Chapter 5

Double Morphemic Exponence as Morphological Opacity

5.1 Introduction

This chapter addresses issues surrounding what is here called double morphemic exponence (DME). DME is exemplified in (1) from the plural formation in German, where examples are given orthographically (see Zwicky 1967; Bach and King 1970; Robinson 1975; Strauss 1976; Lieber 1981, 1992; Janda 1982ab; Lodge 1989; Wiese 1996ab among many others). As amply discussed so far, a morphological expression exists as long as some phonological exponent of a morpheme surfaces. The plural formation in (1) is peculiar in this light because the plural forms are different from the singular counterparts in two respects: the presence of a suffix and umlaut on a stem vowel. Given that RM is satisfied by the presence of the suffix alone, the immediate question is why this kind of redundant phonological exponence is observed in natural languages.

(1)		*Singular*	*Plural*	*Gloss*
	a.	Gast	Gäste	guest(s)
		Gaul	Gäule	pack horse(s)
		Nacht	Nächte	night(s)
		Kraft	Kräfte	power
		Not	Nöte	pain(s)
	b.	Buch	Bücher	book(s)
		Mann	Männer	man/men
		Dach	Dächer	roof(s)

A conceivable but immediately rejected hypothesis is recourse to a phonological reason: to achieve less marked structure. This is incorrect because there is no plausible phonological reason behind the umlaut process. Indeed, umlaut creates a more marked vowel given the crosslinguistic tendency that front vowels are unrounded by default.

Umlaut is thus morphological, but why is it required? Various derivational analyses maintain different positions regarding their specific analytical implementations, but the focus of discussion has centered on how the distribution of umlaut is to be accounted for in a principled way. But they do not attempt to explain why DME as in German plurals takes place in the first place. As discussed and analyzed later in this chapter, DME is by no means limited to the plural formation in German. DME is frequently observed in various languages although it is not as pervasive as single morphemic exponence across languages. The formal mechanism underlying in DME is therefore an empirical issue which must receive a satisfactory understanding.

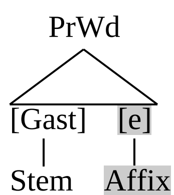
The remainder of this chapter is organized as follows. Section 5.2 outlines my general proposal to answer why DME is required and how it should be explained theoretically in the overall context of this work. The motivation and mechanism of DME are closely wired with each other, so they should be explained in a unified manner. I propose the idea of morphological opacity in the sense to be clarified and fleshed out later. Furthermore, I argue that sympathy theory (McCarthy 1999) crystallizes morphological opacity in DME from a formal theoretic perspective. The following three sections are devoted to case studies. Section 5.3 deals with so-called dominant affix effects in Japanese, where attachment of a certain suffix causes accent deletion, preaccentuation, or accent shift, depending upon the nature of the suffix. In section 5.4, I discuss the impersonal formation in Chaha. What is interesting here is that morphologically conditioned palatalization and labialization take place simultaneously. Contrary to various analyses developed in the earlier literature, I argue that this morphological process should be subsumed under the rubric of DME. In section 5.5, I present interactions of affixation and reduplication in Tagalog, which exhibit DME fully integrated in the language. The proposal made in section 5.2 is applied to phonological polarity in section 5.6. Phonological polarity is an important empirical domain that Alderete (1999) discusses to motivate anti-faithfulness theory. Discussing the singular≈plural alternation in Luo, I argue that the general proposal for DME succeeds in accommodating phonological polarity. In section 5.7, I return to the proposal made in section 5.2 and discuss its theoretical predictions. The discussion is primarily concerned with the formal restrictiveness of the proposal and predictions regarding possible and impossible morphological constructions in natural languages. I also discuss that anti-faithfulness theory makes different predictions in this context. Finally, section 5.8 briefly summarizes the main results of this chapter.

5.2 Morphological Opacity and Sympathy Theory

This section is aimed at providing a principled and integrated answer to the two questions raised above: (i) why DME takes place, and (ii) how it should be formally analyzed. Given the fact that many morphemes are phonologically expressed either by adding an affix (e.g., English plurals) or by simply modifying the phonological shape of the base (as in a lot of nonconcatenative morphological processes discussed so far), it is at first glance a mystery that both affixation and a phonological change of a base should be necessary at the same time for a single morphemic expression.

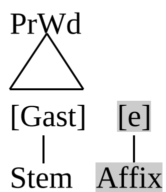
The reason why no stem modification is necessary in most cases of affixation is that it is sufficient for the satisfaction of RM. On the other hand, some kind of stem modification is employed when no affix exists underlyingly because it is the only eligible strategy to avoid a violation of RM. This apparently trivial observation is indeed the key toward a satisfactory understanding of DME. Building on this, I propose that DME occurs when the affix is made invisible to RM through some mechanism to be fleshed out shortly. Consider the illustration given in (2) to illuminate this idea. The entire word contains a suffix as well as a stem, but the suffix is invisible, hence morphological opacity. The suffix behaves as if it were not present in the structure, making only the stem available as a visible element. For the aforementioned reasons, the stem needs some phonological change due to the pressure of RM: the cooccurrence of affixation and a stem modification makes sense if the affix is made opaque for the purpose of satisfying RM.

(2)



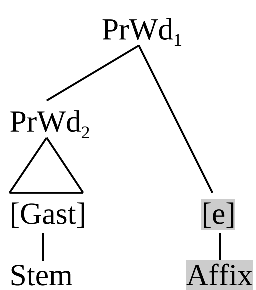
My proposal is that the effect of morphological opacity is obtained through sympathy theory, originally advanced by McCarthy (1999) to handle phonological opacity (Kiparsky 1971, 1973). Consider (2) as an example. What is needed here is to make the suffix invisible. This is in effect tantamount to articulating a system to exclude the suffix from the word domain. This is achieved by assuming Stem≡PrWd as the selector constraint. The effect of this constraint is to make the domain of a stem accord with that of a prosodic word. As schematically illustrated in (3), the output form that satisfies this constraint has a structure in which the suffix is disregarded from the prosodic word domain. In other words, the stem domain is coextensive with the prosodic word domain. Since RM is sensitive to a prosodic word, this output representation violates RM as it stands. Thus, (3) is precisely the configuration where some nonconcatenative morphological operation takes place, the only difference being whether an opaque affix is present or not. The structure in (3) thus requires a phonological change on the stem, the specific instantiation of which depends upon which Faith-IO constraint is ranked lower than RM.

(3)



An important issue is the possibility that the entire word encompassing the stem and the suffix has the recursive prosodic word structure as in (4). In this case, the stem is coextensive with $PrWd_2$, but $PrWd_1$ subsumes both the stem and the suffix. Although this word structure is a possibility, this does not impinge upon the argument. Assuming that Stem≡PrWd is operative with respect to all prosodic word nodes contained in the representation, one violation is incurred because the stem domain does not coincide with the $PrWd_1$ domain. This indicates that the recursive prosodic word structure of the kind depicted in (4) fares worse than the structure in (3), everything else being equal.

(4)



Returning to the German plural examples in (1), the analysis is given in (5), where Stem≡PrWd plays a key role as the selector constraint. As far as Stem≡PrWd is concerned, output candidates yielded by *Gen* are all required to have the structure in (3). (5c) is more harmonic between the two candidates fulfilling Stem≡PrWd. Since this is the selector constraint, (5c) is opted for as the sympathy candidate due to the fact that Ident-IO-[+back] is ranked lower than RM. (5b) and (5d) are immediately eliminated from the selection of the sympathy candidate because they violate the selector constraint itself. But a further step is needed: the well-formedness evaluation of overall candidates with respect to the sympathy candidate through Ident-❁O-[back]. (5d) satisfies this constraint, but (5a) and (5b) do not. Especially, (5b) incurs a fatal violation here because it satisfies RM by virtue of the fact that it faithfully parses the suffix associated with the plural morpheme. Candidates (5a) and (5c) are ruled out by high ranking Max. Thus, the intuition behind this sympathy analysis is pretty straightforward: faithful parsing of the suffix is required by high ranked Max, but a stem modification is added since the suffix behaves as if it were not there. ❁Stem≡PrWd and Ident-❁O-[back] jointly require the optimal form to agree with the sympathy candidate in the relevant vowel quality change. Certain morphemes activate ❁Stem≡PrWd when they receive two phonological exponents.

(5)

		$/Gast\text{-}e/_{Plural}$	Max	RM	Ident-❁O [back]	Ident-IO [+back]	❁Stem ≡PrWd
a.		Gast	*!	*	*		
b.		Gaste			*!		*
c.	❁	Gäst	*!			*	
d.	☞	Gäste				*	*

Building on this argument, I propose a generalized schema of DME. Several crucial ranking relations can be excerpted from (5). First, it is essential that RM outrank Ident-IO-[+back] so that a candidate with umlaut is selected as the sympathy candidate (compare (5a) and (5c)). Second, Ident-❀O-[back] needs to be ranked over Ident-IO-[+back] because the sympathy candidate would not exercise any influence over other candidates otherwise (compare (5b) and (5d)). Finally, the fact that the optimal form carries the underlying suffixal element *-e* suggests that Max dominates ❀Stem≡PrWd (compare (5c) and (5d)). Given these crucial rankings, the generalized schema of DME looks as in (6). The reason why umlaut takes place in the plural formation in German is that relevant faithfulness constraints are Ident-IO-[+back] and Ident-❀O-[back]. Faith-IO and Faith-❀O are variables, so various nonconcatenative morphological operations can be obtained depending on the specific faithfulness constraints replacing these variables.

(6) *General ranking schema of DME*

Max-IO-Seg   RM   Faith-❀O

❀Stem≡PrWd   Faith-IO

This general ranking schema is demonstrated below. Consider the following schematic example: /ABC-D_{α}/$_{\alpha}$ → [ABC'D]$_{\alpha}$, where the three segments *ABC* belong to a stem and the remaining one *D* to a suffix, /C/ → [C'] represents a nonconcatenative stem change, and α is an arbitrary morphosyntactic category distinct from that expressed by [ABC]. As illustrated in (7), the generalized schema in (6) successfully generates [ABC'D]$_{\alpha}$.

(7)		/ABC-D_{α}/$_{\alpha}$	Max	RM	Faith ❀O-[C']	Faith IO-[C]	❀Stem ≡PrWd
a.		ABC	*!	*	*		
b.		ABCD			*!		*
c.	❀	ABC'	*!			*	
d.	☞	ABC'D				*	*

The selector constraint (i.e., ❀Stem≡PrWd) might seem to be excessively general for explaining the plural formation data of German, but this is empirically motivated. The reason is that suffixation is not the only affixation involved in DME. Languages actually exhibit DME in the context of prefixation, circumfixation, and infixation as well, each of which will be exemplified shortly. As in (8), the stem and the prosodic word must be completely coextensive for the sympathy system to function since the affixal portion can be regarded as the phonological exponent of the relevant morpheme. It is thus indispensable to establish a selector constraint that is applicable to any kind of affixation. The two affix$_{\alpha}$s in circumfixation and stem$_{\alpha}$s in infixation are intended to indicate that they are a single affix and a stem respectively.

(8) Prefixation / Circumfixation / Infixation

Prefixation	Circumfixation	Infixation
PrWd	PrWd	PrWd
[Affix] [Stem]	[Affix$_{\alpha}$ [Stem] Affix$_{\alpha}$]	[Stem$_{\alpha}$ [Affix] Stem$_{\alpha}$]

Stem≡PrWd is more formally understood in terms of the conjunction of the constraints given in (9). First, Anchor-R(Stem,PrWd) requires that the segment occupying the right edge of the stem must be positioned at the right edge of a prosodic word. This constraint thus has the effect to exclude a suffix from the domain of a prosodic word, as in (3). Second, the mirror image holds of Anchor-

L(Stem,PrWd), and therefore, a prefix is disregarded for the purpose of computing the element within the prosodic word domain. Third, in infixation, Contiguity is violated by virtue of the fact that the phonological string of a stem is separated by the affixal element. This indicates that Contiguity-Stem is the relevant constraint to exclude the infix from the domain of a prosodic word. Finally, circumfixation is the combination of prefixation and suffixation, and therefore, the effect of Stem≡PrWd is obtained through conjunction of Anchor-L(Stem,PrWd) and Anchor-R(Stem,PrWd) operative in prefixation and suffixation. This yields the effect of Hierarchical Anchor in the sense of Itô, Kitagawa and Mester (1996).

(9)	Prefixation:	Anchor-L(Stem,PrWd)	
	Suffixation:	Anchor-R(Stem,PrWd)	
	Infixation:	Contiguity-Stem	
	Cirucumfixation:	Anchor-L(Stem,PrWd)	Anchor-R(Stem,PrWd)

Crucial here is that the proposed constraint conjunction is propositional logical conjunction (Hewitt and Crowhurst 1996; Crowhurst and Hewitt 1997; Itô and Mester 1999a), where the conjoined constraint is satisfied only when all conjoined constraints are individually satisfied. It is violated everywhere else. This positive conjunction (in Crowhurst and Hewitt's 1997 terminology) or best-of-the-best (in Itô and Mester's 1999a terminology) is shown in the evaluation table in (10a). Since three constraints are conjoined here, Stem≡PrWd is satisfied only when all of them are satisfied simultaneously. This sharply contrasts with negative/disjunctive conjunction (in Crowhurst and Hewitt's 1997 terminology) or worst-of-the-worst (in Itô and Mester's 1999a terminology), where a conjoined constraint is violated if and only if both conjuncts are violated (Smolensky 1993, 1995, 1997), as in (10b). The crucial difference appears when only one of the conjoined constraints is violated. The whole conjoined constraint is violated in positive conjunction when only one conjunct is satisfied. By contrast, the entire constraint is satisfied in such cases under negative conjunction.

