

Chapter 4.

Transderivational Faithfulness and Anti-Faithfulness

The thesis of Root-Controlled Accent clarifies the distinction between two classes of morpho-accentual phenomena: root-controlled accent (RCA) and affix-controlled accent (ACA). As in root-controlled vowel harmony, RCA entails that the accentual properties of the larger word are predictable from the properties of the word-internal root. Therefore, root-control in both kinds of phonological systems is systematic and applies across the board. Affix-control in accent systems, by contrast, is more sporadic and is predictable from the properties of individual morphemes. As illustrated in the next section, morphologically conditioned de-accentuation, the result of attaching a so-called ‘dominant’ affix, is affix-controlled because it requires the lexical specification for this de-accentuation on an affix-by-affix basis. The properties of affix-controlled processes will be studied in more detail in chapter 5, but from this first look at the problem, it will be clear that ACA forms a class of phenomena that excludes RCA.

The observed differences between these two phenomena suggests that they require a different analysis, and the last two chapters are dedicated to developing an integrated theory of affix-controlled accent. The current chapter provides the theoretical background for this theory, which has two basic components. The first involves a set of mechanisms which encode a formal relationship between morphologically related words. In Optimality Theory, this relationship is established through a set of Transderivational Faithfulness constraints which compare a base form with its related derivative and assess the pair for their phonological similarity. Following many recent proposals, I employ this basic approach in the analysis of accent-neutral morphology, i.e., cases where the derived form mimics the prosody of its base. The nuts and bolts of this theory, dubbed Transderivational Correspondence Theory (TCT) in Benua 1997 [1998], is presented in §4.2.

The second main ingredient in the theory of ACA involves a further development of Faithfulness in OT, namely the introduction of the related notion, Anti-Faithfulness. Anti-Faithfulness demands a phonological change in related strings where Faithfulness requires phonological inertness. As will be shown in §4.3, Anti-Faithfulness constraints solve a significant problem in the analysis of exchange processes. After motivating these two basic ingredients, transderivational relations between words and the notion of Anti-Faithfulness, they will be applied jointly in the development of a theory of morpho-phonological alternations, which has broad implications for the morphology-phonology interface. Within this theory, the properties of affix-controlled accentual processes will be explained as a special type of a more general kind of morpho-phonological operation.

4.1 Morphemic Sources of Accentual Regularity

The focus of much of the discussion up to now has been on what might be called ‘culminativity effects’ for inherent accent, i.e., the resolution of a sequence of lexical accents in the competition for a unique word accent. For example, in the study of word accent in Cupeño, we have seen a role for edge orientation in culminativity effects: in words with a sequence of inherently accented affixes, the rightmost accent wins. Another important means of resolving this competition is achieved by an ordering of Root and Affix Faithfulness. In root-controlled accent systems such as Cupeño, the competition between root and affix accent is resolved as the satisfaction of $\text{MAX-PROM}_{\text{Root}}$ over $\text{MAX-PROM}_{\text{Affix}}$, as predicted by the RCA hypothesis, repeated below from chapter 2, section 2.

(1) Root-Controlled Accent Hypothesis

In lexical-to-surface mappings of a word with more than one inherent accent, if accent is deleted, accent in the root is realized over accent elsewhere in the word.

If a sequence of accented morphemes do not differ in morphological class membership, then the thesis of Root-Controlled Accent (RCA) says nothing, and additional principles, e.g., edge orientation, may apply. However, if the accented morphemes do in fact differ in the relevant way, i.e., some are roots and some are affixes, the universal ordering of Root and Affix Faithfulness eliminates non-root accents from the competition. Further, a straightforward extension of this idea is to include a position for Stem Faith, or Faithfulness to derivational affixes (as in Revithiadou 1997) in the meta-constraint, in which case a more articulated ‘chain of command’ can be established (see the analysis of derived nouns in Russian in §5.2.3 for a relevant example).

The RCA hypothesis is a restrictive claim in that it rules out certain logically possible types of culminativity effects, the obvious one being a case where accented affixes systematically win out over accented roots. This result is a necessary consequence of the overall theory because, as emphasized throughout, the explanation of overriding root stress derives directly from the assumption that Root Faith is universally ranked above Affix Faith. With this inherent ranking, the facts could not be otherwise. A possible challenge to this claim comes from the behavior of certain special affixes, often called ‘dominant affixes’ because they appear to win in competitions with a root accent. For example, the adjective-forming suffix *-ppó* in Japanese is a dominant suffix as all words that contain this suffix have accent on *-ppó*, even when it combines with an accented stem (2b). Another example is the noun-forming suffix in Russian *-úx*, which likewise ignores the accentedness of the base to which it attaches and is always accented (3).

(2) Dominant Accented Suffix *-ppó* in Japanese

- | | | | | |
|----|-------------------|---|-------------|--------------|
| a. | /abura + ppó + i/ | → | abura-ppó-i | ‘oily’ |
| | /kaze + ppó + i/ | → | kaze-ppó-i | ‘sniffly’ |
| b. | /adá + ppó + i/ | → | ada-ppó-i | ‘coquettish’ |
| | /kíza + ppó + i/ | → | kiza-ppó-i | ‘affected’ |

(3) Dominant Accented Suffix -úx in Russian

- | | | | | |
|----|------------------|---|------------|---------------|
| a. | /skak + úx + a/ | → | skak-úx-a | ‘frog’ |
| | /vos’m + úx + a/ | → | vos’m-úx-a | ‘1/8 pound’ |
| b. | /s’ív + úx + a/ | → | s’iv-úx-a | ‘raw alcohol’ |
| | /gólod + úx + a/ | → | golod-úx-a | ‘hunger’ |

The problem posed by these examples is that a root accent appears to be in competition with an affix accent, and so the thesis of RCA predicts that the root accent should win, contrary to fact.

If these examples represent valid cases of culminativity effects, then they constitute truly lethal counter-examples to the thesis of RCA, and accordingly, they would lead to a serious re-thinking of the patterns attributed here to RCA. However, the behavior of dominant morphemes is not standardly treated as an effect of culminativity. Rather, they are typically handled as a morphologically conditioned deletion of the accent in the base to which the dominant affix is attached. The reason for this assumption is that dominant morphemes often show a contrast in accentedness, and dominant unaccented morphemes also show evidence of a deletion. Dominant unaccented affixes, as exemplified below in Japanese and Russian, trigger a deletion of base prosody and the emergence of a default accentual pattern, or no accent at all in the case of Japanese. Thus, when the dominant suffix *-kko* attaches to accented stems, as shown in (4b), the result is a deletion of the stem accent and a completely unaccented word, which is a default pattern for accent in Japanese. Likewise, when noun-forming *-ač* attaches to accented stems, the stem accent is deleted and the larger word receives default ending stress (5b).

(4) Dominant Unaccented Suffix *-kko* in Japanese

- | | | | | |
|----|-------------------|---|---------------|----------------------|
| a. | /edo + kko/ | → | edo-kko | ‘Native of Tokyo’ |
| | /niigata + kko/ | → | niigata-kko | ‘Native of Nigata’ |
| b. | /kóobe + kko/ | → | koobe-kko | ‘Native of Kobe’ |
| | /nyuuyóoku + kko/ | → | nyuuyooku-kko | ‘Native of New York’ |

(5) Dominant Unaccented Suffix *-ač* in Russian

- | | | | | |
|----|------------------|---|-------------|-------------------|
| a. | /borod + ač + u/ | → | borod-ač -ú | ‘man with beard’ |
| | /gorb + ač + u/ | → | gorb-ač -ú | ‘hunchback’ |
| b. | /púz + ač + u/ | → | puz-ač -ú | ‘man with paunch’ |
| | /tr’úk + ač + u/ | → | tr’uk-ač -ú | ‘stuntman’ |

Returning to the main point, dominant unaccented affixes show that dominance effects are clearly not culminativity effects: unaccented affixes cannot compete for the realization of an inherent accent. The more general point is that the behavior of dominant morphemes does not counter-exemplify RCA because dominance effects are not to be attributed to culminativity.

As will be argued in detail in §5.1, dominance effects are one type of a more general class of so-called ‘affix-controlled’ morpho-accentual processes. Some canonical examples of these affix-controlled processes are illustrated below with some further examples from Japanese.

