Chapter 6

Conclusion

Throughout this dissertation, I addressed various questions surrounding realizational morphology with special attention to nonconcatenative morphology. To close this dissertation, I summarize the main results discussed in the earlier chapters.

To begin with, I argued that two influential morphological models (i.e., Item-and-Arrangement and Item-and-Process) are both unsatisfactory in capturing the whole range of morphological phenomena attested in human languages. The Item-and-Arrangement model cannot accommodate nonconcatenative morphological processes because a word is taken to consist of a sequence of morphemes. On the other hand, the Item-and-Process model is not restrictive in the sense that potentially any type of process could be incorporated in this view, including many unattested ones. In a nutshell, the two morphological models suffer from complementary problems. Given that morphemes manifest their presence through some phonological expression, it is natural that morphological operations take advantage of the same range of processes as those eligible in phonology (cf. Martin 1988), but the immediate question was how to capture this morphology-phonology correspondence. I argued in this light that OT offers an appropriate analytical tool. Phonological alternations are motivated through the existence of markedness constraints ranked over faithfulness constraints, and therefore, possible phonological changes are restricted to those violating the limited set of faithfulness constraints. Because the faithfulness constraints needed in phonology have been fairly established since the development of correspondence theory (McCarthy and Prince 1995), the extension of OT to realizational morphology is a natural move.

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Given this set-up, I investigated the formal nature of nonconcatenative morphology in chapter 2. The most important observation was that purely morphologically motivated phonological changes exhibit anti-faithfulness effects (cf. Alderete 1999). Since no phonological factor enters the picture as the driving force of such stem modifications, phonological markedness constraints do not play a central role. Under the standard assumption that *Con* contains only markedness and faithfulness constraints, however, anti-faithfulness effects cannot be captured. This is because anti-faithfulness effects involved in nonconcatenative morphology generate an output which is phonologically more marked than the input, the state of affairs which is never found in markedness-driven phonological alternations. I proposed RM as a universal constraint, whose definition is reproduced in (1). RM requires every morpheme in the underlying representation to receive some phonological exponence on the surface, so it is considered as a morphological faithfulness constraint in the sense that it refers to the morpheme information present in the underlying representation.
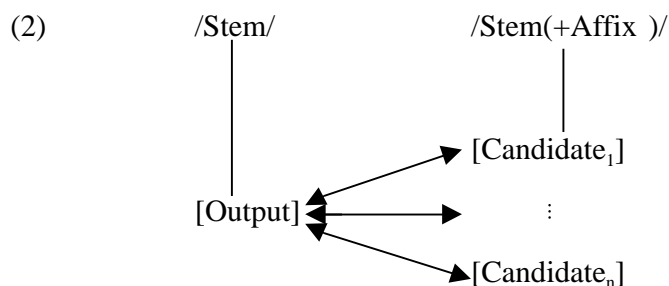
(1)   Realize Morpheme (RM):

Let   be a morphological form,   be a morphosyntactic category, and F( ) be the phonological form from which F(+) is derived to express a morphosyntactic category . Then RM is satisfied with respect to   iff F(+) F( ) phonologically.

The use of RM per se is not a new proposal, as proposed and employed by many earlier works (Samek-Lodovici 1993; Akinlabi 1996; Gnanadesikan 1997; Rose 1997; Walker 1998, 2000; Piggott 2000; Kurisu 1999, 2000ab, 2001, to appear). I proposed a formalization of the constraint, and developed a significantly expanded argument for the importance of the constraint. Given morphemes as primitive

morphological units, RM requires every morpheme in the underlying representation to receive some phonological exponence. The specific instantiation of the phonological exponence is not determined by RM. Rather, interactions of constraints determine how a given morpheme should be phonologically manifested in the surface representation. As amply demonstrated, this is especially important when a given morpheme does not contain any phonological substance as part of its information. Under RMT developed here, nonconcatenative morphology is derived by RM » Faith. This general schema directly captures the fact that stem changes invoked in nonconcatenative morphology are morphologically conditioned because they sacrifice phonological faithfulness constraints to satisfy the higher ranked morphological faithfulness constraint. The specific stem modification is determined by the particular phonological faithfulness constraint ranked below RM. This way of understanding realizational morphology enables a formal distinction between purely phonological processes and morphologically governed ones. While the former is motivated by phonological markedness constraints outranking faithfulness ones, the latter is motivated by RM.