(10) a. Positive conjunction (Best-of-the-best)

Constraint_1		Constraint_2
Satisfied	*Satisfied*	*Satisfied*
Satisfied	*Violated*	*Violated*
Violated	*Violated*	*Satisfied*
Violated	*Violated*	*Violated*

b. Negative/disjunctive conjunction (Worst-of-the-worst)

Constraint_1	&/	Constraint_2
Satisfied	*Satisfied*	*Satisfied*
Satisfied	*Satisfied*	*Violated*
Violated	*Satisfied*	*Satisfied*
Violated	*Violated*	*Violated*

Establishing the formal aspect of Stem≡PrWd, I present cases where DME is involved in affixation other than suffixation. First, Tagalog presents a good representative example of DME involved with prefixation. In this language, prefixation and reduplication cooccur quite regularly and productively to stand for a single morphosyntactic function (Carrier 1979, 1984; Lieber 1981; McCarthy 1981; Marantz 1982; French 1988). This is exemplified in (11), where *trabahoh* is a stem meaning 'work' and *mag-*/*nag-* is an agentive prefix. The crucial observation is that the same prefix form is employed in more than one morphosyntactic category (i.e., *mag-* is used in both the basic and future aspects, and *nag-* is employed both in the completive and continuative aspects). Furthermore, the same reduplicant shape is recycled to express various morphosyntactic categories (i.e., CV-reduplication is observed in both the future and continuative aspects). This strongly suggests that prefixation and reduplication are both indispensable to disambiguate various morphosyntactic categories (Lieber 1981:158-159): just one of them is not sufficient to specify a particular morphosyntactic function.

(11) *Affixed/reduplicated form* *Gloss*

mag-trabahoh	work (basic aspect)
mag-ta-trabahoh	will work (future aspect)
nag-trabahoh	worked (completive aspect)
nag-ta-trabahoh	be working (continuative aspect)

Under the system developed here, the future aspect formation, for instance, is explained simply by replacing Faith-IO and Faith-❁O with Integrity-IO and Max-❁O respectively, as shown in (12). In (12), the precise size restriction on the reduplicant is not of immediate relevance, and hence, I simply assume here that it obtains through the emergence of the unmarked (McCarthy and Prince 1994), as argued by Spaelti (1997), Walker (1998), and McCarthy and Prince (1999) among others. I discuss this issue in more detail in section 5.5.2.

(12)

		/mag-trabahoh/$_{Future}$	Max	RM	Max ❁O	Integrity IO	❁Stem ≡PrWd
a.		trabahoh	*!**	*	**		
b.		mag-trabahoh			*!*		*
c.	❁	ta-trabahoh	*!**			**	
d.	☞	mag-ta-trabahoh				**	*

Several remarks are in order regarding reduplication in the context of DME. Given the fact that the reduplicant blocks the underlying stem (or base) from being anchored at the left edge of the prosodic word, it might appear that (12c) violates Stem≡PrWd. This is a significant issue since reduplication would not be motivated at all if this were true. My contention is that Stem≡PrWd is indeed satisfied by the sympathy candidate. Under the reduplication model assumed here (see section 2.2), the source of the reduplicant is the same as the base since the entire reduplication form is evaluated by IO-faithfulness constraints. This indicates that the leftmost segment of the underlying stem still occupies the left edge of the whole reduplication form even though the base-initial segment is not left-anchored to the prosodic word. I claim that Anchor-L(Stem,PrWd) is satisfied if there exists some element at the left periphery of the output which is the correspondent of the leftmost element in the underlying representation. As a consequence, Stem≡PrWd is also satisfied by (12c). Again, each underlying segment has two opportunities to be realized on the surface (i.e., base and reduplicant) under the assumed reduplication model, so this kind of satisfaction of Stem≡PrWd is special to reduplication.

This is in accord with the claim made by Struijke (1998). Investigating reduplication in Kwakwala, where either a certain segment in the input is realized either in the base or in the reduplicant depending on the context in order to avoid a sequence of heavy syllables, she proposes 'Broad IO-faithfulness'. The gist of the idea is that IO-faithfulness constraints are satisfied as long as either the base or the reduplicant is faithful to the input in the relevant dimension. She argues for the necessity of positing a reduplication model along the lines of Spaelti (1997) rather than McCarthy and Prince (1995). Under McCarthy and Prince's full reduplication model, the input has independent correspondence relations with the base and the reduplicant. Given such a model, however, Anchor-L(Stem,PrWd) is clearly violated since the relevant stem faithfulness should be evaluated by IO-faithfulness constraints. This shows that the idea of 'Broad IO-faithfulness' is tenable only under a model where the entire reduplication form is compared with the underlying representation.

A related issue is concerned with Contiguity. As can be seen from (11) and (12), complex onsets are not allowed in the reduplicant in Tagalog. This is taken as an effect of the emergence of the unmarked, but avoidance of a *Complex violation results in a violation of Contiguity within the reduplicant domain. Given the fact that Contiguity-Stem is a member of Stem≡PrWd in the sense of propositional logic, this seems to be a problem too. But given the consideration above, Contiguity-Stem is indeed satisfied by (12c) since it is satisfied in the domain of the base. In effect, what Struijke (1998) dubs 'Broad IO-faithfulness' resolves the apparent problem here. Anchor-L(Stem,PrWd) is satisfied by the reduplicant while Contiguity-Stem is fulfilled by the base. In the same vein, Anchor-R(Stem,PrWd) is fulfilled by the base, so all the faithfulness constraints conjoined to obtain the effect of Stem≡PrWd are satisfied by (12c), as encapsulated in (13).

(13)

	Anchor-L (Stem,PrWd)	Anchor-R (Stem,PrWd)	Contiguity Stem
Base	*violated*	*satisfied*	*satisfied*
Reduplicant	*satisfied*	*violated*	*violated*
Entire form	***satisfied***	***satisfied***	***satisfied***

In the suffixal reduplication, the mirror image holds. Contiguity-Stem is still satisfied by the base, but Anchor-L(Stem,PrWd) and Anchor-R(Stem,PrWd) are satisfied by the base and the reduplicant respectively. Finally, infixal reduplication can also be accommodated under the idea of 'Broad IO-faithfulness'. Consider the following schematic example: [A-BC-BCD], where the underlined *BC* is the reduplicant. Anchor-L(Stem,PrWd) and Anchor-R(Stem,PrWd) are both satisfied by the base, and Contiguity-Stem is also satisfied both/either by the reduplicant and/or the base. All modes of reduplication are effectively accommodated.

Second, French (1988:33-34) provides an example where circumfixation cooccurs with reduplication in Tagalog. In [pag-ʔa-ʔaral-an] 'will study X' derived from [ʔaral], *pag- -an* is an object circumfix, and CV-reduplication takes place additionally. To motivate reduplication, it is necessary that both *pag-* and *-an* become invisible for the purpose of evaluating the satisfaction of RM. Essentially the same constraint ranking as in (12) succeeds in obtaining the simultaneous occurrence of circumfixation given that the relevant nonconcatenative change is reduplication.

Essential here is positive (or best-of-the-best) constraint conjunction discussed above. To hide the circumfix from the prosodic word domain, one might suggest that both Anchor-L(Stem,PrWd) and Anchor-R(Stem,PrWd) could be independently assumed as selector constraints, but this is not a viable alternative. As (14) and (15) show, the reason is that either [pag-trabahoh] or [trabahoh-an] is chosen as the sympathy candidate depending on the relative ranking of Anchor-L(Stem,PrWd) and Anchor-R(Stem,PrWd): Anchor-L(Stem,PrWd) » Anchor-R(Stem,PrWd) opts for [trabahoh-an], as in (14), whereas the reverse ranking obtains [pag-trabahoh], as in (15). The problem here is that reduplication is not motivated at all regardless of the sympathy candidate to be chosen because the two possible sympathy candidates satisfy RM by virtue of the fact that they contain either the prefixal portion *pag-* or suffixal one *-an*. Thus, the candidate with reduplication incurs gratuitous violations of Integrity-IO, and is harmonically bounded by [pag-trabahoh-an]. This argument indicates that the desired sympathy candidate cannot be chosen as long as multiple selector constraints are posited. A single constraint is needed which makes opaque both the prefixal and the suffixal elements at the same time.

(14)

		/pag-trabahoh-an/$_{Future}$	Max	RM	Max ❀O	Integ IO	❀Anchor L
a.		trabahoh	*!****	*	**		
b.		pag-trabahoh	*!*		**		*
c.	❀	trabahoh-an	*!**				
d.	☞	pag-trabahoh-an					*
e.		ta-trabahoh	*!****		**	**	
f.		pag-ta-trabahoh	*!*		**	**	*
g.		ta-trahahoh-an	*!**			**	
h.	☹	pag-ta-trabahoh-an				**	*

(15)

		/pag-trabahoh-an/$_{Future}$	Max	RM	Max ❀O	Integ IO	❀Anchor R
a.		trabahoh	*!****	*	***		
b.	❀	pag-trabahoh	*!*				
c.		trabahoh-an	*!**		***		*
d.	☞	pag-trabahoh-an					*
e.		ta-trabahoh	*!****		***	**	
f.		pag-ta-trabahoh	*!*			**	
g.		ta-trahahoh-an	*!**		***	**	*
h.	☹	pag-ta-trabahoh-an				**	*

Finally, Clallam, a Salishan language spoken in aboriginal times in many villages along the north coast of Washington's Olympic Peninsula, exhibits the cooccurrence of *ʔ*-infixation and metathesis in the actual aspect formation although it is not quite productive in the language. Examples are given in (16) (Thompson and Thompson 1971:276).

(16)

	Nonactual	*Actual*	*Gloss*
	q'ʷutʃ	q'ʷ-(ə)ʔ-tʃu	lick, beat up
	suy	s-(ə)ʔ-yu	swell up

Again, these examples are also accommodated by the general schema of DME, as illustrated in (17). Since metathesis is involved, the relevant faithfulness constraint is Linearity.

(17)

		/q'ʷutʃ,ʔ/$_{Actual}$	Max	RM	Linearity ❁O	Linearity IO	❁Stem ≡PrWd
a.		q' ʷutʃ	*!	*	*		
b.		q'ʷ-(ə)ʔ-utʃ			*!		*
c.	❁	q'ʷtʃu	*!			*	
d.	☞	q'ʷ-(ə)ʔ-tʃu				*	*

In summary, I argued that DME effects are obtained through sympathy theory in an integrated manner. The key constraint in the theory is the selector constraint. Since the sympathy candidate to be opted for is the one without parsing the underlying affix, I argued that Stem≡PrWd serves as the operative selector constraint in morphological opacity. This constraint is formally understood as constraint conjunction of Anchor-L(Stem,PrWd), Anchor-R(Stem,PrWd) and Contiguity-Stem in the sense of propositional logic. This particular interpretation is necessary not only to capture DME in all kinds of affixation but also is empirically motivated. The generalized ranking schema of DME presented in (6) generates DME as follows. First, Stem≡PrWd requires the sympathy candidate to underparse the affix given in the underlying representation. Due to RM » Faith-IO, the sympathy candidate needs to undergo some stem modification, the specific one depending upon the particular Faith-IO. Given Faith-❀O » Faith-IO, all candidates are required to imitate the stem modificational property of the sympathy candidate, yielding a first phonological exponent. Finally, high ranking Max demands faithful parsing of the underlying affixal element on the surface, obtaining a second phonological exponent.

5.3 Dominant Affix Effects in Japanese

Alderete (1999) discusses dominant affix effects in Japanese as an important empirical domain covered by anti-faithfulness theory. Dominant affix effects are phenomena where affixes determine the phonological pattern of the whole word. In this sense, affixes take precedence over roots or stems. Alderete (1999) argues that no standard theoretical machinery of OT can derive them without anti-faithfulness constraints given the universal constraint meta-ranking Faith-Root » Faith-Affix (McCarthy and Prince 1995; Urbanczyk 1996). I claim here that dominant affix effects are subsumed under the rubric of DME, along with various morphological phenomena discussed in the previous section.

5.3.1 Facts and Descriptive Generalization

McCawley (1968) and Poser (1984b) observe that Japanese exhibits three types of affix-controlled accentuation processes: dominance effects, preaccentuation, and accent shift. Each of these cases is exemplified below in (18). First, the dominant affix -*kko* requires deletion of the base accent, as in (18a). Thus, the entire word is accentless whether the base contains a lexical accent (as in [kóobe]) or not (as in [edo]). Second, (18b) shows examples of preaccentuation. The suffix -*ke* demands that the word accent be placed on the syllable immediately preceded by it. As a result, the base-final syllable carries accent both when the base has some original accent (as in [nisímura]) and when the base is accentless (as in [yosida]). Two possible interpretations are available for the /nisímura-ke/→[nisimurá-ke] example: (i) deletion of the original accent plus insertion of a new accent, and (ii) the shift of the original antepenultimate accent to the base-final syllable. I argue that the first interpretation must be rejected in favor of the second one. Finally, (18c) illustrates accent shift. The difference between (18b) and (18c) is that no accent insertion takes place in (18c) while it is obligatory in (18b). In (18c), no accentual change is found when the base carries no original accent, as in /toma-ya/→[toma-ya]. These data are instances of DME since suffixation is accompanied by some suprasegmental change.

