Allomorph Selection in the Japanese Verb Paradigm

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- Why does such allomorphy occur only in these contexts?

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- Allomorph selection (Ito and Mester 2004, 2015): such allomorphs are specified in the lexicon and selected by the phonology via (classic) Optimality Theory.

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  - Failure to handle cases of opacity
  - Redundant lexical specification of allomorphs of verbal stem
  - Overgeneration caused by lexically specified stem allomorphs
- We should seriously consider the existence of phonological processes whose application is restricted by morphological/lexical context.

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- Conclusion

The Main Paradigm

Alternation	Ex. Suffix		Ex. C-Stem *nom-* 'drink'	Ex. V-Stem *tabe-* 'eat'
C $\leftrightarrow \varnothing$	non-past	-(r)u	nom-**u**	tabe-**ru**
V $\leftrightarrow \varnothing$	negative	-(a)na	nom-**ana**-i	tabe-**na**-i
Irregular	potential	-rare/e	nom-**e**-ru	tabe-**rare**-ru

Table 1: Suffix alternations in the main paradigm

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- Standard Analysis (Kuroda 1965; McCawley 1968)
  1. C $\rightarrow \varnothing$ / C $]_{\text{vb-stem}}$ __ /nom+**ru**/ $\rightarrow$ [nom-**u**]
  2. V $\rightarrow \varnothing$ / V $]_{\text{vb-stem}}$ __ /tabe+**ana**+i/ $\rightarrow$ [tabe-**na**-i]

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- Following Ito and Mester (2004, 2015), we aim to derive verbal allomorphy using constraints on syllable structure.
- We must assume that ONSET and NOCODA are ranked low in modern Japanese, since vowel hiatus and consonant clusters are common.
- In order to exceptionally allow deletion in the suffix, we need high-ranking constraints which are specific to verbal stems and suffixes.

OT Version of the Standard Analysis

Context-specific constraints are needed, parallel to the rule-based analysis.

/nom+ru/	CODA COND	DEP-IO	IDENT-IO	MAX-IO	NOCODA
a. nom-ru	∗!		∗		
☞ b. nom-u				∗	
☞ c. no-ru				∗	
d. nomi-ru		∗!			
e. nom-mu			∗!		∗

Figure 1: C-stem verb with non-past suffix, no context-specific constraints

- CODACOND disallows codas with independent place features.
- MAX-IO/DEP-IO/IDENT-IO disallow deleting/inserting/changing a segment.
- NOCODA disallows syllables with a coda.

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☞ b. nom-u					*	
c. no-ru				*!		
d. nomi-ru		*!				
e. nom-mu			*!			*

Figure 2: C-stem verb with non-past suffix, *with* context-specific constraints

- CODACOND disallows codas with independent place features.
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- Key Point #1: the relevant morphemes have more than one UR.
  - potential: {-rare, -e}
  - non-past: {-ru, -u}
  - negative: {-ana, -na}
- Key Point #2: We consider every mapping from UR to SR for every possible combination of URs, and let OT select the best mapping as usual.

The Allomorph Selection Analysis – Main Paradigm Example

/nom+{u,ru}/	CODA COND	DEP-IO	IDENT-IO	MAX-IO	NOCODA
☞ a. nom-u → nom-u					
b. nom-ru → nom-ru	*!				*
c. nom-ru → nom-u				*!	
d. nom-ru → no-ru				*!	
e. nom-ru → nomi-ru		*!			
f. nom-ru → nom-mu			*!		*

Figure 3: C-stem verb with non-past suffix, allomorph selection analysis

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- It is not without cost, since we need to enrich the lexicon.
- It also handles fully irregular forms, such as the potential suffix *-rare/-e*, which must be lexically specified in any case.