I proposed a specific model of how RM violations are computed. First, morphosyntactic categories are derived from bare stems unless there is evidence that a certain morphosyntactic category is derived from another (the input and candidates are directly compared in such cases). Bare stems are forms which crucially lack morphosyntactic information, and their output forms are computed by the grammar. The candidates produced by *Gen* to evaluate the optimal form of a given base for a certain morphosyntactic category are compared with the output of the bare stem for the purpose of evaluating the satisfaction/violation of RM, as repeated in (2) below.

This procedure is not only necessary given the richness of the base hypothesis but also desirable in that only morphological factors are taken into account, abstracting away from the influence of purely phonological effects. The pivotal idea is to segregate morphosyntactic functions from stems. Given cases where a certain morphosyntactic category does not have any plausible category as its base, the notion of bare stems is empirically necessary, as discussed in section 2.3.

(2)   /Stem/   /Stem(+Affix)/

                                                              ▸ [Candidate$_1$]

         [Output] ◂▸   ▸   ⋮

                                                              ▸ [Candidate$_n$]

RM requires the two output forms (one of which is typically the output of a bare stem) to be phonologically non-identical, and therefore, it may appear to be the same as anti-faithfulness constraints. They are significantly different in a number of respects. First, anti-faithfulness constraints are descriptively over-powerful in that they call for specific stem modifications, whereas RM does not have such power. Second, anti-faithfulness constraints are operative only when the input is itself an actually occurring output form, but the output of a bare stem does not have to be an actual surface form for RM. This difference is empirically important since there are cases where a certain morphosyntactic category comes from forms which do not stand on their own as independent prosodic words, as in the nominative formation in Lardil. As discussed, the surface-to-surface restriction imposed on anti-faithfulness constraints cannot be dispensed with to avoid undesirable phonological polarity

effects in the lexical-to-surface dimension. This point thus strongly suggests that RMT is more plausible than anti-faithfulness theory in a large context.

Given RM as the impetus of stem modifications in nonconcatenative morphology, I proposed a general ranking schema to account for them: Faith » RM » Faith . The gist of the idea is the relativization of faithfulness constraints with respect to morphosyntactic functions. Since stem modifications do not take place indiscriminately irrespective of morphosyntactic categories, their faithfulness values must be ranked differently with respect to RM. The general ranking schema above explains an asymmetrical behavior of the two morphosyntactic categories and : Faith is violated in to satisfy RM, but RM must be sacrificed to satisfy Faith in . This means that does not receive any phonological exponence on the surface. A conceivable alternative is relativizing RM, yielding RM » Faith » RM . This possibility results in a ranking paradox, however, when some phonological markedness constraint enters the picture to shape the output of the derived category. This indicates that RM is literally a primitive atomic constraint. In the generalized schema, Faith is a variable that is replaced by a range of specific faithfulness constraints. Since reduplication and deletion violate Integrity and Max respectively, one desirable consequence is that we can eliminate abstract but process-specific underlying morphemes such as RED and TRUNC. Given the system that succeeds in obtaining the reduplication and truncation effects, there is no substantive evidence for such morphemes.

RMT has a number of significant theoretical implications. First, it is neither Item-and-Arrangement nor Item-and-Process. It is similar to Item-and-Arrangement in that morphemes are taken to be entities. But the morphological system developed

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here successfully handles morphological operations other than affixation, overcoming the empirical limitation of Item-and-Arrangement. On the other hand, RMT is akin to Item-and-Process too in the sense that linear arrangements of morphs are not what constitutes word formation. But morphemes are taken to be substantial entities, so my view departs from Item-and-Process too. I argued that the extreme pursuit of the Item-and-Process view within the framework of OT attempted by Russell (1995, 1999) is not successful. Second, haplology violates RM if it takes place between adjacent segments without changing phonological features. Because RM is strictly defined in terms of phonological (non-)identity, morphological affiliations of phonological elements have no role to play. Morphological haplology has been considered as a special case where one and the same phonological material manifests the presence of more than one morpheme, but only phonologically tangible manifestation counts as a contribution to the satisfaction of RM. This line of thought would be more promising from the perspective of language processing given the transparent computation of RM.