(18) a. *Dominance effect*

Underlying	*Output*	*Gloss*
/kóobe-kko/	[koobe-kko]	native of Kobe
/edo-kko/	[edo-kko]	native of Tokyo

b. *Preaccentuation*

Underlying	*Output*	*Gloss*
/nisímura-ke/	[nisimurá-ke]	the Nishimura family
/yosida-ke/	[yosidá-ke]	the Yoshida family

c. *Accent shift*

Underlying	*Output*	*Gloss*
/kúzu-ya/	[kuzú-ya]	junkman
/toma-ya/	[toma-ya]	mat seller

5.3.2 Analysis

This section develops an OT analysis of the dominant affix effects exemplified in (18). Beginning with the dominance effect in (18a), in [koobe-kko], accent deletion is a natural outcome if the suffix is made opaque through the selector constraint and accent deletion is employed as the strategy to fulfill RM. The sympathy candidate should be [koobe]. The optimal candidate must imitate the absence of accent in the sympathy candidate because of Dep-❀O-Accent. This analysis is demonstrated in (19). There are potentially many other options for a sympathy candidate to satisfy RM, but accent deletion is the most harmonic given RM » Max-IO-Accent, assuming that all other IO-faithfulness constraints outrank Max-IO-Accent.

(19)

		/kóobe-kko/	Max	RM	Dep-❀O Accent	Max-IO Accent	❀Stem ≡PrWd
a.		kóobe	*!*	*	*		
b.		kóobe-kko			*!		*
c.	❀	koobe	*!*			*	
d.	☞	koobe-kko				*	*

The same ranking explains [edo-kko], as in (20). This form carries no surface accent, but this is not because of sympathetic correspondence. Since /edo/ lacks an underlying accent, Dep-❀O-Accent plays no role in the decision of the winner. In (20), RM is assumed to outrank Dep-IO-Accent such that (20c) is selected as the sympathy candidate. Even with this disadvantageous assumption, the correct result is obtained since Dep-❀O-Accent is satisfied by (20b). [edó-kko] is eliminated by Dep-IO-Accent. This constraint does not play any visible role in /kóobe-kko/ since the base already contains an underlying accent.

(20)

		/edo-kko/	Max	RM	Dep-❀O Accent	Dep-IO Accent	Max-IO Accent	❀Stem ≡PrWd
a.		edo	*!*	*				
b.	☞	edo-kko						*
c.	❀	edó	*!*			*		
d.		edó-kko				*!		*

Second, consider preaccentuation in (18b). The examples show that the suffix -*ke* demands that the output bear accent on the syllable immediately preceding the suffix regardless of the position and the presence/absence of an underlying accent. Beginning with [yosidá-ke], this example is quite the opposite of [koobe-kko]. The underlying representation of [yosidá-ke] does not carry any accent while the output does. Thus, the operative ranking is obtained if Max-IO-Accent and Dep-❀O-Accent for the dominance effect are replaced by Dep-IO-Accent and Max-❀O-Accent respectively. As (21) shows, this analysis accounts for [yosidá-ke]. The suffix -*ke* is made opaque, and the sympathy candidate is required to insert an accent because RM outranks Dep-IO-Accent. Its accentedness becomes crucial given Max-❀O-Accent.

(21)

		/yosida-ke/	Max	RM	Max-❀O Accent	Dep-IO Accent	❀Stem ≡PrWd
a.		yosida	*!*	*	*		
b.		yosida-ke			*!		*
c.	❀	yosidá	*!*			*	
d.	☞	yosidá-ke				*	*

An important issue here is the locus of accent insertion. Given the ranking in (21), [yósida] and [yosída] are equally qualified as a sympathy candidate, and in effect, it is expected that [yósida-ke] and [yosída-ke] are as well-formed as [yosidá-ke], contrary to fact. My claim is that the base-final syllable carries an inserted accent because the attached affix *-ke* is a suffix. The suffix *-ke* and the inserted accent both contribute to the phonological expression of the same morpheme, so they should be realized contiguously on the surface. The locality effect involved in DME is not special to preaccentuation in Japanese. In the plural formation in German, a similar effect is observed: $[\text{Palast}]_{\text{Singular}} \rightarrow [\text{Paläste}]_{\text{Plural}}$ (cf. *[Pälaste], *[Päläste]) (see Wiese 1996b:183-184 for more German examples and discussion). This is formally expressed by a morphemic contiguity constraint such as Morph-Contiguity.

The same constraint ranking does not capture [nisimurá-ke], however. There are three potential forms for the sympathy candidate: [nisímura], [nisimurá], and [nisimura]. Given that [nisimurá-ke] is the optimal form, the sympathy candidate needs to be [nisimurá]. Although [nisímura] loses the selection of the sympathy candidate due to its violation of RM, [nisimura] is a serious competitor. Provided that the final accent in [nisimurá] comes from deletion of the underlying accent plus insertion of a new accent, this form is harmonically bounded by [nisimura], because the latter violates only Max-IO-Accent but still satisfies RM, as shown in (22). This suggests that the deletion-plus-insertion interpretation of [nisimurá(-ke)] is wrong.

(22)

		/nisímura-ke/	Max	RM	Max-❀O Accent	Max/Dep-IO Accent	❀Stem ≡PrWd
a.		nisimurá	*!*			**	
b.	☹	nisimurá-ke				**!	*
c.	❀	nisimura	*!*			*	
d.	☞	nisimura-ke				*	*

The only possible interpretation of preaccentuation in [nisimurá-ke] is that the underlying accent undergoes movement. From the perspective of Alderete (1999), accent shift incurs a violation of NoFlop. I assume that this is part of the universal constraint set. As demonstrated in (23), the selector constraint chooses [nisimurá] as the sympathy candidate. Under the accent shift interpretation, accentless [nisimura] can be easily ruled out by high ranked Max-IO-Accent. Finally, NoFlop-❀O-Accent requires the output accent to fall on the syllable immediately before *-ke*. Because NoFlop-IO-Accent does not require a specific position where the original accent is moved to, Morph-Contiguity plays a key role here too.

(23)

	/nisímura-ke/	Max	RM	NoFlop-❀O Accent	NoFlop-IO Accent	❀Stem ≡PrWd
a.	nisímura	*!*	*	*		
b.	nisímura-ke			*!		*
c.	❀ nisimurá	*!*			*	
d.	☞ nisimurá-ke				*	*

Although the analysis of preaccentuation might appear to depend on two separate rankings, this is not true. In [yosidá-ke], the underlying form does not have any accent, so NoFlop has no room to play a role. By contrast, in [nisimurá-ke], there is an underlying accent, and therefore, Dep-IO-Accent is of no relevance.

Finally, the analysis of accent shift in (18c) is straightforward given the discussion of [nisimurá-ke]. As (24) and (25) show, interactions of NoFlop-IO-Accent and NoFlop-❀O-Accent with other constraints obtain correct output forms. In (25), the underlying representation contains no accent, so all candidates vacuously satisfy the two NoFlop constraints. The relative ranking between RM and Dep-IO-

Accent selects either (25a) or (25c) as the sympathy candidate, but this issue does not matter here since NoFlop-❁O-Accent is satisfied by all candidates except [tóma] and [tóma-ya], which are ruled out by Dep-IO-Accent.

(24)

		/kúzu-ya/	Max	RM	NoFlop-❁O Accent	NoFlop-IO Accent	❁Stem ≡PrWd
a.		kúzu	*!*	*	*		
b.		kúzu-ya			*!		*
c.	❁	kuzú	*!*			*	
d.	☞	kuzú-ya				*	*

(25)

		/toma-ya/	Max	RM	NoFlop ❁O Accent	Dep IO Accent	NoFlop IO Accent	❁Stem ≡PrWd
a.		toma	*!*	*				
b.	☞	toma-ya						*
c.		tomá	*!*			*		
d.		tomá-ya				*!		*

In sum, I discussed that the three types of dominant affix effects involved in Japanese accentuation can be subsumed under the rubric of DME. The constraint rankings offered for the analysis are summarized in (26). It is clear that all the data in (18) are explained in a unified way by the general ranking schema in (6). The only variables are Faith-IO and Faith-❁O. They are replaced by different faithfulness constraints depending on the kind of affix. Finally, it should be made explicit that each faithfulness constraint must inherently bear the type marking of the relevant affix, because the ranking of Max-IO-Accent, for example, varies from affix to affix.

(26)

	Affix-specific ranking	Common ranking
Dominance effect	Dep-❀O » Max-IO RM » Max-IO	Max » ❀Stem≡PrWd Faith-❀O » Faith-IO RM » Faith-IO
Preaccentuation	Max-❀O » Dep-IO NoFlop-❀O » NoFlop-IO RM » Dep/NoFlop-IO	
Accent shift	NoFlop-❀O » NoFlop-IO RM » NoFlop-IO	

5.4 The Impersonal Formation in Chaha

The impersonal formation in Chaha, a Western Gurage language of the Southern Ethiopic group, exhibits an interesting type of DME. Unlike the examples discussed so far, there is no apparent affix in the surface representation, and the impersonal morpheme is expressed in four varieties: (i) both labialization and palatalization, (ii) only labialization, (iii) only palatalization, or (iv) no surface phonological realization. DME is thus observed when the morpheme is realized both by labialization and by palatalization simultaneously. The principal issue is why two realizations appear despite the fact that no surface transparent affix exists. I argue that the underlying representation indeed does contain an affix. I also demonstrate that cases where only labialization or palatalization occurs are explained by high ranked markedness constraints which suppress the function of RM or Max.

5.4.1 Facts and Descriptive Generalization

The phonology and morphology surrounding the impersonal formation in Chaha have attracted a substantial body of earlier attention both descriptively and theoretically (Polotsky 1938; Leslau 1950; 1967; Hetzron 1971, 1977; Johnson 1975; McCarthy 1983, 1986a; Lieber 1988; Elmedlaoui 1992; Rose 1994, 1997). The impersonal is primarily used when the subject is inexplicit like English *one*, although this is by no means the exhaustive context (see Leslau 1967:1150-1151 for documentation of other contexts). This section provides the entire set of facts and descriptive generalization of the impersonal secondary articulations.

The impersonal is characterized most prominently by the simultaneous occurrence of labialization and palatalization, although their cooccurrence does not always hold. Labialization targets only labial and dorsal consonants while potential legitimate targets of palatalization are coronal and dorsal obstruents. This generalization is quite robust and holds of other morphological formations in the language, including the second person singular feminine imperative, the third person singular masculine perfective with objects, and the second person singular feminine subject. Another strong general tendency across these paradigms is that palatalization targets only the rightmost consonant of a root or stem whereas labialization exhibits a more flexible and unbounded character in that the rightmost eligible consonant serves as the target. These two generalizations cover most of the data of concern. Examples are given in (27). Palatalization of coronal obstruents turns them into palato-alveolars (Johnson 1975; Rose 1994, 1997), but I keep using a superscripted [^{y}] for perspicuity.

(27)	*Personal*	*Impersonal*	*Gloss*
a.	kəfət	kəf^{w}ət^{y}	open
	nəkəs	nək^{w}əs^{y}	bite
	dəməd	dəm^{w}əd^{y}	join
	təbəs	təb^{w}əs^{y}	fry
	təzrabət	təzrab^{w}ət^{y}	have hope for someone
b.	nəkəb	nəkəb^{w}	find
	s^{y}ənəb	s^{y}ənəb^{w}	spin
	məkər	mək^{w}ər	advise
	bənər	b^{w}ənər	demolish
	qətər	q^{w}ətər	kill

c.	sənt	sənt^{y}	force through
d.	t^{y}af^{w}ər	t^{y}af^{w}ər	scratch and mark
	g^{y}ək^{y}ər	g^{y}ək^{y}ər	straighten out
e.	bətəx	bətəx^{w}	dig out
	ax^{w}ənəq	ax^{w}ənəq^{w}	take off the clothes
	dənəg	dənəg^{w}	hit

First, both labialization and palatalization take place when the stem-final segment is a coronal obstruent. Palatalization occurs stem-finally whereas labialization is realized on the rightmost available consonant, as in (27a). Second, palatalization fails to appear whenever the final consonant is not a proper segment. Rather, only labialization occurs, as shown in (27b). Unlike palatalization, however, labialization is permitted flexible mobility and targets the rightmost available segment, although labialization shares the right-edge orientation with palatalization. Third, only palatalization is observed when all consonants are coronals, as exemplified in (27c). Fourth, neither labialization nor palatalization takes place if the rightmost consonant is labial or sonorant and no segment is a proper docking site of labialization because of underlying secondary articulations, as shown in (27d). I simply assume that an articulatorily motivated feature cooccurrence constraint against *$[[\text{Lab}][\text{Cor}]]_{\text{Seg}}$ is operative, and I do not discuss the examples in (27d) any further. When the stem-final segment is a dorsal consonant, labialization takes precedence to palatalization, as exemplified in (27e). Since palatalization strictly targets a stem-final consonant, this labial priority entails the failure of palatalization in such cases.

5.4.2 Morphemic Representation of the Impersonal

It is clear from the data presented in (27) that no surface affix exists in the impersonal formation in Chaha. This appears to be problematic for the general proposal for

DME because the selector constraint makes only affixes opaque such that the pressure of RM forces some phonological change on the stem. In this section, I argue that there exists an affix in the underlying representation. For this purpose, I critically review various claims made in the earlier literature.