(6) Affix-Controlled Morpho-Accentual Processes in Tokyo Japanese

a. Dominance effects require a deletion of base prosody

/edo + kko/	→	edo-kko	‘Native of Tokyo’
/kóobe + kko/	→	koobe-kko	‘Native of Kobe’

b. Pre-accentuation requires an insertion of accent into the base

/yosida + ke/	→	yosidá-ke	‘the Yoshida family’
/nisímura + ke/	→	nisimurá-ke	‘the Nishimura family’

c. Accent shifts require a shift of base prosody

/kúzu + ya/	→	kuzú-ya	‘junkman’
/toma + ya/	→	toma-ya	‘mat seller’

Affix-controlled processes are so named because they correlate with the application of a morphological process, which is illustrated here with affixation. Linked to the morphology in a fundamental way, these processes in a sense support a contrast between the base of a process and its related derived form. Thus, dominance effects induce a deletion of the base accent, which supports a contrast between accented bases and unaccented derivatives, as in *kóobe* versus *koobe-kko*. Likewise, pre-accentuation, shown in (6b) with the suffix *-ke*, supports a contrast between base-derivative pairs by inserting an accent in the base of the derived form: *nisimurá-ke*, cf. *nisímura*. A different class of affix-controlled accent involves a shift in the position of base prosody, as exemplified in (6c) with the suffix *-ya*. In this case, a contrast is achieved through a shift of the base accent in the derived form. In sum, the three different types of affix-controlled processes form a class in that they serve to mark a contrast between a base and the form derived from that base.

Another important property of affix-controlled processes is that they are lexically idiosyncratic and must therefore be specified in the lexical entry of each affix. Thus, it is an idiosyncratic property of the morpheme *-kko* that it conditions a deletion of base prosody, which contrasts this affix from others that do not trigger a deletion. Likewise, both *-ke* and *-ya* must be set apart from other affixes on the basis of the accentual patterns they bring about. This property of affix-controlled processes contrasts sharply with the behavior of roots in accent systems, which, as we have seen throughout the case studies in chapters 2 and 3, show the systematic behavior of overriding accent in neighboring affixes. Hence, while the accentual regularities caused by affixes are lexically idiosyncratic, the accentual regularities induced by roots are systematic and apply across the board, i.e., in all the words containing accented roots.

The conclusion that can be drawn from this discussion is that affix-controlled processes such as dominance effects have a morphemic source. That is, it is an idiosyncratic property of the morpheme *-kko* that it triggers a deletion of base prosody, and the specification of this property is the key to explaining the morphological contrast induced about in base-derivative pairs. The same holds for the morphemes *-ke* and *-ya*, which must also be lexically specified for the accentual processes they trigger. In contrast to these

morphemic sources of regularity, overriding root accent comes under grammatical control. In particular, the culminativity effects found in words with accented roots follow from a general property of Universal Grammar, namely that the Faithfulness constraints sensitive to roots are ordered above the Faithfulness constraints sensitive to affixes.

The rest of this thesis is thus dedicated to arriving at a principled explanation of the properties of affix-controlled accent and an explanation for the properties like those mentioned above which set ACA apart from RCA. Since a general explanation of these properties is sought, i.e., one which applies to non-accentual morpho-phonological processes, the next two sections develop and motivate a formal theory of morpho-phonological operations. Once this theory has been fully developed, then it will be applied to the analysis of affix-controlled morpho-accentual phenomena in chapter 5.

4.2 Transderivational Correspondence Theory

4.2.1 Introductory Remarks

Morphologically related words may be phonologically similar, even in ways that cannot be attributed to the fact that these words share morphemes. A brief look at English stress in suffixed words (to be revisited below) will illustrate this basic fact. English suffixes fall into two classes concerning their interaction with the stress of the base to which they attach (Siegel 1974). Class 2 suffixes contrast with class 1 suffixes in that only the former requires preservation of base prosody, yielding the surface contrast in the morphologically complex forms given below.

(7) Class 1 versus Class 2 Suffixation

Class 1	<i>párent</i>	$\neq$	<i>parént-al</i>
Class 2	<i>párent</i>	$\approx$	<i>párent-hood</i>

The first pair shows the regular pattern of stress in English nouns and adjectives, i.e., penultimate heavy, otherwise antepenultimate stress, which effectively causes a stress shift in the derived form. Yet suffixation of a class 2 affix like *-hood* does not trigger the same stress shift, even when the phonological composition of the string predicts penultimate stress. Therefore, for the second pair of words, it is said that class 2 suffixes require preservation of the prosodic information of the base to which they attach. The complex word *párenthood* mimics the prosody of its base *párent*, even if this results in an otherwise irregular stress pattern.

A classical approach to this problem, often called the Cyclic Approach, is to derive the similarity effects by embedding the simplex form in the derivation of the complex form (Chomsky & Halle 1968, Siegel 1974, Allen 1978). Thus, stress sensitive suffixes are attached before Stress Assignment, predicting that they are counted in the placement of stress. Stress neutral suffixes, on the other hand, are attached after Stress Assignment, and as a result, they do not affect stress in the larger word.

(8) Preservation of Base Prosody with the Cycle

	/parent/	/parent/
Class 1 Affixation	parent-al	————
Stress Assignment	parént-al	párent
Class 2 Affixation	————	párent-hood
	[paréntal]	[párenthood]

The derived form *párenthood* is not truly exceptional in this analysis because surface stress is the product of a valid application of the stress rules.

The Cyclic Approach to the preservation of base prosody may be characterized as strongly derivational because it relies crucially on the interleaving of the stress rules with an ordered set of morphological rules. It is on this basis that the Cyclic Approach has been criticized and a fresh alternative has been developed. With the advent of Optimality Theory (Prince & Smolensky 1991, 1993) and other non-derivational frameworks (see Goldsmith 1993), the role of derivations in phonology has been seriously challenged, leading to a growing body of evidence that serial derivations may in fact be unnecessary and that the quality of the explanation is enhanced in non-derivational theories (see McCarthy 1993, 1997, Benua 1995, 1997, Alderete 1995, 1997, Kager 1995). Against this background, a number of researchers have proposed to derive similarity effects via a form of Faithfulness that holds between the morphologically related words (Benua 1995, 1997 [1998], Burzio 1994, 1996, 1998, Kenstowicz 1996, 1997).¹ These works differ in many of the formal details of encoding Faithfulness relations between words, and so a choice of a specific model must be made before applying this idea to stress-neutral affixation. Since Benua's Transderivational Correspondence Theory (TCT) employs the basic tenets of Correspondence Theory fundamental to this problem and the larger thesis, I will employ this model, though many of the same arguments made below carry the same weight in the other theories.

In TCT, morphologically related words stand in correspondence in a way that is formally similar Input-to-Output Correspondence. Class 1 and 2 suffixes are then distinguished lexically by the type of correspondence relation they enter into: class 1 suffixes like *-al* trigger the output-to-output correspondence relation OO_1 , while class 2 suffixes like *-hood* trigger the relation OO_2 (see also Urbanczyk 1995, 1996 for a parallel case with multiple reduplicative morphemes). The differences in phonological behavior may in turn be treated as a differences in ranking: OO_2 -Faithfulness is ranked above the Markedness constraints which are responsible for the regular stress pattern, call them STRESS, effectively requiring similarity in stress where the regular stress patterns predict alternation. Class 1 suffixation, in contrast, does not require preservation of base prosody because the Faithfulness constraint regulating similarity between simplex-complex words of this type is ranked below STRESS.

¹For further discussion and developments of this notion of Transderivational Faithfulness see Buckley 1995, Crosswhite 1997, Duanmu 1995, Flemming 1995, Itô & Mester 1997, Kager 1995, 1996, Lin 1998, McCarthy 1995, 1997, Orgun 1995, 1997, and Steriade 1998.

(9) Transderivational Approach to Preservation of Base Prosody (Benua 1997 [1998])

OO₁-Correspondence (No Effect)

párent	→	paréntal
↑		↑
/parent/		/parent + al/

OO₂-Correspondence (Faithfulness Effect)

párent	→	párenthood
↑		↑
/parent/		/parent + hood/

The transderivational approach does not differ from the cyclic approach in the proposed differences between class 1 and class 2 phonology: some measure of morpheme segregation is necessary on any analysis. The cyclic analysis needs a ordered block of phonological and morphological rules, while the transderivational analysis needs a ranking of distinct Faithfulness constraints to distinguish the two classes. The two theories differ sharply, however, on other matters of the analysis of similarity effects. As argued extensively in Burzio 1994 et seq., Benua 1997 [1998], and Kenstowicz 1996, the transderivational approach provides a natural account of the fact that similarity effects generally arise when the base of affixation is an independently occurring word (an observation originally due to Brame 1974). In TCT, this fact is explained by the very nature of Transderivational Correspondence — a phonological relation between words. This point will be developed directly below in the analysis of stress neutral affixation in English.