Building on the argument developed in chapter 2, I examined morphological truncation in chapter 3. Two types of morphological truncation are observed in natural languages: subtractive morphology and templatic truncation. The most important difference is that the deleted portion is constant in subtractive morphology whereas the residue of morphological clipping is prosodically invariable in templatic truncation. Despite this remarkable difference, I argued that both types of truncation are regulated by the same underlying principle. They are required to achieve phonological realization of the relevant morpheme. Given the general schema encapsulated above, RM » Max is the operative ranking. The formal difference

between subtractive morphology and templatic truncation is explained by the presence/absence of a set of constraints deriving a templatic effect. Since such constraints are ranked over Max in templatic truncation, the size of the eventual output can be defined prosodically. On the other hand, subtractive morphology is not governed by such prosodic constraints, and therefore, the residue of truncation varies depending on the phonological size of the base.

Another important difference of the two kinds of truncation processes is that subtractive morphology is associated with various grammaticalized word formation (i.e., categorical changes are involved) whereas templatic truncation is employed in non-grammaticalized word formations such as hypocoristics. Put differently, a large portion of the base is preserved in grammaticalized word formations while only a small portion of base information remains in non-grammaticalized truncation. The reason behind this robust difference is a matter left open for future research, but I suggest my speculation here. As discussed in chapter 3, grammaticalized word formation processes are indispensable in the sense that their absence results in serious communication problems while the lack of non-grammaticalized morphology such as hypocoristics does not cause communication troubles. Thus, one possibility to account for the difference would be to claim that preservation of the base information is important in grammaticalized morphology compared with non-grammaticalized one. This idea would be captured by hypothesizing that paradigm uniformity (Kenstowicz 1996; Burzio 1998) plays an active role in regulating the similarity of grammaticalized forms but it is not operative in non-grammaticalized ones. Given that non-grammaticalized morphemes are not a central part of the linguistic system, they are not governed by the principle of paradigm uniformity.

In chapter 4, I discussed cases where a single morpheme exhibits nonconcatenative allomorphs. The essence of the proposal was that they are indications of languages' effort to optimize phonological structure of the output. Various faithfulness constraints are ranked below RM, and the nonconcatenative allomorph violating the lowest faithfulness constraint is chosen as the default. But other allomorphs are employed when the default option creates a phonologically marked representation. This idea is implemented through interactions of faithfulness and markedness constraints, a central tenet of OT. This way of understanding nonconcatenative allomorphs is parallel to the distribution of affixal allomorphs such as the plural morpheme -*s* in English in the sense that the phonologically least marked allomorph appears on the surface. This suggests that it is not desirable to comprehend concatenative and nonconcatenative morphology through two distinct mechanisms. Indeed, the integration of them is not only desirable but also necessary. In the discussion of the actual aspect formation in Saanich, I presented a case where they coexist in the realization of a single morpheme. The actual aspect morpheme contains a glottal stop as its phonological substance, but some nonconcatenative stem change is employed even at the expense of a Max violation when glottal stop infixation results in a highly marked phonological representation. Such cases cannot be understood satisfactorily without an integrated system of concatenative and nonconcatenative morphology, so they must be unified under the rubric of realizational morphology.

Nonconcatenative allomorphs also present a serious challenge to anti-faithfulness theory. Under this theory, multiple anti-faithfulness constraints need to be ranked over their faithfulness counterparts. Given that anti-faithfulness constraints

are always in conflict with their faithfulness counterparts, there is no systematic way to prevent the appearance of multiple anti-faithfulness effects for a single morpheme. In other words, anti-faithfulness theory offers no principled way to capture the complementary distribution of various nonconcatenative allomorphs. Furthermore, the actual aspect formation in Saanich counteracts with anti-faithfulness theory since some stem modification is expected to occur in addition to the glottal stop if the actual aspect morpheme activates the strength of anti-faithfulness constraints, contrary to fact. RMT does not lead to the same problem because there is no intrinsically conflictive constraint in the system. This accords with the fundamental idea of OT that which constraints are in conflict with one another differs depending upon the given phonological context.