Polotsky (1938) and Leslau (1967) attempt to provide a historical account for the emergence of labialization and palatalization in the impersonal. The gist of their argument is that labialization came from the Proto-Ethiopic plural marker -*u* whereas palatalization originated from the object suffix pronoun -*i*. The impersonal accompanies various different suffixes expressing the object type, but the impersonal obligatorily carries the third person singular masculine heavy object marker -*i* when no such suffix exists. Polotsky and Leslau argue that the *i*-induced palatalization process was morphologized and pervaded the impersonal paradigm regardless the type of the object, resulting in the contemporary palatalization phenomenon in the whole paradigm. However, it is entirely unclear why the plural marker and the object suffix pronoun together contribute to the impersonal formation. The semantic content of the impersonal is never obtained from their compositionality. The impersonal morpheme is an indivisible atomic primitive.

Hetzron (1971) gives a different diachronic account. His position is that the third person plural masculine suffix -*uu* was developed into the impersonal. He posits some steps to derive both labialization and palatalization from this single source. First, the suffix underwent shortening, and compensatory labialization occurred on the stem. Second, dissimilation took place between the secondary labial articulation and the suffix -*u*, and the latter changed into -*i*. Finally, the suffix -*i* came to be realized as palatalization of a stem consonant. This proposal is attractive for two reasons. First, labialization and palatalization come from one and the same source, so the problem encountered by Polotsky (1938) and Leslau (1967) is overcome. Second, Hetzron's analysis provides a natural account for the reason why labialization is granted priority when a stem-final consonant is dorsal, thereby labialization and palatalization compete with each other for the segmental position as in (27e). Since labialization came first historically, the dorsal position was already occupied by labialization when palatalization came into the impersonal. In spite of these strengths, Hetzron's historical study does not offer a significant insight into the synchronic system of the impersonal formation. Adopting his analysis would be tantamount to saying that the impersonal formation is not governed by any systematic morphological and phonological regularity from a synchronic point of view. The secondary articulation process is quite productive and systematic, and thus, the robust generalization would be a synchronic accident.

McCarthy (1983), Lieber (1988), and Rose (1994) tackle the impersonal formation from a generative point of view. Despite the fact that their specific details of analyses are different, they share the idea that the secondary articulations are attributed to floating autosegmental features in the underlying representation. Docking of these two autosegmental features on stem consonants is regulated by language-specific rules, and they are phonetically uninterpretable when there is no proper docking site. Their analyses give a synchronic analysis of the impersonal formation, and the use of autosegmental elements in the underlying representation turns out to be a significantly useful analytical device since the emergence of autosegmental phonology (Goldsmith 1976). But I argue that their analyses are not on the right track.

First, the equal status accorded to the two floating features in the underlying representation fails to capture a number of crosslinguistic asymmetries between labialization and palatalization attested in a wide range of the *tt*-group Gurage languages, which include the following four families: Gurage (Muher), Western Gurage (Masqan), Central Western Gurage (Ezha, Chaha, Gumer, and Gura), and Peripheral Western Gurage (Gyeta, Inor, Endegen, and Ener). First, the impersonal formation in Muher is associated only with stem-final palatalization, but there is no language in which only labialization expresses the impersonal morpheme (Hetzron 1971:195). In all other languages enumerated above, both labialization and palatalization participate in the impersonal formation.

Second, Hetzron (1971:196) notes that final palatalization always entails internal labialization in Inor and Ener. This indicates that palatalization is primary while labialization is subsidiary, but not vice versa. Moreover, in all Peripheral Western Gurage languages except Gyeta, palatalization affects the third person plural feminine morpheme without labialization.

Finally, as listed in (28), internal labialization takes place with a suffix in various word formations in extensive Gurage languages, but palatalization does not (Hetzron 1971:194-196). In (28), 'IL' indicates internal (i.e., word-medial) labialization. These contrasts between palatalization and labialization strongly pose a suspicion that they should not be treated on the same ground.

(28) a. *Third person singular masculine light object*:

IL+n (Masqan, Central Western Gurage, Gyeta)

b. *Third person singular masculine light L*:

IL+rä/lä	(Chaha, Ezha)	IL+rä	(Gura)
IL+lä	(Gumer)	IL+nä	(Gyeta)

Second, and more convincingly, another asymmetry resides in the behaviors in terms of phonological locality. Presumably related to the first set of arguments, palatalization is most generally (though not strictly) restricted to the right edge of a stem across the Gurage languages, but labialization displays a more unbounded character. This is true of the impersonal in Chaha as seen from (27), but some independent evidence is given in (29). As with the impersonal, only coronal and dorsal obstruents qualify as docking sites of secondary palatalization while labials and dorsals serve as proper docking sites of secondary labialization. The second person singular feminine imperative is expressed solely by palatalization, but it fails to appear if the final segment is illegitimate for palatalization, as in (29a), even if an appropriate segment exists word-initially or word-medially. By contrast, the third person singular masculine perfective with objects is denoted only by labialization. Unlike palatalization, labialization occurs anywhere as long as the segment is the rightmost eligible one, as in (29b). It remains phonetically unrealized only when no segment is a legitimate target as in [sædæd]. This locality contrast is inexplicable if labialization and palatalization have the same status. Rose's (1997) analysis assuming two discontinuous suffixes /-u, -i/ likewise suffers from the same problems.

(29) a.

	2sg.masc.	*2sg.fem.*	*Gloss*
	nəmæd	nəmæd^{y}	love
	nəkəs	nəkəs^{y}	bite
	gəræz	gəræz^{y}	be old
	g^{y}æk^{y}ət	g^{y}æk^{y}ət^{y}	accompany
	fəræx	fəræx^{y}	be patient
	nəkəq	nəkəq^{y}	take apart
	wət'æq	wət'æq^{y}	fall
	nəkəb	nəkəb	find
	bəkər	bəkər	lack

b. *Perfective 3sg.masc.*

Without object	*With Object*	*Gloss*
dænæg	dænæg^w	hit
nædæf	nædæf^w	sting
nækæb	nækæb^w	find
nækæs	næk^{w}æs	bite
bækær	bæk^{w}ær	lack
kæfæt	kæf^{w}æt	open
qæfæt	q^{w}æfæt	kill
mæsær	m^{w}æsær	seem
mæk^{y}ær	m^{w}æk^{y}ær	burn
sædæd	sædæd	chase

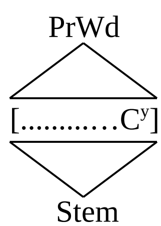
My proposal is that the impersonal morpheme has only /i/, and an appropriate alignment constraint determines the affixal position as a suffix. On the other hand, labialization does not come from any direct phonological source in the underlying representation but from interactions of constraints. This proposal directly captures the various asymmetries between labialization and palatalization discussed above. First, it makes direct sense that only palatalization participates in the impersonal in Muher and that all other *tt*-group Gurage languages employ both labialization and palatalization in the phonological manifestation of the impersonal morpheme. Under the proposal here, palatalization occupies a more central position than labialization, so the lack of labialization without palatalization is directly captured whereas palatalization can occur independently of labialization. Second, the entailment relationship found in Inor and Ener (i.e., labialization always entails palatalization) receives a natural understanding in the same manner if palatalization comes from a real affix but labialization does not. Third, the non-existence of the cooccurrence of a suffix and palatalization also follows from my proposal. The source of palatalization is a phonologically full-fledged segment in the underlying representation, and therefore, no other affix has room to occupy the same suffixal position. But labialization does not derive from any such underlying affixal segment, meaning that some independent affixal segment does not need to compete for a single suffixal slot. Finally, the locality contrast is easily explained by the underlying contrastive status of palatalization and labialization too. The strict right edge orientation of palatalization is considered as the effect to preserve the suffixal feature associated with the relevant alignment constraint, but the locus of labialization is not inherently fixed since it does not have any phonological source from which it is derived. In conclusion, these various differences holding of labialization and palatalization naturally follow if palatalization is granted the status of an authentic affix (i.e., /i/) and if labialization is not. This proposal plays a central role in the subsequent discussion.

5.4.3 Selector Constraint Revisited

I argued that the morphemic representation of the impersonal merely consists of an affix /i/. The immediate question is how labialization is additionally obtained. In this section, I demonstrate that the selector constraint (i.e., Stem≡PrWd) cannot accommodate the Chaha data as it stands, and propose a slightly extended but more stringent version of the selector constraint.

Labialization is considered as an instance of additional morphemic exponence. Under the proposal advanced here, this is required because the existence of the affix /i/ is made opaque. However, the affix is realized as a secondary articulation, and therefore, no overt affix exists in the output form. This gives rise to an important question: how is labialization motivated? In all cases considered so far, there exists some element made opaque through the selector constraint. The nature of Anchor becomes crucial at this point. According to the definition of the constraint given by McCarthy and Prince (1995:371), all that is needed for the satisfaction of this constraint is that any element at the designated edge (left or right) of one category has a correspondent at the same edge of another category. Thus, Anchor(Stem,PrWd) is satisfied even if palatalization affects the rightmost segment of a stem. Since the affixal element /i/, which contributes to the satisfaction of RM, is incorporated in the stem domain, as schematized in (30), the stem domain is coextensive with the prosodic word domain. It is important that the selector constraint can make part of an output element invisible but not an underlying element since the impersonal morpheme contains a segmental affix in the underlying representation. This holds since OT constraints are output-oriented.

(30)



The structure in (30) created through palatalization satisfies both RM and Stem≡PrWd by merging the stem-final segment and the affixal segment of the impersonal morpheme, which are affiliated with distinct morphemes. This means a violation of Morphological Uniformity that militates against underlying elements belonging to different morphemes from collapsing phonologically such that they are realized within one phonological element (Sanders 1999). Particularly, the pertinent phonological element here is a segment so that underlying segments affiliated with different morphemes must be instantiated heterosegmentally. It is essential here to define Morphological Uniformity with reference to underlying elements.

Labialization occurs in the impersonal formation in Chaha, and it is obviously parasitic upon a stem segment. Given that labialization is completely morphological, it is associated with the impersonal morpheme rather than with a stem morpheme. Given the proposal in the preceding section, however, labialization does not possess any phonological substance as an underlying source, and therefore, the presence or absence of the relevant phonological content in the underlying representation is what differentiates palatalization from labialization. Labialization would incur a violation of Morphological Uniformity unless the input-output mapping is taken into account. Since Uniformity is a faithfulness constraint, the sensitivity of Morphological Uniformity to the input naturally follows. Morphological Uniformity can be now defined as in (31).

(31) Morphological Uniformity
Let x, y Underlying material, x $Morpheme_1$, y $Morpheme_2$, and $M_1 \neq M_2$.
Then, Morphological Uniformity is satisfied iff x and y are segmentally independent.

Morphological Uniformity as defined here is similar to Morphemic Disjointness proposed by McCarthy and Prince (1995:310), but they are not quite the same. The definition of Morphemic Disjointness is given in (32), where morpheme associate is considered as follows: a segment (autosegment) x is an *associate* of morpheme M_k if x *or some correspondent* of x is an exponent of M_k, expressed as x§M_k). Morphemic Disjointness maintains that distinct instances of morphemes have distinct phonological contents like Morphological Uniformity.

(32) Morphemic Disjointness
x§M_i → xÎM_j, for instances of morphemes $M_i \neq M_j$ and for x a specific segmental (autosegmental) token.
"Distinct instances of morphemes have distinct contents, tokenwise."

McCarthy and Prince espouse Morphemic Disjointness in the context of phonological merger concomitant with reduplication in languages such as Chumash. In the Chumash word [sik-sikuk] meaning 'he is chopping/hacking', the initial *sik* is the reduplicant of the base, but the initial segment *s* corresponds to the phonological prefix of the third person singular morpheme as well. In this context, reduplication denotes the continuative. The crucial difference between Morphological Uniformity and Morphemic Disjointness is that the former is sensitive only to the phonological material already present in the underlying representation while the latter is not. Because the reduplicant does not carry any concrete underlying phonological substance, Morphological Uniformity as defined in (30) is satisfied by [sik-sikuk] in Chumash. In this sense, the coverage of Morphological Uniformity is a subset of that of Morphemic Disjointness. In Chaha impersonals, labialization parasitic on a stem segment violates Morphemic Disjointness, but it satisfies Morphological Uniformity.

I propose that Morphological Uniformity must be incorporated as part of the definition of the selector constraint (i.e., Stem≡PrWd). This is achieved by conjoining it with Stem≡PrWd already established in section 5.2 (see (9)). The net effect of the integration of Morphological Uniformity within the definition of the selector constraint is that squeezing an affix in the form of secondary articulation or coalescence is prohibited to the end of keeping an affix visible. Such a makeshift resolution of the offending problem is not allowed. This extension seems necessary independently of the impersonal formation in Chaha since such brute-forced satisfaction of RM and Stem≡PrWd must be prohibited in all cases discussed thus far.

Besides the proposed solution, another possibility is conceivable, paying attention to the fact that palatalization affects the phonological make-up of a stem:

conjunction of Stem≡PrWd and Ident-IO-[F]. The idea is that setting aside an affix outside the prosodic word domain is not sufficient but stem segments must not undergo any featural changes. Assuming best-of-the-best conjunction here, the case at hand might be tenable. However, this alternative comes across serious problems. First, this identity-based approach cannot distinguish labialization and palatalization since the presence or absence of their underlying source does not matter for the computation of Ident-IO-[F]. This is an empirical problem specific to the impersonal formation.