A second class of arguments that can be made in favor of the transderivational approach is that it provides a cogent explanation of non-uniform applications of a phonological process, i.e., the ‘do something, except if...’ patterns. Because the constraints responsible for the similarity effects, i.e., the Transderivational Faithfulness constraints, are ranked in an OT constraint hierarchy, these constraints may interact directly with other constraints in the grammar. This constraint interaction describes non-uniform phonological patterns in a direct and natural way, which distinguishes it from the rule-based approach to non-uniformity (see Prince & Smolensky 1993, Prince 1993, Pater 1996, and Alderete 1997a for a related set of arguments). This argument will be developed below in the analysis of the ‘semi-neutrality’ of various affixes.

A third class of arguments presented in detail in Benua 1997 [1998] is that the transderivational model of phonological similarity is more restrictive. As will be shown in the analysis below, the behavior of both the base and its derivative is predicted by the same grammar, which in OT is an ordered ranking of universal constraints. Because of this requirement, the grammar puts substantive limits on the range of variation between the phonological patterns in base-derivative pairs. Derivational approaches to similarity effects such as the cyclic approach, on the other hand, allow the possibility that different levels of derivation be drastically different, and as a result, these theories are less restrictive than TCT.

Now that we have seen a glimpse of the motivation behind Transderivational Correspondence, let us proceed to apply this theory to the problem of stress neutral affixation and see how the approach is justified in the context of an explicit analysis.² We will start with a brief review of some familiar examples in English as a means of establishing the distinction between class 1 and class 2 affixes for stress. This review will then be followed by a presentation of the analysis given in Benua 1997 [1998] as an illustration of how TCT applies to stress-neutral affixation, a very common phenomenon in morphologically governed accent systems.

²For further reading on stress neutral affixation, see Crosswhite 1997, Kager 1996, and Kenstowicz 1997.

4.2.2 Transderivational Faithfulness in Stress Neutral Affixation

4.2.2.1 Theoretical Assumptions

Preservation of base prosody presents a nice context for introducing the theoretical tools of TCT which will be used in subsequent analyses. The following set of assumptions together comprise TCT.

(10) Theoretical Assumptions in TCT (Benua 1997 [1998])

a. Transderivational (OO) Correspondence

Morphologically related words stand in correspondence; phonological similarity is regulated by OO-Faithfulness constraints.

b. Recursive Hierarchies

The constraint hierarchy is duplicated and ranked with respect to other hierarchies; morphological processes are associated with a given recursion of the recursive hierarchy.

c. Subcategorization of OO-Correspondence Relations

Subcategorization frames specify the OO-correspondence relation that links the affixed form with its base in a paradigmatic identity relation.

The first assumption (10a) forms the crux of the theory. In addition to relations between input-output pairs, correspondence relations hold between related outputs, e.g., *párent* $\approx$ *párenthood*. That is, correspondence relations may be ‘transderivational’ in nature, establishing a bond between two forms which share the same base.³ Furthermore, it is upon this correspondence relation that certain Faithfulness constraints are defined and which may bring about phonological similarity through constraint ranking.

A second basic assumption (10b) is that morphological concatenation is accompanied by the recursion of the constraint hierarchy which is ranked with respect to other hierarchies. The innermost input-output mapping establishes the ‘base’ of affixation for derived forms. This base is the form to which the morphologically complex forms must be faithful (to be elaborated on below).⁴ Thus, the first recursion of the constraint hierarchy gives penultimate stress on the monomorphemic form *párent*, establishing this form as the base for more complex words. Attachment of a class 2 suffix like *-hood* is derived in a second recursion, and it is on this input-output mapping that Faithfulness to the base becomes active, yielding preservation of base prosody in *párenthood*.

Finally, since the phonological behavior of affix-controlled phenomena is idiosyncratic, it must be lexically specified. In Benua’s theory, this effect is achieved through subcategorization of the output-to-output correspondence relation that links the derived form with its base. Hence, class 1 suffixes like *-al* subcategorize for the correspondence relation OO₁, while a class 2 suffix such as *-hood* selects a base specified for OO₂-Correspondence. An important point is that the notion of subcategorization here is different than the notion commonly used in syntax. It is not the case that the affix selects a base with certain inherent properties of that base, e.g., it being a noun or bearing some feature. Rather, the affix imposes a property on the base to which it attaches, namely an

³The notion of transderivational relations between words is not new to OT; see for example Hock 1973, Hooper 1976, and Chung 1983.

⁴See also Benua 1995, 1997 [1998], Urbanczyk 1996, Kager 1995, Odden 1996, Itô & Mester 1997, and Steriade 1998 for more discussion on this notion of a ‘base’ for other morphological processes.

OO-correspondence relation. The differences in behavior between these two classes of suffixes are thus modelled as the differences in rankings of OO₁- and OO₂-Faithfulness. These effects will be made explicit in the analysis that follows.

In most of the case studies developed below, the base of affixation stands in the simplex-complex relation, i.e., the bare stem or root forms the base for further affixation. In languages with obligatory inflections, however, the characterization of the base is a more subtle matter. Describing a pattern of analogy in Sanskrit, Green 1997 posits singular nouns as the base for the corresponding plurals; but there is no straightforward sense in which the inflected singular is the morphological base for the plural. A related case is found in Russian (§5.2.3) where the singular forms the base for a shifting pattern of stress in the plural, e.g., *kolbas-é* versus *kolbás-am* ‘sausage (singular/plural)’; yet again, the obligatory inflections show that the base-output relations go beyond the usual simplex-complex relation. What principles are at work in predicting the base in these cases?

The answer to this question, I believe, involves considering traditional notions of markedness in morphology. It is common in linguistic studies to come across statements like ‘the singular is the unmarked number’ or ‘the masculine is the unmarked gender’, observations which are sometimes based on elicitation data, but also rooted in the linguistic processes of a given system. Interestingly, the base of an OO-correspondence relation is often the unmarked member of the pair in precisely this sense. In the Russian and Sanskrit examples given above, it is the singular which forms the base for the plural, where the former is less marked than the latter. Extending the case of Russian, masculine nouns form the base for corresponding feminine forms (see §3.2 for discussion), a fact which follows the same basic principle: the base is the unmarked member of the pair. Clearly, the key to these cases is to make more precise the role of markedness in determining the base.

The problem posed by obligatory inflecting languages is analogous in a way to the problem posed by language learners when more than one input-output pair converge on the same output. Which of the inputs is learned as the one to which the actual output is faithful? Compare this problem with the situation in obligatory inflecting languages: various base-output relations are conceivable, but only one is operative in a given coupling of output forms. Prince & Smolensky 1993 (see also Tesar & Smolensky 1998) propose that constraint-based optimization has a role in solving this problem. According to the principle of Lexicon Optimization, the learned input is the one which leads to the most harmonic mapping relative to the language particular constraint hierarchy (see §1.2.2.3 for a definition and application of this principle). In other words, the input of the input-output pair which fares the best with respect to the grammar is the one which is posited as the lexical form.

My proposal is that the selection of the base is also the result of constraint-based optimization, as defined by the following principle.

(11) Base Optimization (Alderete 1997c, cf. Prince & Smolensky 1993)

If a set of words created by some morphological process stands in the correspondence relation *R*, then the base for *R* is the member of the base-output pair which is most harmonic with respect to the constraint hierarchy.

The idea is thus that the base is chosen as the word which leads to the best base-output pair, as prescribed by morphological markedness theory. Concretely, the observation that the singular is unmarked relative to the plural supports the ordering of constraints given below. Furthermore, these markedness relations are at work in determining the base for an output-to-output correspondence relation, as they are fundamental to establishing harmony

relative to the constraint hierarchy. The following tableau illustrates this result for the singular-plural relations in Russian. The Markedness constraints here assess base-derivative pairs as a whole — a paradigm in effect — and the resulting data structure is an ordered pair of the constraint violations incurred by the base and its related output. In evaluating these marks, violations incurred by the base take precedence over those of the output, consistent with the ordering implicit in the notion of Base Priority in Benua 1997 [1998].

(12) Selecting the Base with Base Optimization

(Base, Output)	*PLURAL	*SINGULAR
(kolbas-amp _L , kolbas-es _G)	(*!, ∅)	(∅, *)
→ (kolbas-es _G , kolbas-amp _L)	(∅, *)	(*, ∅)

With this ordering of constraints, the singular is unmarked relative to the plural and not the other way around. As a result, Base Optimization chooses the singular form as the base because this option leads to better well-formedness in the paradigm overall. I speculate that the same principles are also at work in selecting other morphological classes, for example the masculine base in masculine-feminine pairs in Russian, and the case studies of languages with obligatory inflections will establish the base with the principle of Base Optimization.⁵ While there are still some details to be worked out concerning the evaluation of constraint violations, the important point here is that Markedness for morphological structure is what is fundamental, an idea that can be formalized in a variety of ways.

