
\text{STEM} & \boxed{10} \\
\text{SYNSEM} & \begin{bmatrix}
synsem \\
\text{CATEGORY} & \begin{bmatrix}
cat \\
\text{HEAD} & \boxed{12} \\
\text{COMPS} & \left\langle\begin{bmatrix}sign \\ \text{STEM} & \boxed{0} \\ \text{SYNSEM} & \boxed{7}\end{bmatrix} \Big| \boxed{11}\right\rangle
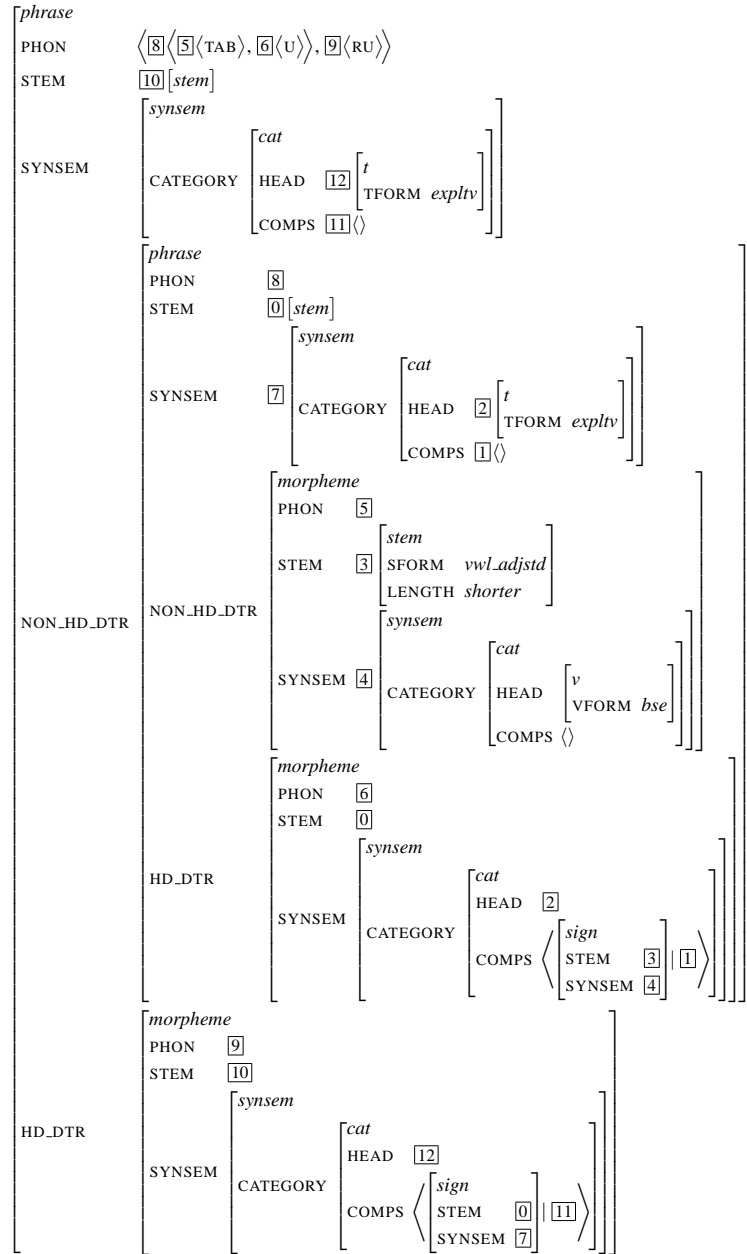\end{bmatrix}
\end{bmatrix}
\end{bmatrix}
\end{bmatrix}
$$

Figure 9: An analysis of /tab#u#ru/ 'eat-Tense Expletive-Tense Expletive'

future research, we repeat Koga and Ono's, 2010 surface constraints. Grammatical but inappropriate candidates like */tab#u/ 'eat-Tense [Expletive]' in Figure 8 in the dialect are excluded by surface constraints (SCs) (Koga and Ono, 2010). The characteristic of the surface constraints is that they may use notions of various components, thus suggesting a requirement of heavier loads on computations in brain and resulting in children's errors in the later period of their acquisitions. SC1: The prosodic structure of every tensed form is at smallest bimoraic. This is similar to Ito, 1990. For example, /n#u/ 'sleep-Tense [expletive]', violates this. SC2: Given a subconstituent C of a candidate expression characterized by a set of syntactic specifications, C stands in correspondence to every other listed form that is characterized by the same set of syntactic values within its immediate morphological class (Steriade, 2008). Constraint SC2 with the subconstituent C being the rest of the verbal stem excludes */tab#u/ 'eat-Tense [Expletive]', which contains only /u/ in the rest of the verbal stem, since some lexeme within its morphological class whose stem consists only of one consonant, e.g., /n/ 'sleep', leads to a violation of the surface constraint 1 (SC1). The lexemes /tab(e)/ and /n(e)/ are two of the morphological class with the basic stem endings with the vowel /e/. Thus, the grammar, which is the core components plus the surface constraints, allows /tab#u#ru/ for 'eat [Non-past]'. See Koga and Ono, 2010 for another constraint of the economy for the number of repeated occurrences of the tense expletive. The well-known apparently-irregular 'conjugations' of the strong base verbs /k(o)/ 'come' and /s(e)/ 'do' left unexplained until now are thus explained with an explanatory adequacy similarly.

4 Conclusion and implications

We found stem dependency in Japanese-Yanagawa dialect. The stem dependency forms a hierarchical structure with the stem forms of the past affix at the top node and with each local relation describing a *either* relation-argument *or* marked-unmarked relation. It is revealed that the more deeply embedded or marked the affix is, the longer or at least equally lengthened verbal stem will be selected. We argued for Koga and Ono's, 2010 analysis of /u/-/ru/ in the 'non-past' forms of the so-called vowel /e/-final base verbs and the strong base verbs as the doubled occurrences of the tense expletive, using the data of the old Japanese and Saga western dialect, which is crucial to the current study. When we examined the two descriptive-adequate stem dependency hierarchies, we used a criterion, whether we can find an explanation for why and how the basic (or more basic) one plus the affix, which would be implicated from the hierarchy if it were not for the specification there, would be avoided for every specification of another allomorph in the hierarchy (either by a suppletion or an allomorph derivational rule). This is considered an explanatory-adequate criterion for stem dependency hierarchies. As two examples from among the affixes, we presented implementations of the past affix and Koga and Ono's, 2010 selectional analysis by the tense expletive in the

core components of the grammar, which both include the morphological selectional specifications as well as syntactic and semantic ones. The current study implies that the morphological selectional specifications are independently necessary, and are analyzed with the use of the dimensions of derivationhood and length in the agglutinative language Japanese.

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