A more general and serious problem arises once Ident-IO-[F] is conjoined with Stem≡PrWd, however. Consider a hypothetical DME example in which the underlying /ABC-D_{α}/$_{\alpha}$ surfaces as [ABC'D]$_{\alpha}$. The three segments *ABC* are members of a stem and *D* is a suffixal segment, and /C/→[C'] involves some Ident-IO-[F] violation. If the best-of-the-best conjunction of Stem≡PrWd and Ident-IO-[F] is posited as the selector constraint, the desired output never wins. As demonstrated in (33), this is because (33c) crucially violates the selector constraint and (33a) is chosen as the sympathy candidate. (33d) is harmonically bounded by (33b). This shows that DME never emerges when the stem modification incurs an Ident-IO-[F] violation, contrary to fact (e.g., umlaut in German plurals).

(33)

		/ABC-D_{α}/$_{\alpha}$	Max	RM	Ident-❀O	Ident-IO	❀Stem ≡PrWd
a.	❀	ABC	*!	*			
b.	☞	ABCD					*
c.		ABC'	*!		*	*	*
d.	☹	ABC'D			*!	*	*

5.4.4 Analysis

In sections 5.4.2 and 5.4.3, I set up the background on which my analysis is constructed. This section demonstrates how the set of data in (27) is accounted for. Before going into it, however, I establish several undominated constraints. Since labialization and palatalization never cooccur with coronal and labial segments respectively, I assume $*Cor^{w}$ and $*Lab^{y}$ as undominated constraints. Furthermore, palatalization occurs on only a subset of coronal consonants: obstruents. This can be captured through an antagonistic phonological markedness constraint $*[+Son,Cor]^{y}$. Finally, palatalization targets only a final segment of a stem (or a root-final segment). This generalization is captured by inviolable Align-R(Pal,PrWd). These constraints are never violated in the impersonal, so we can safely assume that they are all undominated. Hence, I do not consider candidates violating any of them.

Another background concerns the driving force of palatalization. As I argued in section 5.4.2, palatalization originates from the underlying impersonal affix /i/, but what causes its surface realization as a secondary articulation? Rose (1997) addresses the same question, and argues that Anchor-Root is pertinent. This constraint requires the affixal element to be segmentally anchored on the stem to which it is attached in the underlying representation. Some other promising analytical possibilities come to our mind, but pursuing the best constraint is beyond the scope of the interest here, so I simply assume that the Anchor constraint is operative. The underlying full segment of the impersonal affix surfaces parasitically as a secondary articulation when it is parsed in the output, so the Anchor constraint is also considered to be undominated.

I begin my analysis with the central examples in (27a) in which both labialization and palatalization occur. The descriptive idea is that labialization is called for because Anchor-induced palatalization leads to a violation of Stem≡PrWd. The reason why labialization is employed as a secondary exponent is considered to be the result of RM » Dep-IO-[Round]. As illustrated in (34), this analysis picks up (34b) as the sympathy candidate. This form exerts its influence over other candidates through Max-❀O-[Round] such that (34c) is crucially eliminated here. (34c) and (34d) satisfy Max-IO-Seg because they preserve the affixal segment in the form of palatalization, whereas the underlying segment is completely obliterated in (34a) and (34b). Given this analysis, the double secondary articulations are now understood as follows. First, palatalization has its source in the impersonal affix, and the affixal full segment is forced to appear as a secondary articulation due to the inviolable pressure of Anchor-Root. Second, palatalization necessarily leads to a violation of the selector constraint in the sense discussed in the previous section, so the existence of palatalization is disregarded for the computation of the satisfaction/violation of RM. Among various potential strategies to satisfy RM, labialization costs the least because of RM » Dep-IO-[Round]. The sympathy candidate bears this property. Finally, high ranked Max-❀O-[Round] forces the output to carry labiality, resulting in two kinds of secondary articulations.

(34)

		$/\text{kəfət-i}/_{\text{Impersonal}}$	Max	RM	Max-❀O [Rd]	Dep-IO [Rd]	❀Stem ≡PrWd
a.		kəfət	*!	*	*		
b.	❀	$\text{kəf}^{w}\text{ət}$	*!			*	
c.		kəfət^{y}			*!		*
d.	☞	$\text{kəf}^{w}\text{ət}^{y}$				*	*

Consider the examples in (27b). In these cases, the stem-final segments are either a labial or a coronal sonorant, so palatalization cannot target them. Given the undominated Align-R(Pal,PrWd) constraint, the underlying affixal segment fails to surface at the expense of a Max violation. Leaving out the candidates violating any of the undominated constraints discussed above leaves only two candidates. Given RM » Dep-IO-[Round], (35b) is more harmonic. Note that [nək^{w}əb] also passes all undominated constraints but is eliminated by Anchor-R(Lab,PrWd). Given the last three forms in (27b), it is obvious that RM outranks this Anchor constraint. Since both candidates in (35) satisfy the selector constraint, sympathetic correspondence plays no tangible role.

(35)

		/nəkəb-i/$_{\text{Impersonal}}$	Max	RM	Max-❁O [Rd]	Dep-IO [Rd]	❁Stem ≡PrWd
a.		nəkəb	*	*!	*		
b.	❁ ☞	nəkəb^{w}	*			*	

The examples in (27c) are trivial, and do not deserve any special comment. Finally, consider (27e). In these examples, the interesting observation is that a final dorsal segment is occupied by labialization despite the fact that dorsal consonants are available docking sites for palatalization as well. The distribution of palatalization is strictly restricted to the rightmost consonant of a stem, so labialization in this context entails the failure of parsing the underlying affixal segment. Following Rose (1997:112), my analysis employs a markedness consideration. Palatalized coronals are universally preferred to palatalized dorsals (cf. Maddieson 1984). This universal tendency is expressed as *Dor^{y} » Max » *Cor^{y}. The contrast that a final dorsal is blocked from palatalization but a final coronal is not is captured by this ranking.

As demonstrated in (36), this ranking succeeds in generating the correct result. McCarthy (1983), Lieber (1988), and Elmedlaoui (1992) assume in their derivational analyses that labialization takes precedence to palatalization. On the other hand, Rose (1994) provides a historical account, maintaining that only coronal obstruents were palatalizable at an early stage of the language. Rose (1997) argues against these analyses. By contrast, the analysis here gives a synchronic explanation which is intrinsically motivated across languages. As discussed in section 5.4.2, a synchronic account is superior to a historical conjecture to understand the current system of the impersonal formation in Chaha.

(36)

		/bətəx-i/$_{Impersonal}$	*Dor^y	Max	RM	Max ❁O [Rd]	Dep IO [Rd]	❁Stem ≡PrWd
a.		bətəx		*	*!	*		
b.		bətəx^y	*!			*		*
c.	❁ ☞	bətəx^w		*			*	
d.		b^{w}ətəx^y	*!				*	*

Summing up, I argued that the double secondary articulations observed in the impersonal formation in Chaha is an instance of DME. The impersonal morpheme possesses a full segment /i/ underlyingly, and it is realized as palatalization by Anchor-Root. Labialization is required additionally, but it does not come from any underlying phonological source unlike palatalization. Rather, labialization is motivated and obtained through interactions of constraints. Essential in the analysis above is the extension of the selector constraint. As discussed in section 5.4.3, the idea of Morphological Uniformity needs to be incorporated as part of the definition of Stem≡PrWd. Finally, blocking of DME is due to high ranked markedness constraints. Palatalization is prevented when a relevant markedness constraint ranked over Max is active whereas labialization is blocked if the stem consonants consist only of coronal segments.

5.5 Affixation-Reduplication Interactions in Tagalog

Following the discussion thus far developed, this section discusses DME in Tagalog. Affixation and reduplication are both fully integrated in the morphology of the language and are used quite productively to express various different morphosyntactic functions. Tagalog morphology presents strong evidence that DME is authentic in natural languages in that their cooccurrence is indispensable to make explicit the specific morphosyntactic category intended by the speaker. I analyze relevant data to support the argument developed so far. In addition, the discussion here lends endorsement for morphosyntactic markings on faithfulness constraints.

5.5.1 Multiple Functions of Affixation and Reduplication

Tagalog has a rich inventory of affixes, and takes advantage of reduplication quite productively. An interesting fact is that affixation and reduplication are often combined to express a particular morphosyntactic category (Carrier 1979, 1984; Lieber 1981; McCarthy 1981; Marantz 1982; French 1988). A paradigm involving a verbal stem (*trabahoh* 'work' and *ʔisdaʔ* 'fish') and an agentive prefix (*mag-*/*nag-*/*maŋ-*/*naŋ-*) is provided in (37) (French 1988:23). These examples show two prominent facts of Tagalog morphology. First, a phonologically identical prefix is used for more than one morphosyntactic function: *mag-* and *maŋ-* are used both in the basic aspect and in the future aspect, whereas *nag-* and *naŋ-* are used in the completive and the continuative aspects. This suggests that the prefix cannot indicate a unique morphosyntactic category. Second, the same reduplicant shape is recycled: CV-reduplication is employed both by the future aspect and by the continuative aspect. This indicates that the presence/absence of reduplication alone is not sufficient either to disambiguate various morphosyntactic categories.

(37)		*Affixed/reduplicated forms*	*Gloss*
	a.	mag-trabahoh	work (basic aspect)
		mag-ta-trabahoh	will work (future aspect)
		nag-trabahoh	worked (completive aspect)
		nag-ta-trabahoh	be working (continuative aspect)
	b.	maŋ-ʔisdaʔ	fish (future aspect)
		maŋ-ʔi-ʔisdaʔ	will fish (future aspect)
		naŋ-ʔisdaʔ	fished (completive aspect)
		naŋ-ʔi-ʔisdaʔ	be fishing (continuative aspect)

More examples are given in (38) to reinforce the same point. Note in particular that the agent prefix *mag-* is used for multiple morphosyntactic functions: the future aspect, moderative verbs (and intensive verbs). Again, this strongly indicates that this prefix is not sufficient to refer to a particular morphosyntactic category. We also find three types of reduplicant shapes: CV (gerunds and occupational nouns), CVV (the future aspect and causative adjectives), and two syllables (moderative verbs and intensive verbs). Carrier (1979, 1984) argues that permitted reduplicant shapes are restricted to these three in Tagalog, although disyllabic reduplication has a further ramification, as will be discussed in section 5.5.2. Since reduplication occupies a central place in Tagalog morphology and is employed quite regularly and productively across a variety of morphosyntactic functions, the same reduplicant shape is unavoidably recycled frequently.

(38) a. *Gerunds*

Base form	*Reduplication form*	*Gloss*
(um)-laakad	pag-la-laakad	walking
(um)-sunod	pag-su-sunod	obeying
mag-ʔaaral	pag-ʔa-ʔaaral	studying

b. *Occupational nouns*

Base form	*Reduplication form*	*Gloss*
(um)-tahiʔ	ma-na-nahiʔ	seamstress

c. *Future aspect*

Base form	*Reduplication form*	*Gloss*
mag-liinis	mag-lii-liinis	will clean
(um)-takboh	(um)-taa-takboh	will run

d. *Causative adjectives*

Base form	*Reduplication form*	*Gloss*
ʔantok	na-kaa-ka-ʔantok	causing sleepiness

e. *Moderative verbs*

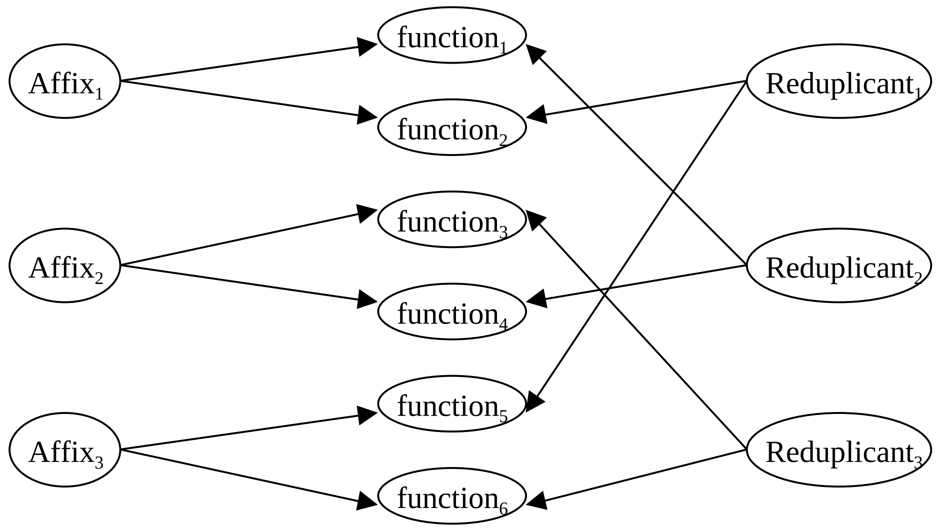
Base form	*Reduplication form*	*Gloss*
mag-liinis	mag-liinis-liinis	clean a little
mag-walis	mag-walis-walis	sweep a little

f. *Intensive verbs*

Base form	*Reduplication form*	*Gloss*
mag-sugat	(mag-)ka-sugat-sugat	be thoroughly covered with wounds

This observation leads to the conclusion that either affixation or reduplication alone is often, if not always, insufficient in isolation to denote a morphosyntactic category. As depicted in (39), the selection of a particular affix and a particular shape of the reduplicant jointly determine a unique function, as emphasized by Lieber (1981:159-160). Tagalog thus presents very strong evidence that DME is real in natural languages because it is not redundant: two exponents are both indispensable for morphosyntactic disambiguation.

(39)



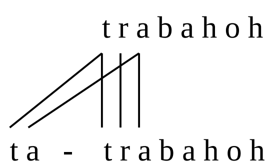
The analysis of DME in Tagalog should be straightforward at this point. By assumption, Integrity is violated by reduplication, so the relevant Faith-IO should be Integrity-IO. The sympathy candidate is a candidate which employs reduplication to fulfill RM but does not parse the underlying affixal material. Since the optimal candidate must mimic the property of the sympathy candidate, Max-❀O becomes crucial. This analysis was already presented in section 5.2, and the tableau is repeated in (40).