One important difference between the theory of OO-Correspondence developed here and that of Benua 1997 [1998] is that the base does not stand in correspondence with the entire derived form in the current theory. Rather, only the segments of the shared morphemes stand in correspondence. This model of OO-Correspondence is crucial, as will become clear in the analysis of various patterns of Anti-Faithfulness. Formally, what this assumption entails is that only the subconstituent of the derived form which has correspondents in the base stand in correspondence. If an affix is attached in an output and is not also present in the base, then the affix does not stand in correspondence with the base. Thus, the plural inflection *-am* does not stand in correspondence with anything in the base form *kolbas-e* above in (12). I show in chapter 5 that this model is important in explaining certain properties of pre- and post-accentuation and accentual shifts.

4.2.2.2 Application to Stress Neutral Affixation

Let us now apply these ideas to the case of stress neutral affixation. In English nouns and adjectives, primary stress is oriented to the right edge of the word, typically falling on a penultimate heavy syllable, otherwise the antepenultimate syllable.⁶ Suffixation may thus give rise to alternations in stress, depending on the sensitivity of the suffix to stress. A basic distinction that is necessary in any treatment of English stress is

⁵Indeed, the same principle of markedness may be at work in deriving the simplex-complex relation often found in base-output relations. Affixation categorically leads to a mismatch between the edges of the stem and larger prosodic structure like the PrWd; simplex forms may thus be chosen as the base for an affixed form by Anchoring constraints which evaluate the edge-anchoring properties of a stem relative to a prosodic category.

⁶On the principles of English Stress, see especially: Chomsky & Halle 1968, Halle & Keyser 1971, Ross 1972, Goyvaerts & Pullum 1974, part II, Hayes 1980, 1982, Selkirk 1980, 1984, Fudge 1984, Kager 1989, Hammond 1989, Burzio 1994, and Pater 1995.

one between STRESS SHIFTING and STRESS NEUTRAL affixes (Siegel 1974). Stress shifting suffixes are typically not themselves stressed, but are counted in the determination of stress and may also trigger certain non-automatic processes like vowel shortening. The examples given below show a shift in primary stress with attachment of this class of suffixes.

(13) Stress Shifting Suffixes⁷

<i>-al</i> _A	<i>-ity</i>	<i>-ic</i>
óorigin — oríginal	tránquil — tranquíllity	áthlete — athlétic
médicine — medícinal	uniform — ùnifórmity	mícroscope — microscópíc
úniverse — univérsal	pópular — populárity	hý giene — hygénic
párent — paréntal	contínue — continúity	álgebra — algebráic

The second class of suffixes, the stress neutral suffixes, are also themselves unstressed, but they differ from the previous class in that they do not affect the prosody of the base to which they are attached.

(14) Stress Neutral Suffixes

<i>-hood</i>	<i>-dom</i>	<i>-less</i>
párent — párenthood	free — freedom	bóttom — bóttomless
child — childhood	mártyr — mártýrdom	defénse — defénseless
néighbor — néighborhood	báachelor — báchelordom	expréssion — expréssionless
	héathen — héathendom	méaning — méaningless

Stress neutral suffixes typically attach to independently occurring words (though there are some exceptions) and they may not trigger non-automatic processes. In summary, there is a fundamental distinction between suffixes which require Faithfulness to base prosody (class 2) and suffixes which do not (class 1), and any analysis of affixed words in English must recognize and analyze this basic distinction.

Before dealing with the difference between class 1 and class 2 suffixes, we require an analysis of stress in monomorphemic words. Assuming what may be characterized as the ‘standard’ analysis, primary stress is assigned by laying down moraic trochees from right-to-left, ignoring the final syllable; secondary stress is then derived by assigning trochees from the left edge of the word (see especially Hayes 1980, 1982, Selkirk 1984, Pater 1995, cf. Burzio 1994). Following Pater, this analysis is characterized in the partial ranking of constraints given below.⁸

(15) Stress in Monomorphemic English Words (Pater 1995)

FTBIN, TROCH, NONFINALITY >> ALIGN-HEAD-RIGHT >> ALL-FT-LEFT

⁷Two of these suffixes, namely *-ity* and *-ic* also trigger a non-automatic process of vowel shortening, but this fact will be ignored here because it is orthogonal to the Faithfulness effect discussed here. See Myers 1987b for an attractive analysis, however, in terms of prosodic foot structure.

⁸The role of quantity sensitivity is ignored here because it does not bear directly on the arguments which follow.

(16) The Operative Constraints

FTBIN: Feet are binary as some level of analysis (μ , σ), (P&S, see also McCarthy & Prince 1986, Hayes 1987).

TROCH: feet are left-headed.

NONFINALITY: No head of PrWd is final in PrWd (P&S, OT constraint deriving extrametricality effects).

ALIGN-HEAD-RIGHT (ALIGN-HD-RT): The foot head of the PrWd must coincide with the right edge of PrWd (McCarthy & Prince 1993a).

ALL-FT-LEFT (ALL-FT-LT): The left edge of all feet must coincide with the left edge of PrWd (McCarthy & Prince 1993a).

Because of the ranking of NONFINALITY, the final syllable is ignored, and so in a form like *agénda*, a moraic trochee is built over the penultimate heavy syllable: [a(gén)⟨da⟩]. In words with penultimate lights, e.g., *Cánada*, the stress is assigned to the antepenultimate syllable, as in: [(Cána)⟨da⟩]. In longer forms, a second foot is possible, yielding secondary stresses iterated from the beginning of the word, [(Ále)(xán)⟨der⟩], which may result in an initial dactyl, e.g., [(Táta)ma(góu)⟨chi⟩], because of low-ranking ALL-FT-LEFT.

Moving now to the analysis of stress in derived words, we employ the notion of Transderivational Correspondence to derive preservation of base prosody. To begin, in word pairs like *párent*—*párentage*, the attachment of a class 2 suffix like *-age* triggers a specific correspondence relation. Further, the Prosodic Faithfulness constraints defined upon this relation, an encapsulation of OO-MAX-PROM, OO-DEP-PROM, OO-NOFLOP-PROM (see §1.2), require similarity in stress.⁹ Thus, the output pairs [(pá)⟨rent⟩] ≈ [(párent)⟨hood⟩] match in prominence structure in that there are corresponding grid marks in each head of the stress foot, and so this pair of words satisfies OO-PROS-FAITH. However, a stress shift to improve the overall prosodic well-formedness of the word, as in *[pa(rént)⟨hood⟩], violates OO-PROS-FAITH because of the mismatch in prosody, and so this pairing can be ruled out through constraint interaction.

The distinction between class 1 and class 2 suffixes may now be modelled in terms of familiar kinds of constraint interaction. Hence, the stress-shifting/stress-neutral behavior of various affixes may be modelled by the interspersing of the OO-Faithfulness constraints relative to the constraints also active in underived words, as shown in (17). As Benua makes clear, it is significant that the ranking of the two Alignment constraints, ALIGN-HEAD-RIGHT and ALL-FT-LEFT, must be consistent with their ranking in (15). On the assumption that the grammar of English stress is a total ordering of constraints, the rankings could not be otherwise.

(17) Stress in Derived Words (Benua 1997 [1998])

OO₂-PROS-FAITH >> ALIGN-HEAD-RIGHT >> OO₁-PROS-FAITH >> ALL-FT-LEFT

⁹In Benua's analysis, the Faithfulness constraint responsible for preserving base prosody is a Prosodic Anchoring constraint (after McCarthy 1997), but for the sake of consistency with the analyses developed elsewhere in this thesis, I employ the Prosodic Faithfulness constraints argued for in §1.2.

Running through the ranking here, the Faithfulness constraint for class 2 suffixes, OO₂-PROS-FAITH ranks above ALIGN-HEAD-RIGHT, with the effect that the attachment of a class 2 suffix will not affect the prosody of the base. However, the corresponding Faithfulness constraint for class 1 affixes, OO₁-PROS-FAITH, is dominated by the constraint responsible for the placement of main stress, and therefore class 1 suffixes like *-al* will not induce preservation of base prosody. Finally, OO₁-PROS-FAITH does dominate the constraint responsible for secondary stress assignment, namely ALL-FT-LEFT, and this ranking yields preservation of a base prosody in a non-primary stress foot, a typical kind of ‘non-uniformity’ effect. These results will be illustrated in a tableau given below.