The T-Suffix Sub-Paradigm

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Process	Ex. Verb		Past Form	
Gemination	*kaer-u*	'go home'	kaer+ta	→ kaet-ta
Assimilation	*sin-u*	'die'	sin+ta	→ sin-da
Epenthesis	*kas-u*	'lend'	kas+ta	→ kasi-ta
C-to-V	*nak-u*	'cry'	nak+ta	→ nai-ta

Table 2: Allomorphy in the past suffix, partial listing

The T-Suffix Sub-Paradigm – All Stem Types

Type	Ex. Verb		Past Form	
V	*tabe-ru*	‘eat’	tabe+ta	→ tabe-ta
t	*tat-u*	‘drink’	tat+ta	→ tat-ta
w	*kaw-u*	‘buy’	kaw+ta	→ ka**t**-ta
r	*kaer-u*	‘go home’	kaer+ta	→ kae**t**-ta
n	*sin-u*	‘die’	sin+**t**a	→ sin-**d**a
m	*nom-u*	‘drink’	no**m**+ta	→ no**n**-**d**a
b	*yob-u*	‘call’	yo**b**+ta	→ yo**n**-**d**a
s	*kas-u*	‘lend’	kas+ta	→ kas**i**-ta
k	*nak-u*	‘cry’	na**k**+ta	→ na**i**-ta
g	*oyog-u*	‘swim’	oyo**g**+ta	→ oyo**i**-**d**a

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- The stem consonant may be replaced with a vowel (k, g)
- The suffix consonant may be voiced to match the stem (n, m, b, g)

Extending the Allomorph Selection Analysis

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- We can derive the past tense of s- and k-stem verbs in this manner, but not g-stems, which require opaque voicing in the suffix → opacity problem.
- The new stem URs will be predicted to be available in the main paradigm → overgeneration problem.

Classic OT Alone is Sufficient for Some Stems

/kaw+ta/	*DD	*NT	CODA COND	MAX-IO	IDENT-IO	NOCODA
a. kaw-ta			∗!			∗
☞ b. kat-ta					∗	∗
c. kaw-wa	∗!				∗	∗
d. ka-ta				∗!		
e. ka-wa				∗!		

Figure 4: W-stem verb with past suffix, single UR

- *DD disallows voiced obstruent clusters (including geminates)
- *NT disallows a nasal followed by a voiceless obstruent

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/nom+ta/	*DD	*NT	CODA COND	MAX-IO	IDENT-IO (MANNER)	IDENT-IO	NOCODA
a. nom-ta			*!				*
☞ b. non-da						*	*
c. non-ta		*!				*	*
d. no-ta				*!			
e. nom-a				*!			
f. nom-ma					*!	*	*
g. not-ta					*!	*	*

Figure 5: M-stem verb with past suffix, single UR

- *DD disallows voiced obstruent clusters (including geminates)
- *NT disallows a nasal followed by a voiceless obstruent

Allomorph Selection Succeeds for S/K-Stems

/{kas,kasi}+ta/	CodaCond	Dep-IO	Ident-IO	NoCoda
☞ a. kasi-ta → kasi-ta				
b. kas-ta → kas-ta	∗!			∗
c. kas-ta → kasi-ta		∗!		
d. kas-ta → kat-ta			∗!	∗

Figure 6: S-stem verb with past suffix, allomorph selection

Allomorph Selection Succeeds for S/K-Stems

/{nak,nai}+ta/	CodaCond	Dep-IO	Ident-IO	NoCoda
☞ a. nai-ta → nai-ta				
b. nak-ta → nak-ta	∗!			∗
c. nak-ta → nai-ta		∗!		
d. nak-ta → nat-ta			∗!	∗

Figure 7: K-stem verb with past suffix, allomorph selection

Allomorph Selection Fails for G-Stems

/{oyog,oyoi}+ta/	CODACOND	IDENT-IO	NOCODA
☞ a. oyoi-ta → oyoi-ta			
☹ b. oyoi-ta → oyoi-da		*!	
c. oyog-ta → oyog-ta	*!		*
d. oyog-ta → oyoi-da		**!	
e. oyog-ta → oyot-ta		*!	*