(40)

		/mag-trabahoh/$_{Future}$	Max	RM	Max ❀O	Integrity IO	❀Stem ≡PrWd
a.		trabahoh	*!**	*	**		
b.		mag-trabahoh			*!*		*
c.	❀	ta-trabahoh	*!**			**	
d.	☞	mag-ta-trabahoh				**	*

Recall from section 5.2 that there is an important question which concerns Stem≡PrWd: why does the sympathy candidate (40c) satisfy the selector constraint despite the fact that the left edge segment of the base does not occupy the left periphery of the entire prosodic word? This is not a question specific to Tagalog since Stem≡PrWd is defined in such a way that no element other than a stem may be contained in a prosodic word. This indicates that the question is relevant in suffixal and infixal reduplication as well. I argued that the reason why the sympathy candidate satisfies Stem≡PrWd is captured by the assumption that IO-faithfulness constraints are satisfied if they are satisfied somewhere in the output, meaning that they do not have to be satisfied both in the base and in the reduplicant. This idea is the same as 'Broad IO-faithfulness' proposed by Struijke (1998). As schematically shown in (41a), the two reduplicative segments as well as the base-initial three segments are associated with the same base, and therefore, Anchor-L(Stem,PrWd) is satisfied by the reduplicant although it is violated in the base domain. By contrast, Anchor-R(Stem,PrWd) and Contiguity-Stem are violated by the reduplicant (because the base-medial [r] is skipped), but they are satisfied by the base. As encapsulated in (41b), all relevant faithfulness constraints are satisfied by the sympathy candidate in (40), and thus, Stem≡PrWd is effectively fulfilled.

(41) a.



b.

	Anchor-L (Stem,PrWd)	Anchor-R (Stem,PrWd)	Contiguity-Stem
Base	*violated*	*satisfied*	*satisfied*
Reduplicant	*satisfied*	*violated*	*violated*
Entire form	***satisfied***	***satisfied***	***satisfied***

5.5.2 Emergence of the Unmarked in Reduplication

The goal of this section is to present an analysis which determines the precise reduplicant shapes attested in Tagalog. Because Tagalog displays three types of reduplication as aforementioned and because different reduplicant shapes make a crucial contribution to disambiguate various morphosyntactic functions, it is essential that the grammar have a mechanism to derive the appropriate reduplicant shape. In this sense, the discussion developed in this section is tightly connected to DME in Tagalog although sympathy theory is irrelevant to the variation of reduplicant shapes. I argue that the variation of Tagalog reduplication is considered as the emergence of the unmarked derived from interactions of independently motivated constraints, as discussed by Spaelti (1997) and McCarthy and Prince (1999) among many others.

Tagalog has three kinds of reduplication: (i) initial CV of the base regardless the vowel length of the base-initial vowel, (ii) initial CVV where the first vowel of the base undergoes lengthening if it is short, and (iii) two syllables. Although the disyllabic reduplication examples in (38e, f) appear to be total reduplication, disyllabic reduplication has another branch. In all the examples in (42) (Carrier 1984:293), the shape of the reduplicant is consistently CV(C)CVV, where the entire first syllable and the CV of the second syllable of the base are copied, the second vowel undergoing lengthening. The crucial difference between (38e, f) and (42) is the size of the base. When the base is disyllabic, the whole base is copied including the coda consonant of the second syllable. But the coda of the second syllable is not copied if the base is larger than two syllables (or more precisely, if the second syllable is not directly followed by a morpheme demarcation). Carrier (1979, 1984) regards (38e, f) and (42) as two sub-branches of a single reduplication type.

(42) *Base form* *Reduplication form*

tahiimik	tahii-tahiimik
baluktot	baluu-baluktot
kalansiŋ	pagka-kalaa-kalansiŋ
ʔintindiŋ	ʔintii-ʔintindiŋ

Given this basic description of the three reduplicant shapes, the generalization is summarized in (43), where affixes are omitted to focus attention on reduplication. (43) shows that a certain morphosyntactic category is associated with a particular shape of the reduplicant. Although the earlier literature such as Carrier (1979, 1984), Lieber (1981), McCarthy (1981), and Marantz (1982) employs various templates to derive the right reduplicant shapes, I argue that the various templatic effects are obtained through constraint interactions a-templatically. Given CV-reduplication and CVV-reduplication, it is obvious that these reduplicant shapes are associated with something special to a given morphosyntactic category because vowel shortening and lengthening can be never obtained for purely phonological reasons in the same context. I demonstrate that the morpheme-peculiar nature is captured by relativizing morpheme-specific faithfulness constraints with respect to other constraints. This idea not only captures the contrast between CV-reduplication and CVV-reduplication but illuminates an integrated understanding of the entire pattern encapsulated in (43).

(43)

Type	Morphological category	Reduplicant shape	Example
(I)	Gerunds Occupational nouns	CV	la-laakad su-sunod ka-kandilah
(II)	Future aspect Causative adjectives	CVV	lii-liinis taa-takboh guu-gupit
(III)	Moderative verbs Intensive verbs	σσ σCVV	walis-walis baluu-baluktot

Considering the vowel length contrast between (43I) and (43II), vowel shortening occurs in the former while lengthening takes place in the latter. As a pertinent constraint which motivates vowel shortening, I assume *LongV (Rosenthall 1994). By contrast, the driving force of vowel lengthening has to do with stress facts in Tagalog. Schachter and Otanes (1972:16), Carrier (1979:118-119) and Soberano (1980:36) maintain that vowel length is contrastive in Tagalog. But French (1988) argues that CVV is not a legitimate syllable by investigating reduplication which is not relevant here. Rather, building on the observation that both primary stress and secondary stress cause phonetic vowel lengthening on a non-final syllable (French 1988:63) and that the syllable created by reduplication attracts foot-level (secondary) stress (French 1988:72), she proposes a stress-based vowel lengthening process in the language. In other words, her idea is the opposite of Schachter and Otane (1972), Carrier (1979), and Soberano's (1980) claim that stress is sensitive to vowel length, although syllable weight plays an important role, for example, in verb stress assignment (French 1988:71). Although this which-came-first-the-chicken-or-the-egg question is an issue which has not received an unanimous solution, it is clear that vowel length and stress have a mutual correlation. This correlation is sufficient here.

As the driving force of vowel lengthening, I assume Align-R(RED,$\sigma_{\mu\mu}$), which maintains that the rightmost reduplicated syllable be heavy. A caveat is necessary. Although RED is contained as a variable, this should not be taken as the input morpheme. As I discussed in section 2.4, such phonologically empty but process-specific morphemes have no room to play a role in RMT. But the grammar must be still able to differentiate the base and the reduplicant since BR-correspondence constraints need to refer to them. Given the reduplication model assumed here (see section 2.2), the grammar's ability to recognize the base and the reduplicant is necessary for the computation of IO-correspondence constraints. Align-R(RED,$\sigma_{\mu\mu}$) is thus a markedness constraint. RED in Align-R(RED,$\sigma_{\mu\mu}$) is phonological substance of candidates produced by *Gen* but not a morpheme with serious theoretical status.

Another background concerns the fact that the reduplicant is maximally disyllabic. Spaelti (1997) discusses that the size of the reduplicant can be properly adjusted by alignment constraints. Crucially, Align-L(Ft,PrWd) » Max-BR yields foot size reduplication, and Align-L(σ,PrWd) » Max-BR monosyllabic one. I take advantage of these alignment constraints as size restrictors, henceforth abbreviating them as AllFtL and AllσL respectively. Given that only two syllables are maximally reduplicated, AllFtL is undominated in the base-reduplicant dimension. The base is not subject to the restriction imposed by the restrictors. This shows that Max-IO dominates them. Given this, we can establish a partial constraint ranking in (44). This ranking yields a mini-typology by placing Max-BR in various slots: (i) AllσL » Max-BR generates a monosyllabic reduplicant, (ii) AllFtL » Max-BR » AllσL provides a foot size reduplicant, and (iii) Max-BR » AllFtL yields total reduplication, modulo no other factor enters the picture. Because the reduplicant is monosyllabic or disyllabic in Tagalog, only the first two options are available in the language.

(44) Max-IO
| ← Max-BR: total reduplication
AllFtL
| ← Max-BR: foot reduplication
AllσL
← Max-BR: syllable reduplication

Beginning with (43I), AllσL » Max-BR is not sufficient, taking [ka-kandilah]. Two serious competitors need to be considered against the optimal form: [kaa-kandilah] and [kan-kandilah]. The optimal form violates Align-R(RED,$\sigma_{\mu\mu}$), so *LongV must be ranked over it to rule out [kaa-kandilah]. Second, I employ NoCoda as the pertinent constraint penalizing [kan-kandilah]. As demonstrated in (45), this analysis properly restricts the size of the reduplicant to CV. The three high ranked constraints prohibit any deviance from CV-reduplication. The same analysis holds of cases where the base-initial syllable contains a long vowel, as illustrated in (46). In the subseuqnet tableaux in this section, violations of AllσL are indicated numerically.

(45)

		/kandilah/$_{\text{Type (I)}}$	No Coda	AllσL	*Long V	Max BR	Align-R (RED,$\sigma_{\mu\mu}$)
a.	☞	ka-kan.di.lah	**	6		******	*
b.		kaa-kan.di.lah	**	6	*!	******	
c.		kan-kan.di.lah	***!	6		*****	
d.		kaa.di-kan.di.lah	**	10!	*	****	*
e.		kan.di-kan.di.lah	***!	10		***	*

(46)

		/laakad/$_{\text{Type (I)}}$	No Coda	AllσL	*Long V	Max BR	Align-R (RED,$\sigma_{\mu\mu}$)
a.		laa-laa.kad	*	3	**!	***	
b.	☞	la-laa.kad	*	3	*	***	*
c.		laa.kad-laa.kad	**!	6	**		
d.		la.kad-laa.kad	**!	6	*		
e.		la.ka-laa.kad	*	6!	*	*	*
f.		la.kaa-laa.kad	*	6!	**	*	

Turning to CVV-reduplication in (43II), Max-BR and Align-R(RED,$\sigma_{\mu\mu}$) still need to be ranked beneath AllσL, but they must outrank *LongV, yielding Max-BR, Align-R(RED,$\sigma_{\mu\mu}$) » *LongV. This obtains the effect of CVV reduplication. As illustrated in (47) and (48), CVV-reduplication surfaces irrespective of the vowel length of the base-initial syllable. Two important remarks are in order. First, Max-BR and Align-R(RED,$\sigma_{\mu\mu}$) must be jointly reranked with respect to *LongV to explain the contrast between (43I) and (43II). Reranking of *LongV with only either Max-BR or Align-R(RED,$\sigma_{\mu\mu}$) cannot capture the whole range of patterns in (43I) and (43II). Second, this reranking is conceptualized in terms of morphosyntactic markings on Max-BR. This idea is consistent with one of the central proposals in this work that morpheme-specific faithfulness constraints may be relativized with respect to other constraints. Since gerunds and occupational nouns belong to type (I), long vowels are prohibited in the reduplicant as in (45) and (46), while possessing a heavy syllable in the reduplicant is more important in type (II) morphosyntactic categories such as the future aspect and causative adjectives. Given high ranked NoCoda, vowel lengthening is required when the base-initial vowel is short, as demonstrated in (48). The different rankings of Max-BR and Align-R (RED,$\sigma_{\mu\mu}$) with respect to *LongV account for the contrast between type (I) and type (II).

(47)

		/liinis/$_{\text{Type (II)}}$	No Coda	AllσL	Max BR	Align-R (RED,$\sigma_{\mu\mu}$)	*Long V
a.	☞	lii-lii.nis	*	3	***		**
b.		li-lii.nis	*	3	***	*!	*
c.		lii.ni-lii.nis	*	6!	*	*	**
d.		lii.nis-lii.nis	**!	6			**

(48)

	/gupit/$_{\text{Type (II)}}$	No Coda	AllσL	Max BR	Align-R (RED,$\sigma_{\mu\mu}$)	*Long V
a.	gu-gu.pit	*	3	***	*!	
b. ☞	guu-gu.pit	*	3	***		*
c.	gup-gu.pit	**!	3	**		
d.	gu.pi-gu.pit	*	6!	*	*	
e.	gu.pit-gu.pit	**!	6			

Finally, consider (43III). It is obvious that the block constraints (i.e., Max-BR and Align-R(RED,$\sigma_{\mu\mu}$)) must be ranked between AllFtL and AllσL in this case. The question is how the different behaviors of coda and vowel lengthening attested between disyllabic and longer bases can be well captured. I demonstrate that this string dependency is indeed understood as an emergence of the unmarked effect. Cases where the base is longer than two syllables follow rather straightforwardly given the discussion so far: Max-BR and Align-R(RED,$\sigma_{\mu\mu}$) intervene between NoCoda and AllσL. As illustrated in (49), NoCoda ranked over Max-BR and Align-R(RED,$\sigma_{\mu\mu}$) prohibits the copy of the coda consonant in the base-second syllable, but these constraints ranked above AllσL and *LongV require disyllabic reduplication and vowel lengthening. Moreover, Align-R(RED,$\sigma_{\mu\mu}$) plays an important role here. Given that vowel lengthening occurs in the syllable abutting on the left edge of the base-initial syllable, it is not sufficient to establish a constraint that demands the reduplicant to carry a heavy syllable. A potential but undesirable candidate (49f) cannot be eliminated by such a constraint, but it is successfully ruled out by Align-R(RED,$\sigma_{\mu\mu}$) since it specifically requires the right edge of the reduplicant to carry a heavy syllable (compare (49d) and (49f)).