Moving next to the individual affixes, consider the differences between class 1 and class 2 suffixes encoded in the lexical entries sketched below. Class 1 suffixes may differ from some class 2 suffixes in that they may attach to a bound stem, which, following Chomsky & Halle 1968, is represented with different boundaries: ‘+’ is used with bound stems and ‘#’ with free stems. More importantly, however, the two classes of suffixes are distinguished by their subcategorized correspondence relations, which is specified by the numerical index. Hence, class 1 suffixes trigger a OO₁-Correspondence relation between the base and the derived form containing the suffix, while class 2 suffixes trigger a OO₂ correspondence relation.¹⁰

(18) Lexical Entries for Class 1 Suffixes

- al* [+Noun+OO₁ ____] → Non-Gradable Adjective
- ity* [+Adjective+OO₁ ____] → Noun: ‘State/Quality of Adjective’
- ic* [+Noun+OO₁ ____] → (Non-Gradable) Adjective

(19) Lexical Entries for Class 2 Suffixes

- hood* [#Noun#OO₂ ____] → Abstract Noun: ‘Status of Noun’
- dom* [#Noun#OO₂ ____] → Abstract Noun: ‘Domain/Condition of Noun’
- less* [#Noun#OO₂ ____] → Adjective: ‘Without Noun’

The index on the host of the affix is the subcategorized correspondence relation which indicates the type of Faithfulness which relates the base to the derived form. Thus, consistent with other idiosyncratic features of the affix, subcategorization frames are used as a means of encoding the specific correspondence relation triggered by a given affix.

All of the basic assumptions inherent to TCT are illustrated in the following OT tableau. The prosody of the monomorphemic form *parent* is computed in the first recursion, yielding [(pá)⟨rent⟩] as the base for further word derivation.

¹⁰The interpretations and morphological restrictions on these affixes are based on the description given in Quirk & Greenbaum 1973, but nothing crucial hinges on this information.

(20) Preservation of Base Prosody with Class 2 Suffixation

i. Recursion (a)

	/parent/	NONFINALITY	OO ₂ -PROS-FAITH	ALIGN-HD-RT	>>
a.	(párent)	*!		*	
b.	pa(rént)	*!			
c. →	(pá)⟨rent⟩			*	

ii. Recursion (b)

>>	Base	/parent + hood/	NONFINAL	OO ₂ -P-FAITH	HD-RT
a.	(pá)⟨rent⟩	pa(rént)-⟨hood⟩		*!	
b. →	(pá)⟨rent⟩	(párent)-⟨hood⟩			* *

On the second recursion, the class 2 suffix *-hood* is attached, triggering the Faithfulness constraint OO₂-PROS-FAITH. Base-derivative pairs are therefore compared for their prosodic faithfulness, and the output pair which preserves the prosody of the base wins because of the rank of OO₂-PROS-FAITH in the system.

Class 1 suffixes, on the other hand, subcategorize for OO₁-correspondence, and as a result they are only sensitive to the Faithfulness constraints defined on this correspondence relation. Together with the constraint hierarchy in (17), this lexical property accounts for their non-neutral behavior in relation to base prosody. Thus, because the Alignment constraint responsible for the rightward orientation of stress outranks OO₁-PROS-FAITH, the regular pattern of heavy penultimate stress is assigned in a form like *paréntal*, as illustrated in the following tableau.

(21) Stress Shift with Class 1 Suffixation

i. Recursion (a)

	/parent/	NONFINALITY	ALIGN-HD-RT	OO ₁ -PROS-FAITH	>>
a.	(párent)	*!	*		
b.	pa(rént)	*!			
c. →	(pá)⟨rent⟩		*		

ii. Recursion (b)

>>	Base	/parent + al/	NONFINAL	HD-RT	OO ₁ -P-FAITH
a. →	(pá)⟨rent⟩	pa(rén)⟨t-al⟩		*	*
b.	(pá)⟨rent⟩	(páren)⟨t-al⟩		**!	

While a form like *párent* receives initial stress, in the second recursion, OO₁-PROS-FAITH has no force because of its rank in the system. As a result, *párent* cannot influence the prosody of the derivative, and we predict regular penultimate stress.

Now that the basic analysis to stress-neutral affixation in TCT has been illustrated, we can make the first argument in favor of this approach more forcefully. This argument is based on the empirical observation that class 2 suffixes in English only exhibit base identity effects for stress when the affixed word stands in correspondence with an independently occurring word. Thus, while many class 2 suffixes only attach to free stems, some suffixes may also attach to bound stems (this tendency often correlates with different phonological behavior). For example, the suffixes exemplified below are stress neutral when they attach to a free stem, but counted in the placement of primary stress when the base to which they attach is not an independent word.

(22) Stress Neutral Suffixation with(out) Base Identity Effects

<i>-age</i>	<i>-or</i>	<i>-ist</i>
párent — párentage	conféss — conféssor	extrême — extrémist
bróker — brókerage	góvern — góvernor	séparate — séparatist
hérit — héritage	prósecute — prósecutor	módern — módermist
báronet — báronetage	cf. cóntribute — contribútor	propagánda — propagándist
advántage	ambássador	Báptist
vérbage	wárior	recídivist
fólage	interlócutor	ventríloquist
cámouflage		opportúnist
cf. éspionage		

Drawing on the classification system of Fudge 1984, these suffixes are stress neutral when they attach to words, but ‘Pre-Stressed 1/2’ (pre-stressing when they follow a strong syllable, otherwise pre-pre-stressing) if they attach to a bound stem. In other words, the regular pattern of ‘penultimate heavy, otherwise antepenultimate stress’ takes effect in the latter case.

The analysis of stress-neutral affixation in terms of Transderivational Faithfulness explains this split effect with the same basic premises of the theory.¹¹ Assuming that these suffixes are class 2, they will trigger OO₂-correspondence, and as a result, the preservation of base prosody in base-derivative pairs such as *párent*—*párentage* is fully consistent with the analysis of this same fact in *párent*—*párenthood*. Moreover, in derived words which do not have an independently occurring free base, OO₂-PROS-FAITH does not have an effect because there is no word for the derived form to be faithful to. The decision in a case like *advantage* falls to the lower ranking constraint, ALIGN-HEAD-RT, which gives the observed Latin-like stress pattern, as in [ad(ván)⟨tage⟩]. In sum, one of the fundamental tenets of the theory, namely that Faithfulness relations specifically hold between related words, explains the curious dual behavior of some class 2 suffixes.

A second argument in favor of the transderivational approach can be constructed by considering the mixed behavior of class 1 suffixes. As noted in both Burzio 1994 and Benua 1997 [1998], while class 1 suffixes do not affect the placement of main stress, they may bring about an apparently exceptional pattern of secondary stress they are compared with a base form. As exemplified below, the prosody of the base may be preserved as a secondary stress in a derived form with a class 1 suffix, yielding irregular second syllable stress in words like *originálicity*.

¹¹This argument was first put forth in Burzio 1994, though it is couched in a different theoretical framework.

(23) Preservation of Base Prosody in Class 1 Paradigms

original	orìginálicity	cf. Tàtamagóuchi
aristocrat	arìstocràtic	
theàtrical	theàtricality	

The analysis of this fact in TCT is again established through constraint ranking. While OO₁-ANCHOR is dominated by some constraints, it is ranked above the constraint responsible for positioning secondary stress feet, namely ALIGN-FT-LT. By giving OO₁-PROS-FAITH intermediate rank in the system, the non-uniform application of prosodic faithfulness is achieved simply and directly, as illustrated below (from Benua 1997 [1998]).

(24) Non-Uniform Preservation of Base Prosody with Class 1 Suffixes

i. Recursion (a)

	/origin/	NONFIN	ALIGN-HD-R	OO ₁ -P-FAITH	ALL-FT-LT	>>
a.	o(rígin)	*!			*	
b. →	(óri)⟨gin⟩		**			

ii. Recursion (b)

>>	Base	/origin + al/	NONFIN	HD-R	OO ₁ -FAITH	ALL-FT-LT
a.	(óri)⟨gin⟩	(óri)gi⟨n-al⟩		***!		
b. →	(óri)⟨gin⟩	o(rígi)⟨n-al⟩		**	*	*

iii. Recursion (c)

>>	Base	/original + ity/	NONFIN	HD-R	OO ₁ -FAITH	ALL-FT-LT
a.	o(rígi)⟨n-al⟩	(òri)gi(n-ál-i)⟨ty⟩		*	*!	***
b. →	o(rígi)⟨n-al⟩	o(rìgi)(n-ál-i)⟨ty⟩		*		* ***

As with the case of *paréntal*, when *-al* is attached on the second recursion, the prosody of the base is not preserved, and we find regular penultimate stress (24ii). However, when a second class 1 suffix is attached on the third recursion, the base prosody is matched in the derivative by a shifting of the secondary stress foot away from its canonically left-aligned position (24iii). Again, this result follows from the interleaving of OO₁-Faithfulness with the constraints responsible for primary and secondary stress, ALIGN-HD-R and ALIGN-FT-LT respectively. To summarize, the non-uniform application of OO₁-PROS-FAITH derives directly from a basic assumption in OT, namely that constraints are ranked and violable.