Figure 8: G-stem verb with past suffix, allomorph selection

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/{oyog,oyoi}+ta/	CODACOND	IDENT-IO	NOCODA
☞ a. oyoi-ta → oyoi-ta			
☹ b. oyoi-ta → oyoi-da		∗!	
c. oyog-ta → oyog-ta	∗!		∗
d. oyog-ta → oyoi-da		∗∗!	
e. oyog-ta → oyot-ta		∗!	∗

Figure 8: G-stem verb with past suffix, allomorph selection

- We need to select the vowel-final allomorph of a g-stem verb when combining with a t-suffix, but we also need the information in the consonant-final allomorph in order to derive voicing in the suffix.
  - Ruled-based derivation: /oyog+ta/ → oyog-da → [oyoi-da]

Allomorph Selection Overgenerates in the Main Paradigm

/{kas,kasi}+{u,ru}/	CODACOND	FAITH	ONSET	NOCODA
☞ a. kas-u → kas-u				
b. kas-ru → kas-ru	∗!			∗
c. kasi-u → kasi-u			∗!	
☞ d. kasi-ru → kasi-ru				

Figure 9: S-stem verb with non-past suffix, allomorph selection

- FAITH is a shorthand for all (context-free) faithfulness constraints.

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3. Lexical Redundancy
   - For the main paradigm (e.g. non-past *-u/ru*) we were able to simplify the grammar and increase explanatory power in exchange for a small number of lexically specified allomorphs.
   - For the t-suffix paradigm, we needed lexical specification of a huge number of allomorphs whose relations are completely predictable, and created new problems in the process.

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  - Overgeneration in the main paradigm → preferred allomorphs
- The complexity that we tried to eliminate from the grammar ended up being shifted elsewhere.
- The alternations seen in the t-suffixes do not appear to be optimizing.

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  - Can we learn anything from looking at other dialects?

Works Cited

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The Main Paradigm

Verb Form	Suffix	Ex. C-Stem *nom-* 'drink'	Ex. V-Stem *tabe-* 'eat'	Alternation
non-past	-(r)u	nom-u	tabe-ru	
passive	-(r)are	nom-are-ru	tabe-rare-ru	
causative	-(s)ase	nom-ase-ru	tabe-sase-ru	$\varnothing \leftrightarrow$ C
conditional	-(r)eba	nom-eba	tabe-reba	
volitional	-(y)oo	nom-oo	tabe-yoo	
negative	-(a)na	nom-ana-i	tabe-na-i	V $\leftrightarrow \varnothing$
infinitive	-i/$\varnothing$	nom-i	tabe-$\varnothing$	
potential	-rare/e	nom-e-ru	tabe-rare-ru	V $\leftrightarrow$ CVCV
imperative	-ro/e	nom-e	tabe-ro	V $\leftrightarrow$ CV

Rules for the T-Suffix Paradigm

1.	[labial] $\rightarrow$ [alveolar] / __]$_{\text{vb-stem}}$ [alveolar]	stem: w $\rightarrow$ t, m $\rightarrow$ n
2.	[-cons, -syl] $\rightarrow$ [+cons, -cont] / __]$_{\text{vb-stem}}$ [-cont]	stem: {r, w} $\rightarrow$ t
3.	[alveolar] $\rightarrow$ [+voice] / [+voice]]$_{\text{vb-stem}}$ __	suffix: t $\rightarrow$ d
4.	[labial, -cont] $\rightarrow$ [+nasal] / __]$_{\text{vb-stem}}$ [-cont]	stem: b $\rightarrow$ n
5.	$\varnothing \rightarrow$ [i] / [s] __]$_{\text{vb-stem}}$ [alveolar]	stem: s $\rightarrow$ si
6.	[velar] $\rightarrow$ [i] / __]$_{\text{vb-stem}}$ [alveolar]	stem: {k, g} $\rightarrow$ i

Rule (2) must be ordered before rule (6).