(49)

/baluktot/$_{\text{Type (III)}}$		No Coda	Max BR	Align-R (RED,$\sigma_{\mu\mu}$)	AllσL	*Long V
a.	ba-ba.luk.tot	**	*****!*	*	6	
b.	baa-ba.luk.tot	**	*****!*		6	*
c.	ba.lu-ba.luk.tot	**	****	*!	10	
d.	☞ ba.luu-ba.luk.tot	**	****		10	*
e.	ba.luk-ba.luk.tot	***!	***		10	
f.	baa.lu-ba.luk.tot	**	****	*!	10	*

The same ranking makes a wrong prediction for cases where the base is disyllabic, however, because the base-final consonant would not be copied, contrary to fact. My proposal is that the ranking in (49) can be retained but another crucial constraint must be introduced: Hierarchical Anchor-BR (HierAnch-BR) which requires that both edges of the reduplicant be anchored at the base. Expressed differently, this constraint demands total reduplication. If HierAnch-BR is ranked over NoCoda, the right result obtains, as exemplified in (50).

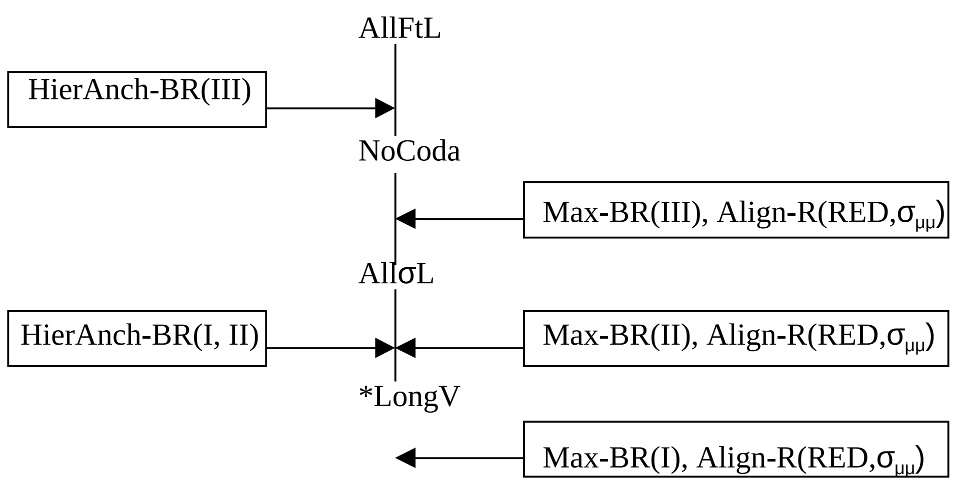
(50)

/walis/$_{\text{Type (III)}}$		HierAnch-BR	NoCoda	Max-BR	Align-R (RED,$\sigma_{\mu\mu}$)
a.	wa-wa.lis	*!	*	***	*
b.	waa-wa.lis	*!	*	***	
c.	wa.li-wa.lis	*!	*	*	*
d.	wa.lii-wa.lis	*!	*	*	
e.	☞ wa.lis-wa.lis		**		

The introduction of HierAnch-BR does no harm to cases where the base is larger than two syllables. Suppose that AllFtL outranks HierAnch-BR. The reduplicant must be partial in those cases, so HierAnch-BR is necessarily violated to satisfy higher ranked AllFtL. This indicates that HierAnch-BR plays no decisive role in (49), and therefore, the evaluation in (49) still holds. HierAnch-BR cannot occupy a fixed position, however. Taking (43I) and (43II) into consideration, HierAnch-BR should not be ranked over AllσL because total reduplication is expected otherwise when the base is disyllabic: AllFtL is vacuously satisfied in such cases, so HierAnch-BR enjoys a decisive role. HierAnch-BR is also a faithfulness constraint, so it is also relativized with respect to various morphosyntactic categories. For (43I) and (43II), HierAnch-BR is ranked below AllσL to avoid total reduplication of disyllabic bases.

Summarizing the analysis above, the whole constraint ranking is given in (51). The three patterns of Tagalog reduplication are emergence of the unmarked effects. But the degree of unmarkedness of the reduplicant is different from morphosyntactic category to category. Given the ranking in (51), CV-reduplication is the least marked and disyllabic reduplication is the most marked among the three types.

(51)



Integrating the analysis here with the discussion in the preceding section, a given morpheme subcategorizes a particular affix, but affixation is not enough to satisfy RM due to the presence of the selector constraint (i.e., Stem≡PrWd). Given the RM » Integrity-IO ranking, reduplication is recruited as a secondary realization of the morpheme. The shape of the reduplicant depends on the position of the relevant faithfulness constraints.

The relativization of Max-BR, Align-R(RED,$\sigma_{\mu\mu}$) and HierAnch-BR poses an interesting question regarding the status of RED as a real morpheme. Given that these constraints are essentially sensitive to the distinction between the base and the reduplicant, does this imply the existence of RED in the input such that this morpheme functions as the imperative to derive reduplication? The answer is negative. I have proposed that all faithfulness constraints are subdivided into subconstraints, each of which carries a morphosyntactic marking. The reason why the relativization of Max-BR and HierAnch-BR are tangible in Tagalog morphology is that morphological opacity enters the grammar and Integrity-IO is ranked below RM. But the grammar still needs to be able to make the distinction between the base and the reduplicant since all BR-faithfulness constraints would not be able to be computed otherwise. Decomposition of BR-faithfulness constraints therefore does not presuppose the existence of the imperative morpheme in the underlying representation. This conforms to the idea developed in this work.

5.6 Phonological Polarity

In this section, I briefly discuss phonological polarity as a final case study of DME, taking the plural formation in Luo as a representative example (Stafford 1967; Gregersen 1972; Okoth-Okombo 1982; Stonham 1994). As reviewed in section 2.5, it constitutes an important empirical phenomenon taken to be support for anti-faithfulness theory by Alderete (1999). The goal of this section is to demonstrate that the sympathy-based idea of morphological opacity successfully explains the phonological polarity effect in Luo. As a consequence, I argue that anti-faithfulness theory is not the only available analytical possibility in OT.

Relevant data are repeated in (52). Again, the descriptive generalization is as follows: (i) a plural suffix *-i* or *-e* (phonetically realized either as [e] or as [ɛ]) is attached, (ii) a word-final vowel of a singular form is subject to deletion, and (iii) the voicing value of the final consonant is reversed (i.e., [-voi]→[+voi], and vice versa). Under the system developed in chapter 2, morphosyntactic functions are not inherent properties of stems and therefore, the singular and the plural are derived by assigning the singular and the plural morphemes to bare stems respectively. Because singular forms are phonologically identical to (the outputs of) bare stems in Luo, this point does not have any serious repercussion on the following discussion.

(52)

	Singular	*Plural*	*Gloss*
a.	alot	alode	vegetable(s)
	bat	bade	arm(s)
	luθ	luðɛ	stick(s)
	ruoθ	ruoði	chief(s)
	guok	guogi	dog(s)
b.	kidi	kite	stone(s)
	puoðo	puoθe	garden(s)
	got	gode	twig(s)
	cogo	coke	bone(s)
	dɛbɛ	depɛ	debbi(s)

Given that the plural forms undergo a voicing change besides affixation, the plural formation can be considered as an instance of DME. Building upon the argument in this chapter, the reason why the voicing polarity is required is that the suffix *-i* or *-e* becomes morphologically opaque due to the existence of Stem≡PrWd serving as the selector constraint. As shown in (53) and (54), the voicing alternation can be accounted for in parallel to other cases of DME examined above. In (52b), the stem-final vowel is subject to deletion. I assume that this is because of high ranking *Hiatus. In the two tableaux below, I attach the plural marking on Max to ensure that the affixal vowel remains undeleted.

(53)

/alot-e/$_{Plural}$			Max_{Plural}	RM	Ident ❁O-[voi]	Ident IO-[voi]	❁Stem ≡PrWd
a.		alot	*!	*	*		
b.		alote			*!		*
c.	❁	alod	*!			*	
d.	☞	alode				*	*

(54)

/kidi-e/$_{Plural}$			Max_{Plural}	RM	Ident ❁O-[voi]	Ident IO-[voi]	❁Stem ≡PrWd
a.		kidi	*!	*	*		
b.		kide			*!		*
c.	❁	kiti	*!			*	
d.	☞	kite				*	*

(53) and (54) show that anti-faithfulness theory is not the necessary tool to analyze phonological polarity phenomena. Since some stem modification is involved in addition to affixation, the voicing exchange in the plural formation in Luo is successfully subsumed under the theme of DME. Given that phonological polarity is also driven by RM in the sense that some stem modification is required because of morphological opacity of the affixal element, the analysis here captures the intuition that the voicing exchange is morphologically motivated. One might claim that the

proposed analysis can derive the morphological derivedness simply by tagging a morphosyntactic category to a faithfulness constraint. This is not a valid counter-argument, however, since morphological idiosyncrasy must be incorporated in any analysis.

In anti-faithfulness theory espoused by Alderete (1999), this morphological character cannot be captured. As pointed out in section 2.5, the theory needs to stipulate that anti-faithfulness constraints are operative only in the surface-to-surface (or output-output) dimension, but even this stipulation does not explain why the voicing polarity is morphologically governed since anti-faithfulness constraints are potentially able to produce phonological alternations with no morphological reasons. Put differently, how can we prevent ¬Faith-IO » Faith-IO in a firmly grounded way? Since a given alternation is not forced by a markedness constraint, it should not be phonological. The only remaining possibility is that it is morphologically conditioned, but there is no principled way to prevent the morpheme-free activation of ¬Faith-IO. The existence of ¬Faith-IO generates context-free anti-faithfulness effects, contrary to fact. Anti-faithfulness effects are restricted to cases where a morpheme needs to receive phonological exponence. To ensure the desired effect, an additional assumption is necessary: anti-faithfulness constraints are activated by morphemes, as explicitly done by Alderete (1999). This proves that morphosyntactic information needs to be encoded as part of faithfulness constraints in anti-faithfulness theory as well, showing that the idea of attaching a morphosyntactic marking does not constitute a damaging argument for RMT developed throughout this dissertation. The fact that phonological polarity is induced by the introduction of a new morpheme is directly captured by RMT but not by anti-faithfulness theory.

5.7 Theoretical Predictions

I have proposed a general schema to explain DME and applied it to various concrete cases. This section addresses theoretical predictions of the sympathy-based system. The discussion is centered on theoretical restrictiveness of the sympathy mechanism, particularly concerning possible and impossible morphological constructions in natural languages. I also compare RMT with anti-faithfulness theory in this context.

I start the discussion with the most important prediction of the sympathy system. DME can be more generally regarded as multiple morphemic exponence. However, it is never the case that natural languages are free from the restriction on the number of phonological exponence associated with a single morpheme. The range is quite limited: minimally zero (i.e., no morphemic exponence at the cost of a RM violation) and maximally two. An exhaustive survey of all human languages is beyond anyone's capacity, but there is no counterexample to this generalization to the best of my knowledge. The formal prediction discussed here is concerned with this generalization, especially the upper bound of morphemic exponence in languages.

Consider the following schematic example: /ABC-D_α/$_\alpha$, where *ABC* are stem segments, and the suffixal element *D* contributes to the realization of morpheme α if it has some correspondent in the output. Another morphological expression of α is obtained if some stem modification takes place, resulting in DME (e.g., [AB'CD] or [ABC'D]). The question is then whether an additional stem change is possible (e.g., [AB'C'D]), exhibiting triple morphemic exponence. Given the theoretical mechanism articulated here, this is an impossible state of affairs. Consider the tableau in (55). In order to obtain two stem changes, it must be minimally true that RM outranks two faithfulness constraints. But the violations incurred by (55b) and (55c) constitute only a subset of those incurred by (55d), so (55d) is harmonically bounded by (55b) and (55c) in the sense of Prince and Smolensky (1993:176-178): no ranking permutation makes (55d) better than (55b) and (55c). This point proves that no sympathetic correspondence can make (55d) optimal because the selector constraint chooses either [AB'C] or [ABC'] as the operative sympathy candidate depending on the relative hierarchy of Faith-B and Faith-C. An immediate consequence is that either (55f) or (55g) is the final output: (55h) is harmonically bounded by them. This shows that more than two phonological exponents of a single morpheme are never obtained mechanically within the sympathy system.

(55)

		$/ABC\text{-}D_{\alpha}/_{\alpha}$	Max	RM	Faith-B	Faith-C	❁Stem≡PrWd
a.		ABC	*!	*			
b.	❁	ABC'	*!			*	
c.	❁	AB'C	*!		*		
d.		AB'C'	*!		*	*	
e.		ABCD					*
f.	☞	ABC'D				*	*
g.	☞	AB'CD			*		*
h.		AB'C'D			*	*	*

This point has a significant correlation with a general property of nonconcatenative morphological operations discussed in section 3.2.1. I argued that it is mechanically impossible in RMT that subtractive morphology and metathesis, for example, cooccur if they are both morphologically conditioned. To recall this point, consider a schematic example: $/ABC/_{\alpha}$. Morpheme α does not bear any phonological content underlyingly. Depending on the specific faithfulness constraint ranked beneath RM, the concrete stem modification is determined. As (56) shows, the candidate with two stem changes is harmonically bounded by the candidates with one stem change. This argument suggests that maximally one phonological exponent can appear when no affix is present. Thus, no language can exist which displays both umlaut and metathesis in order to obtain phonological exponence of a morpheme, for example.