The theory of Transderivational Correspondence developed in Benua 1997 [1998] was introduced as a formal theory of preservation of base prosody between morphologically related words. It was also shown that the principles inherent to this theory go a long way towards explaining the preservation of base prosody. First, some suffixes exhibit mixed phonological behavior, showing stress neutrality with a free stem but regular stress with bound stems. This fact follows from the nature of Transderivational Correspondence because this is a relation that only holds between independently occurring words. Second, the transderivational approach offers a cogent account of class 1 suffixation which shows a different species of non-uniform base identity effect, namely the

preservation of base prosody only with secondary stresses in cases like *original—originality*, but not with primary stress, e.g., *origin—original*. This fact follows from the parallelist interpretation of TCT in which Faithfulness constraints evaluating output pairs interact directly with the other constraints in the grammar. When OO-Faithfulness is ranked between two constraints responsible for a given pattern, non-uniformity in base identity may result.

4.3 Transderivational Anti-Faithfulness

In this section, the notion of Transderivational Anti-Faithfulness (TAF) is developed as a cross-linguistic theory of morpho-phonological alternations. The section starts by introducing exchange rules as a problem for both traditional generative phonology and Optimality Theory. The theory of TAF is then motivated as a means of describing morphologically governed exchange processes, and subsequently, the importance of TAF to explaining the properties of morpho-accentual processes is brought to the fore.

4.3.1 Introduction

It is a common observation that phonological processes have a morphological function. The voicing alternation in *hou[s]e ~ hou[z]es* may be viewed as a phonological process that serves to mark a relationship between a singular and plural form. This type of morpho-phonological process is quite widespread and encompasses a variety of phonological structures. Indeed, a careful study of any given language is likely to turn up non-automatic alternations that are only found in particular morphological environments. For example, there are abundant examples in which a length alternation is only observed in specific affixed forms: Yidiñ (Dixon 1977), Slovak (Rubach 1993), and Gidabal (Geytenbeek & Geytenbeek 1991). Similar examples can be given for features as different as vowel quality, laryngeal settings, nasality, stress, and tone (see Spencer 1998 for a survey and discussion of such morpho-phonological alternations).

The standard approach to this type of observation in the generative program is Lexical Specification (LS). In particular, morpho-phonological alternations are said to follow from a specification for the alternating feature in the lexical representation of the morphemes involved. For the English case, LS requires a lexical [+voice] specification for a consonantal position in the affixes which trigger the alternation (essentially the plural suffix and *-ing*), which, when occupied by the stem-final obstruent, yields the result depicted below.

(25) English Morpho-Phonology as Lexical Specification

$$\begin{array}{c} \text{[+voice]} \\ | \\ /hous + C\text{Iz}/ \end{array} \rightarrow \text{hou[z]-Iz}$$

The ‘frozen’ character of the alternation therefore follows from an assumption about the input: the alternation is not automatic because it derives from a lexical listing. While there are some interesting puzzles for this approach, for example dominant affixes in Russian and Japanese, LS accounts for the spotty distribution of the morpho-phonological pattern with one of the most basic assumptions in generative phonology, the underlying representation.

Often morpho-phonology is ‘one-way’, effecting a change of one class of segments to another, as in the English case. But it may also be a two-way operation, yielding a full

reversal of the lexical properties of the targeted element. A well-known example with this character is the voicing exchange found in the Nilotic language Luo. In this language, the alternation in voicing goes both ways: stem-final obstruents generally reverse their underlying [voice] specification in the plural.

(26) Consonantal Polarity in Luo (Gregerson 1972, Okoth-Okombo 1982)¹²

Singular	Plural	
bat	bed-e	‘arm’
luθ	luD-e	‘walking stick’
reč	reǰ -e	‘fish’
č ogo	č ok-e	‘bone’
owadu	owet-e	‘brother’
luedo	luet-e	‘hand’

As with *hou[s]e ~ hou[z]es*, the alternation has a morphological function, again supporting the opposition between singular and plural forms. This morphological contrast also extends to singular/singular appertentive alternations (a construction similar to the Semitic construct state): *got* ‘mountain’, *gode* ‘mountains’, *god* ‘mountain of’, which demonstrates that the process is truly morphologically governed, and not, for example, a dual process of intervocalic voicing and (opaque) final devoicing. Another parallel case is plural formation in Diegueño verbs, which also involves a full rotation of the vowel length of a stem vowel (Langdon 1970; see Anderson & Browne 1973, Anderson 1975, 1991, Moreton 1996, and Spencer 1998 for discussion of additional examples).

The importance of the voicing exchange in Luo is that it shows that morpho-phonological alternations are not simply additive functions requiring the addition of a given feature in a particular environment. Rather, they may encode a full exchange of two segment classes or other phonological elements. Alternations of this type therefore cannot be described with LS because it is inherently additive. If part of the exchange is lexically specified, then the other is left unaccounted for. Concretely, if the voicing of *bed-e* is due to a lexical marking [+voice] in the plural suffix, then this assumption predicts a different result than the observed pattern with *č ok-e*.

Exchange processes also pose a challenge to some versions of Optimality Theory. As demonstrated in Moreton 1996, if an OT grammar is constructed by ranking Markedness constraints relative to Faithfulness constraints, then no grammar of this type will result in an exchange process or a circular exchange of any kind. To flesh out this point, a phonological process results when a Markedness constraint *M* compels the lexical form to change at the surface, that is, a violation of a Faithfulness constraint *F*. Thus, if the ranking *M* >> *F* gives in /A/ → [B], then [B] must be less marked than [A]; /A/ changed to [B] in order to do better on *M*. This same grammar will not then change /B/ to [A] (in the same context): to do so would result in a form which fares worse on *M*. Moreton’s finding is indeed an interesting one as exchanges of the kind found in Luo are always morphological (Anderson & Browne 1973). It would appear therefore that there is a goodness of fit between the set of possible grammars predicted in OT and the phonological patterns observed in the world’s languages.

¹²A note on transcription: /D/ is a (inter)dental fricative.

How then are morpho-phonological exchanges accounted for in OT? The proposal made here is that, in addition to Markedness and Faithfulness, UG contains a set of rankable constraints which actively enforce an alternation in morphologically related words. These constraints, the so-called Transderivational Anti-Faithfulness (TAF) constraints, induce an alternation by requiring a violation of Faithfulness in base-derivative pairs. Applying this idea to the case of Luo, singular and plural forms are assumed to stand in correspondence, with the singular forming the base of this correspondence relation. Both parts of the exchange are thus accounted for as an effect of Anti-Faithfulness, which requires a reversal of the [voice] specification of the base segments.

(27) Morpho-Phonology as Transderivational Anti-Faithfulness

Base		Output
bat	≠	be[d]-e
chogo	≠	cho[k]-e

This notion of Anti-Faithfulness is not totally new. It has been applied in the analysis of repetition avoidance in reduplication (Yip 1996) and certain patterns of quantitative enhancement in Yupik languages (Baković 1996). Also, the notion of ‘Anti-Correspondence’ employed in Hayes 1997 to account for apparent language particular processes derives from the same underlying idea, namely that morpho-phonology supports an overt contrast (see also Blevins 1997). The novel aspect of the proposal here will be to give a formal characterization of a general set of Anti-Faithfulness constraints, and then to apply them to a wide range of examples, including the affix-controlled accentual process surveyed in §4.1.