Finally, in chapter 5, I investigated examples where a single morpheme receives two phonological exponents. The main question was how a stem modification is motivated in a principled manner. I developed the idea of morphological opacity, the effect for the underlying affixal element to be invisible for the purpose of calculating the satisfaction/violation of RM. Morphological opacity is formally captured through sympathy theory (McCarthy 1999), where Stem PrWd serves as the selector constraint. It requires the stem domain to be exactly coextensive with a prosodic word domain. This idea is more formally expressed in the form of propositional logical constraint conjunction of Anchor-L(Stem,PrWd), Anchor-R(Stem,PrWd) and Contiguity-Stem. Given this selector constraint, the sympathy candidate is expected to underparse the affixal element contained in the underlying representation. But the candidate undergoes some stem modification under the pressure of RM that is ranked over some Faith-IO. The specific stem

change depends upon the particular IO-faithfulness constraint. The relevant Faith-❀O » Faith-IO ranking requires the ultimate output to mimic the stem change property of the sympathy candidate. Finally, Max-IO-Seg » Stem PrWd ensures that the affixal segments ultimately appear on the surface. The sympathy system can handle not merely various cases of double morphemic exponence but also subsume the phonological polarity effect in Luo, an important case alleged by Alderete (1999) to constitute strong empirical support for the necessity of anti-faithfulness constraints. Since RMT successfully handles the same data, the plural formation in Luo does not constitute convincing empirical support for anti-faithfulness theory.

Furthermore, I discussed that RMT and anti-faithfulness theory make different empirical predictions in the context of double morphemic exponence. They are concerned with possible and impossible morphology in natural languages. First, I discussed that the sympathy account predicts that a single morpheme receives maximally two phonological exponents. This is because only the affixal element is made invisible, and therefore, one stem modification is sufficient for the satisfaction of RM. No more phonological manifestation is motivated. This property is closely related to the prediction of RMT concerning nonconcatenative morphology in general. When no affix is involved, maximally one stem modification is permitted. Since double morphemic exponence is a mix of concatenative and nonconcatenative morphology, the restriction imposed on nonconcatenative morphology must be obeyed by double morphemic exponence too. I argued that this prediction follows from the consideration of harmonic bounding. Anti-faithfulness theory, on the other hand, predicts that these restrictions do not exist at all. Since potentially an unlimited number of anti-faithfulness constraints can outrank corresponding faithfulness

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constraints, the number of stem changes invoked for morphological reasons is not restricted. But it is unlikely that a single morpheme receives ten phonological exponents, for instance.

Second, the sympathy account predicts that affixation and subtractive morphology never cooccur. Again, this prediction follows from the logic of harmonic bounding. But anti-faithfulness theory allows for the possibility of ¬Max » Max in a context where affixation is involved. This shows that affixation and subtractive morphology are expected to be compatible with each other. Although a more exhaustive survey of morphology in various languages remains to be done, these predictions distinguish the two theories on empirical grounds.

In the investigation of these (especially nonconcatenative) morphological processes, RM plays a central role. The specific phenomena studied in this dissertation (i.e., morphological truncation, nonconcatenative allomorphs, and double morphemic exponence) might appear unrelated to one another superficially, but they are all subsumed under the rubric of realizational morphology. All such morphological phenomena are motivated to obtain some phonological incarnation of morphemes. There are remaining problems, however. I investigated systematic cases in this dissertation, but the most notable question is how suppletive morphology in English is to be accounted for, for example. It is not clear how suppletion as in *foot feet* should be captured in the overall context of this work. Given the fact that English has various strategies to realize the plural morpheme (i.e., *-s* suffixation (*book books*), suppletion (*foot feet*), no surface realization (*fish fish*)), it is evidently insufficient to allow for faithfulness constraints relativized with respect to morphosyntactic functions. An immediate question is how this kind of morpheme-

specific behavior should be explained in a principled way. One obvious possibility would be to separate a single morpheme into subclasses and make relativized faithfulness constraints sensitive to those subdivided morphosyntactic categories, as actually done in the analysis of Koasati plurals in section 3.2.1. Under this view, Ident-IO-[back] associated with the plural morpheme relevant to suppletion is ranked below RM. This is along the lines of the proposal made in this dissertation, but it awaits further intensive study to understand whether this is the most plausible approach to such rather irregular morphology.