(56)

		$/ABC/_{\alpha}$	RM	Faith-B	Faith-C
a.		ABC	*!		
b.	☞	ABC'			*
c.	☞	AB'C		*	
d.		AB'C'		*	*

This has a direct repercussion on the upper limit of morphemic exponence predicted by the sympathy account. Since the selector constraint (i.e., Stem≡PrWd) simply makes the existence of affixes invisible, DME cases cannot deviate from simple examples of nonconcatenative morphology concerning the restriction imposed on stem changes. DME is a hybrid of concatenative and nonconcatenative morphology. DME is nothing different from examples discussed in chapter 2 except that some affix exists.

In summary, the whole argument so far indicates that the theoretical system developed in this work makes the following two important interrelated predictions. First, DME is possible only when an affix exists in the underlying representation. Second, more than two phonological expressions are never permitted in any languages. Every language has its own phonology, so various phonological changes can occur on a stem. But some phonological factor must come into play when more than one stem change is found. The plural formation in German stated at the outset of this chapter is a clear example. In *Buch≈Bücher*, the stem-final consonant exhibits the [x]≈[ç] alternation. The plural form is different from the output of the bare stem (which is phonologically identical to the singular form) in three respects (i.e., *-er*, umlaut, and [x]→[ç]). But the distribution of [x] and [ç] is quite regular and predictable in German (i.e., [x] after a back vowel, and [ç] elsewhere). The [x]≈[ç] alternation is a phonological consequence of umlaut, and therefore, the segmental alternation is motivated by a high ranked markedness constraint. Given that this alternation is phonologically conditioned, the [x]≈[ç] alternation is not an exponent of the plural morpheme.

Consider anti-faithfulness theory in terms of these theoretical predictions. Taking *Gast≈Gäste* 'guest(s)' in German as an example (see (1) for more examples), the plural formation is analyzed under anti-faithfulness theory that the plural affix *-e* activates ¬Ident-IO-[+back]. This anti-faithfulness constraint is obviously ranked over the faithfulness counterpart, namely Ident-IO-[+back], as shown in (57).

(57)

		/Gast-e/$_{\text{Plural}}$	Max	¬Ident-IO-[+back]	Ident-IO-[+back]
a.		Gast	*!	*	
b.		Gaste		*!	
c.		Gäst	*!		*
d.	☞	Gäste			*

Despite the fact that anti-faithfulness theory works, it makes a prediction different from the sympathy-based system in terms of restrictiveness of possible nonconcatenative morphology in natural languages. The anti-faithfulness account does not restrict the number of changes caused on a stem since multiple anti-faithfulness constraints can dominate the corresponding faithfulness constraints. Suppose that ¬Ident-IO-[+back], ¬Integrity-IO and ¬Linearity-IO outrank Ident-IO-[+back], Integrity-IO and Linearity-IO respectively. The optimal output form is required to undergo umlaut, reduplication and metathesis in this scenario, but no such real case would exist. Thus, the anti-faithfulness account suffers from an over-generation problem. Functionally, one might claim that triple or more phonological exponence of a morpheme is blocked in terms of redundancy. But DME is also redundant in the first place in languages like German and Japanese because the absence of umlaut in German plurals or accentual changes in Japanese would not reveal a different morphosyntactic function. The theoretical predictions discussed above are empirically correct to the best of my knowledge. Although they should be subject to further empirical scrutiny, it is certainly unlikely that a single morpheme must receive ten phonological exponents, as predicted to be possible by anti-faithfulness theory.

In the context of DME, Stem≡PrWd is the only relevant constraint. According to McCarthy (1999), where sympathy theory was originally proposed, any faithfulness constraint can potentially serve as a selector constraint. It is thus necessary here to demonstrate that DME is not obtained no matter what other faithfulness constraints are arbitrarily chosen as the selector constraint. Since the following argument applies to any faithfulness constraint, I arbitrarily choose Linearity as the selector constraint for the test case here. Suppose that /ABC-D_{α}/$_{\alpha}$ is given as the underlying representation and that Linearity-IO is the selector constraint. As delineated in (58), the candidate faithful to the underlying representation (i.e., (58e)) is chosen as the sympathy candidate because it does not incur any constraint violation. This shows that (58e) is the winning form regardless of the specific Faith-❀O to be posited. (58e) has only one exponent of morpheme α, and therefore, DME does not appear. The reason is simply that no faithfulness constraint other than Stem≡PrWd can make the affixal element opaque, and as a result, that there is no reason to deform the phonological shape of the base to satisfy RM.

(58)

		/ABC-$D_{\alpha}/_{\alpha}$	Max	RM	Faith-IO-[C]	❀Linearity
a.		ABC	*!	*		
b.		ABC'	*!		*	
c.		BAC	*!			*
d.		BAC'	*!		*	*
e.	❀ ☞	ABCD				
f.		ABC'D			*!	
g.		BACD				*!
h.		BAC'D			*!	*

One might bring up the possibility of multiple sympathy. This possibility has two ramifications: (i) Stem≡PrWd and some other faithfulness constraint are selector constraints, and (ii) faithfulness constraints other than Stem≡PrWd serve as the selector constraints. I begin with case (i). Consider the tableau in (59), where Stem≡PrWd and Faith-IO-[C] are selector constraints. The principal question here is whether (59h) has ever a chance to surface as the best output. In (59), three candidates are indicated by the flower mark due to the fact that more than one selector constraint is employed here. For ❀Faith-IO-[C], (59e) is selected as the sympathy candidate whereas (59b) or (59c) is the sympathy candidate for ❀Stem≡PrWd. The selection between (59b) and (59c) depends on the ranking of Faith-IO-[B] and Faith-IO-[C]. Given these sympathy candidates, (59h) has no chance to be selected as the ultimate output. First, whatever Faith-❀O constraint is chosen through which (59e) is sympathized, (59h) is harmonically bounded by (59e) given that the violations of (59e) are a subset of those incurred by (59h). Second, for (59b) or (59c) to be active as a sympathy candidate, either Faith-❀O-[C'] or Faith-❀O-[B'] should be the sympathy constraint. Either (59f) or (59g) fares better than (59h) by the harmonic bounding reasoning. This general consideration indicates that triple morphemic exponence is never obtained even if some faithfulness constraint is active as a selector constraint in addition to Stem≡PrWd.

(59)

		$/ABC\text{-}D_\alpha/_\alpha$	Max	RM	Faith IO-[B]	❀Faith IO-[C]	❀Stem ≡PrWd
a.		ABC	*!	*			
b.	❀	ABC'	*!			*	
c.	❀	AB'C	*!		*		
d.		AB'C'	*!		*	*	
e.	❀	ABCD					*
f.		ABC'D				*	*
g.		AB'CD			*		*
h.		AB'C'D			*	*	*

Let us turn to case (ii), where multiple selector constraints are both not Stem≡PrWd. As shown in (60), this case is even simpler. Since the phonological material affiliated with the affix is not required to be underparsed when Stem≡PrWd is not in force as a selector constraint, complete faithfulness is the best. (60e) incurs no violation of the relevant constraints, and therefore, it is chosen as the sympathy candidate regardless of the relative ranking of Faith-IO-[B] and Faith-IO-[C]. The immediate result is that (60e) surfaces irrespective of the particular Faith-❀O constraint. We can thus conclude that more than one phonological exponent never appears when Stem≡PrWd is not employed as the selector constraint.

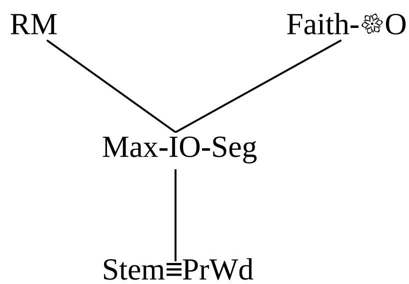
(60)

		/ABC-$D_\alpha/_\alpha$	Max	RM	❀Faith-IO-[B]	❀Faith-IO-[C]
a.		ABC	*!	*		
b.		ABC'	*!			*
c.		AB'C	*!		*	
d.		AB'C'	*!		*	*
e.	❀	ABCD				
f.		ABC'D				*
g.		AB'CD			*	
h.		AB'C'D			*	*

The above argument indicates that multiple sympathy does not succeed in producing triple or more morphemic exponence in the sympathy system here. Integrating the whole discussion developed thus far in this section, we can conclude that Stem≡PrWd is the only eligible selector constraint and that no other (even additional) selector constraint allows for a morpheme to have more than two surface phonological realizations. Therefore, the upper bound of permissible phonological manifestation of a morpheme is strictly restricted under the sympathy system. This restrictiveness, if empirically proved to be correct, provides strong evidence in favor of the RMT-based account of DME.

There is another important theoretical prediction arising from the sympathy system: the stem change involved in DME can never be subtractive morphology. Suppose that Max-IO-Seg occupies Faith-IO in (6), yielding the ranking in (61). The important observation is that Max-IO-Seg crucially has dominated status here whereas it is undominated in all cases discussed in earlier sections.

(61)



The reason why affixation and subtractive morphology are incompatible becomes clear if we consider a schematic example: /ABC-D_{α}/$_{\alpha}$. As the dominance effect in Japanese shows, the pertinent Faith-❀O is Dep-❀O when Max-IO is ranked below RM (see section 5.3.2). (62) illustrates that [ABD] (with both affixation and morphological subtraction) is harmonically bounded by (62c). This suffices as a proof of the non-existence of the cooccurrence of subtractive morphology and affixation. Looking at (62) more closely, however, (62c) violates ❀Stem≡PrWd, but [ABD] does too. The consequence is that (62a) is nominated for the sympathy candidate. Dep-❀O is violated by [ABD] as well as by [ABCD], so [AB] is the winner. The situation is not ameliorated even if Max-❀O takes place of Dep-❀O. [ABC] is selected as the sympathy candidate, and [ABD] violates Max-❀O. Thus, [ABD] never wins no matter what kind of Faith-❀O is employed.

(62)

		/ABC-$D_\alpha/_\alpha$	RM	Dep-❁O	Max-IO	❁Stem≡PrWd
a.	❁	ABC	*!		*	
b.	☞	AB			**	*
c.		ABCD		*!		*
d.		ABD		*!	*	*

This is again an important theoretical prediction distinguishing RMT from anti-faithfulness theory. Because nothing prevents the possibility of ¬Max » Max in the context of DME, anti-faithfulness theory allows for the cooccurrence of affixation and subtractive morphology as simultaneous phonological instantiations of one and the same morpheme. No such example has been reported, however, to the best of my knowledge.

Summing up this section, I discussed two main theoretical predictions made by the sympathy account of DME. First, a single morpheme can receive maximally two phonological exponents. Given the fact that overt phonological realization sometimes fails as discussed in earlier chapters, the range of phonological exponents for one morpheme is between zero and two. This property is closely associated with a general property of nonconcatenative morphology that maximally only one phonological exponent is possible when a morpheme does not possess any phonological substance. Second, it is predicted by the proposed sympathy system that subtractive morphology and affixation are antagonistic to each other. These two predictions were both couched in terms of harmonic bounding considerations. By contrast, anti-faithfulness theory lacks these predictions, and therefore, it is potentially possible for natural languages to have more than two phonological exponents for a single morpheme as well as to combine affixation and morphological subtraction. Exhaustive survey of all human languages is beyond anyone's capacity, and therefore, these two predictions must be tested against more comprehensive data in the future. If they are empirically proved to be correct, the sympathy account for DME embedded in RMT is strongly supported.

5.8 Summary

In this chapter, I investigated various DME phenomena attested in languages with no genetic relation. I argued that sympathy theory offers a satisfactory analysis. The gist of the proposal is that an affixal element contained in the underlying representation is made opaque such that it behaves as if it were absent for the purpose of satisfying RM. This is formally achieved by assuming Stem≡PrWd as the universal selector constraint, which requires perfect correspondence between domains of a stem and a prosodic word. The consequence is that the stem is required to modify its phonological shape. The specific modification is determined by the specific Faith-IO ranked lower than RM. The sympathy candidate exercises its influence over other candidates through Faith-❀O. Since Max-IO-Seg is undominated in the proposed schema of DME, the affixal element must have a correspondent, resulting in two exponents of a single morpheme.

The sympathy theoretic implementation couched in RMT would be superior to anti-faithfulness theory in terms of formal restrictiveness. I pointed out that there are two theoretical predictions that distinguish the sympathy system and anti-faithfulness theory. The sympathy account for DME predicts first that a single morpheme can possess maximally two phonological exponents and second that affixation and subtractive morphology cannot cooccur as phonological realizations of the same morpheme. On the other hand, anti-faithfulness theory is free from these restrictions, and therefore, it predicts first that natural languages do not have any upper bound of the number of phonological exponents of a morpheme and second that affixation is compatible with subtractive morphology. I also argued that more than two phonological exponents of a single morpheme can never be obtained mechanically even if Stem≡PrWd is replaced by some other faithfulness constraint or even if more than one selector constraint is posited. These predictions must be tested against more extensive data in the future.

Finally, it is worth pointing out that the rarity of DME in natural languages and the sympathy system could have a correlation. It is empirically supported that inter-candidate correspondence crucial in sympathy theory is not often essential. Sympathetic correspondence is not as extensive as IO-correspondence, for instance. Given the crosslinguistic fact that DME is not observed as often as single morphemic exponence, the rarity of co-candidate correspondence could be fruitfully linked to the infrequency of DME.