In the discussion which follows, there will be three main arguments in favor of TAF. First, TAF theory solves the problem confronted by the Lexical Specification theory of morpho-phonology by accounting for exchange processes as Faithfulness reversals. Both parts of the voicing exchange in Luo may be described as an effect of constraints which require dissimilarity in a base and its related derivative. A second type of argument is that TAF theory successfully explains phonological ‘conspiracies’ in morpho-phonological alternations (in the sense of Kisseberth 1970). As will be shown below, morpho-phonological patterns are often GRAMMAR DEPENDENT; their output is constrained by the independently motivated grammatical principles in the language on a whole. In the theory proposed here, the TAF constraints simply require that a form be unfaithful to its base, but they do not always specify exactly how the resulting unfaithfulness should be realized. For example, dominant unaccented suffixes in Russian trigger a deletion of a stem accent and bring about default ending stress, as in /púz + ač + u/ → *puz-ač -ú* ‘man with paunch (dative singular)’. The TAF account for this pattern requires a deletion of base stress, but it does not prescribe the ultimate outcome resulting from this deletion. Grammar dependence is the phenomenon whereby the rest of the constraint hierarchy — the independently motivated defaults — says how to be unfaithful. As shown in §3.2, the default pattern for stress in Russian is stress on the inflectional ending, and so the larger grammar of stress has a say here in predicting the pattern which results from the deletion. TAF theory explains grammar dependence by simply requiring a change, and the rest of the grammar dictates how the change is realized.

A third and important type of motivation for TAF theory is that it provides exactly the right tools for describing affix-controlled accent (ACA). As with the cases examined above, morpho-accentual processes are commonly characterized in terms of a morphological opposition. Russian, for example, has two patterns of mobile stress where

singular inflected nouns show a pattern which is different than the plural inflected forms, e.g., *kolbas-é* versus *kolbás-am* ‘sausage (dative singular/plural)’. Stankiewicz 1962 et seq. argues cogently that these patterns support an overt opposition between singular and plural pairs, a pattern of opposition which extends to other morphological classes (see §3.2 for discussion). Likewise, in Getxo Basque, the morpho-accentual process of pre-accentuation serves to mark salient morphological distinctions, also including the plural (Hualde & Bilbao 1993). Singular-plural pairs in words with unaccented stems are distinguished by the presence of an accent in the final (or penultimate) syllable of the stem, as in *gison-a*, cf. *gisón-ak* ‘man (absolutive singular/plural)’, and *gison-ak* versus *gisón-ak* (ergative singular/plural); in the latter case, the only phonetic difference between the two words is the presence of an accent in the plural. In sum, accentual processes also have a morphological function, realizing a contrast between related words, which leads to a comparison with other morpho-phonological alternations in terms of Faithfulness reversals.

The principal goal of chapter 5 is to show that TAF constraints provide the right tools for explaining the properties of affix-controlled accentual processes. TAF theory will derive the fact that said processes are ‘affix-controlled’ because the TAF constraints operate between a base and its derivative, effectively accounting for the morphological nature of the alternation. Furthermore, a significant and important property of ACA is that it is grammar dependent. For example, a fundamental property of dominant affixes is that they trigger a deletion of accent and produce a default accentual pattern. In the TAF theory of ACA, dominant affixes trigger an obligatory deletion of accent and the rest of the grammar kicks in to yield the default accentual pattern, as with other morpho-phonological processes. A final important consequence of the TAF theory of ACA is that it makes a testable prediction concerning the range of affix-controlled accentual processes. Succinctly, if ACA is due to Faithfulness reversals, the range of possible accentual processes is limited by the set of Faithfulness constraints governing accent. As is shown in detail in chapter 5, the typology of affix-controlled processes is correctly correlated with the negation of the independently attested Faithfulness constraints for accent; reversals of the Prosodic Faithfulness constraints motivated in §1.2 produces precisely the set of affix-controlled accentual phenomena found cross-linguistically.

4.3.2 Transderivational Anti-Faithfulness

4.3.2.1 Theoretical Assumptions

Morpho-phonological alternations may support a contrast between morphologically related words. The theory of Transderivational Anti-Faithfulness works in tandem with other independently motivated principles to derive the observed morphological oppositions. In line with Transderivational Faithfulness, this theory builds on the existing notion of Output-to-Output Correspondence (28a). As will become clear in the applications below, the TAF constraints compare a base and its related output, like the Transderivational Faithfulness constraints. The principal difference between these two classes of constraints is that the TAF constraints require a violation of Faithfulness, yielding the observed contrast between related words.

Another aspect of the theory, to be developed more explicitly below, concerns the analysis of locality effects sometimes observed in morpho-phonological alternations. It is often the case that the affected element is ‘close’ in some sense to the affix triggering the alternation. Following Lubowicz 1998, I treat this type of locality effect with the same tools used to account for locality in so-called derived environment effects (28b). The principle of Local Conjunction provides the descriptive framework for deriving a range of

locality effects, all of which are attested in the morpho-accentual processes discussed in chapter 5.

(28) Morpho-Phonological Alternations as Anti-Faithfulness

- a. Output-to-Output Correspondence (Benua 1997 [1998], Kenstowicz 1996, Burzio 1996; see §4.2 for background) Morphologically related words may stand in correspondence.
- b. Constraint Activation Through Local Conjunction (Lubowicz 1998, see also Smolensky 1993, 1995) Derived environment effects are explained as the Local Conjunction of a Faithfulness constraint with a Markedness constraint: violation of a Faithfulness constraint activates the Markedness constraint in a local context.
- c. Anti-Faithfulness
Anti-Faithfulness constraints are the negation of the corresponding Faithfulness constraints, encouraging dissimilarity where Faithfulness constraints require similarity.

These independently necessary principles work to further refine the a new type of constraint, Anti-Faithfulness. Anti-Faithfulness, as stated below, is the negation of Faithfulness, instantiated through wide scope negation of the proposition expressed by the corresponding Faithfulness constraint.

(29) Anti-Faithfulness

Given the Faithfulness constraint $\mathbb{F}$, $\neg\mathbb{F}$ is the related Anti-Faithfulness constraint which is satisfied in a string S iff S has at least one violation of $\mathbb{F}$.

To see how a Faithfulness constraint is converted to a corresponding Anti-Faithfulness constraint, let us consider some logical statements of the two classes of constraints.

(30) The Logic of Faithfulness Constraints

MAX-X: $\forall x \exists x' [x \in S_1 \rightarrow x' \in S_2 \ \& \ xRx']$
'Every X in S_1 must have a correspondent in S_2 .'

DEP-X: $\forall x \exists x' [x \in S_2 \rightarrow x' \in S_1 \ \& \ xRx']$
'Every X in S_2 must have a correspondent in S_1 .'

IDENT(F): $\forall y \forall y' \forall F [yRy' \rightarrow y =_F y']$
'Correspondent segments must be identical for the feature F .'

By introducing a simple negation to the Faithfulness constraints above, and giving the negation highest scope, we arrive at the following Anti-Faithfulness constraints.

(31) The Logic of Anti-Faithfulness Constraints

- $\neg\text{MAX-X: } \neg [\forall x \exists x' [x \in S_1 \rightarrow x' \in S_2 \ \& \ xRx']]$
 'If there is one, delete (at least) one X in the $S_1 \rightarrow S_2$ mapping.'
- $\neg\text{DEP-X: } \neg [\forall x \exists x' [x \in S_2 \rightarrow x' \in S_1 \ \& \ xRx']]$
 'Insert (at least) one X in S_2 not present in S_1 .'
- $\neg\text{IDENT(F): } \neg [\forall y \forall y' \forall F [yRy' \rightarrow y =_F y']]$
 '(At least) one pair of correspondent segments must differ in feature F.'

Working through the first 'Anti-MAX' constraint, the logic spelled out here entails the following: 'it is not the case that, for all X in the input, there is a corresponding X in the output', which in effect requires at least one violation of MAX-X. In general, by introducing a negation which takes scope over the proposition expressed by a given Faithfulness constraint, Anti-Faithfulness constraints demand at least one breach of the corresponding Faithfulness constraint.

The relative scope of the negative operator is actually an empirical issue; an alternative to giving the negation wide scope is clearly to give it narrow scope with respect to the quantifiers by introducing it at the beginning of the consequent of the implication. The latter formulation of Anti-Faithfulness would require a total lack of Faithfulness, forcing a complete reversal of the linguistic properties of the base. The morpho-phonological alternations discussed here, however, do not involve such a rampant breach of Faithfulness, and so it seems that giving the negation wide scope is best supported by the data.

Another empirical issue concerns the claim that there is an Anti-Faithfulness constraint for every Faithfulness constraint. This assumption predicts that affixes will bring about a change in a particular aspect of linguistic structure, e.g., the change of the [voice] specification through the negation of IDENT(voice). A plausible alternative to this approach is that the oppositions like those in Luo derive from a general Anti-Faithfulness constraint which simply requires an overt contrast, regardless of what aspect of linguistic structure yields the opposition. This approach also seems to be empirically unmotivated, as it makes the prediction that there can be more than one way of satisfying the Anti-Faithfulness constraint in a given construction. While the present chapter is not an exhaustive study of segmental morpho-phonology, affix-controlled accentual processes are always limited to a single aspect of accentual structure. For example, there are accent-deleting affixes and accent shifting affixes, but there appear to be no cases where an affix either triggers a deletion or a shift of accent. The proposed symmetry between Faithfulness and Anti-Faithfulness constraints therefore seems to be on the right track too.

If there is an Anti-Faithfulness constraint for every Faithfulness constraint, then this assumption also predicts that Faithfulness reversals will be found in other correspondence relations, not just transderivational correspondence. In particular, Anti-Faithfulness is also implicated in base-reduplicant and input-output correspondence. It would appear that this prediction runs counter to the finding in Anderson & Browne 1973, and supported further in Moreton 1996, that segmental exchange rules are always morphological. The TAF constraints are needed to account for exchanges between morphologically related words, but a completely unconstrained theory predicts non-morphological exchanges as well. Are all types of Anti-Faithfulness empirically motivated?

In support of the general approach taken here is the fact that Faithfulness reversals are quite prevalent in base-reduplicant relations. As pointed out in McCarthy & Prince 1986, and explored further in McCarthy & Prince 1995, Yip 1992, 1995, and Alderete et al. 1998, reduplicative constructions and echo words frequently require an overt phonological difference between the base and the copied part. For example, echo words in English formed with *shm-* are blocked when the base word also begins with this sequence, as in **shmuck-shmuck*. Reduplication of adjectives in Turkish likewise shows an avoidance of repetition between base-reduplicant pairs: the coda may be one consonant from the set /p s m r/, but certain consonants are blocked when they would mimic the consonantism of the base, e.g., *kap-kara* 'jet black', not **kar-kara*. And as argued in detail in Yip 1996, the mutations observed in Javanese relatives also involve repetition avoidance. In sum, there seems to be ample cross-linguistic support for phonological mutations in reduplicative constructions as well, and this observation can be captured by extending Anti-Faithfulness to base-reduplicant correspondence.

An unconstrained process of constructing Anti-Faithfulness constraints also yields input-to-output Anti-Faithfulness, a set of constraints which would yield purely phonological mutations. In contrast to the two types of Anti-Faithfulness examined above, there is not much support for this type of Anti-Faithfulness. Indeed, if Anderson & Browne's generalization is correct, then segmental exchanges in lexical-to-surface mappings should be completely ruled out. For these reasons, it appears to be necessary to stipulate that Anti-Faithfulness operates exclusively in surface-to-surface correspondence, defined in a way to include base-output and base-reduplicant correspondence, but to exclude input-output correspondence (see Benua 1997 [1998], McCarthy & Prince 1995, 1997). Such a move would not be unprecedented, as Faithfulness to syllabic positions appears to be limited to surface-to-surface correspondence as well. While Faithfulness to a segment appearing in the onset or coda of a syllable appears to be crucial in the analysis of blocking effects in re-syllabification, it is never a contrastive feature in the syllable inventory of a given language, which would require input-output correspondence (see McCarthy & Prince 1994a). Thus, as with Faithfulness to syllabic positions, Anti-Faithfulness appears to be limited to related structures which have an overt surface realization in both members of the pair.

There may be a deeper reason for this fact, however, stemming from the properties inherent to Optimality Theory or the way morpho-phonology is learned generally. The parallelist inclination in Optimality Theory entails that there are no intermediate steps or levels in the mapping from the lexical to the surface form. With this assumption, a purely phonological exchange is in fact indistinguishable from a fully faithful mapping from input to output. Thus, if /A/ goes to [B] and /B/ to [A], and there is not an intermediate step which can further apply to the output of this exchange, then the result is an inventory that contains both [A] and [B]. This result is of course the same in the absence of a phonological exchange: a fully faithful mapping of /A/ and /B/ yields the same inventory. Further, the same result holds for circular chain shifts as well; as long as candidate forms are evaluated in parallel, the result of a shifted series of sounds will have the same consequences for the inventory as if they are unshifted. The question one must ask at this point is, why would a child learning a language bother to reverse the specification of a given segment class? If there are no overt alternations showing that the lexical form has changed, why would the learner go to the trouble of undoing an exchange in positing lexical forms when a far more simple alternative is available, namely to assume that the overt structure is the actual input? These questions need to be answered in a specific model of language acquisition, but the basic point is clear: in the absence of overt structure showing an exchange, there is little, if any, incentive to learn a purely phonological

exchange, which may explain the apparent gap in the generality of Anti-Faithfulness constraints observed here.

4.3.2.2 Application to Exchange Processes

Let us return now to the facts of Luo and see how Anti-Faithfulness applies to the morphological pattern of [voice] exchange. In the plural, voiceless consonants become voiced and voiced consonants become voiceless. This pattern is accounted for by negating the garden variety IDENT(VOI) constraint and restricting its application to the output-to-output dimension of Faithfulness. As with in the analysis of stress neutral affixation in §4.2.2, affixes and morphological processes in general may impose on their base the OO-correspondence relation upon which the TAF constraint is defined. Thus, the constraint given below is only operative in the plural and the appertentive because only these categories are lexically specified for this OO-correspondence relation.¹³

(32) ¬OO-IDENT(VOI)

If a pair of words stand in an OO-correspondence relation, at least one pair of correspondent segments must be non-identical for the feature [voice].

The next step in the analysis is to say that the singular forms the base of the plural, which is a straightforward case of the simplex—complex relation in the case of the plural. Lastly, ¬OO-IDENT(VOI) is ranked above the OO-Faithfulness constraint for voicing, which in turn yields both sides of the [voice] exchange. This result is depicted below.¹⁴

(33) Consonantal Polarity in Luo as Transderivational Anti-Faithfulness

a. bat ≠ bede

Base	/bat + e/	¬OO-IDENT(VOI)	OO-IDENT(VOI)
bat	bet-e	*!	
→ bat	bed-e		*

b. č ogo ≠ č oke

Base	/č ogo + e/	¬OO-IDENT(VOI)	OO-IDENT(VOI)
č ogo	č og-e	*!	
→ č ogo	č ok-e		*

It is important to emphasize that the result here is quite uncharacteristic of the general treatment of phonological processes in OT. Phonological processes are unfaithful mappings which are typically modelled as the domination of Faithfulness constraints by Markedness constraints. In this case, there is no Markedness constraint which compels a different [voice] specification in the stem-final consonant. Rather, it is the negation of Faithfulness which derives this result, and because of this approach, the circular nature of

¹³The Anti-Faithfulness constraint could be defined for an input-to-output correspondence relation in this case, and if a distinct set of IO-correspondence relations could be motivated, the application of this constraint would be limited to just the right morphological contexts. However, as will be shown in §4.3.3, the transderivational approach predicts that the effect of the Anti-Faithfulness constraint will only be observed in the base of affixation, a claim that has robust empirical support in the study of morpho-accentual phenomena conducted in chapter 5.

¹⁴The first recursion of the constraint hierarchy is left out of the tableau here because it is irrelevant to the result being illustrated.

the alternation is directly explained. Said another way, since the Markedness constraints attract a particular target, they are unidirectional. Since Anti-Faithfulness constraints, on the other hand, simply demand a phonological difference, they may be bi-directional, as observed in Luo (though Anti-Faithfulness effects can be uni-directional too, as explained below).

The theory of TAF as yet does not describe which segments of the string will be affected by the Anti-Faithfulness constraint. In other words, as far as $\neg$ OO-IDENT(VOI) is concerned, the plural form of [bat] could either be *bed-e*, or the non-occurring **pet-e* — both incur a violation of IDENT(VOI), and so both equally satisfy $\neg$ OO-IDENT(VOI) as it is construed. There are a wide range of choices in approaching this problem. One idea is to employ Positional Faithfulness constraints (see Beckman 1997 [1998]) as a means of predicting the target of the process. For example, in Luo, the fact that the word-initial consonant is inert to the mutation could be handled with high-ranking Faithfulness for root-initial segments. Another possibility is to let the independently attested well-formedness constraints dictate the target of the phonological change. In the analysis of pre- and post-accentuation and accentual shifts in §5, I will show how Alignment constraints play a role in deriving accentual changes close to a designated edge of a word.

I will not explore these approaches at this point in the discussion because I believe there is a more basic fact to be accounted for, namely that the target of Anti-Faithfulness is often local in some sense to the triggering morpheme. Thus, in comparing [bed-e] versus **[pet-e]*, the changed consonant in the good form is ‘closer’ to the plural suffix, and this fact seems to be rather common. The problem of predicting the locality of target and trigger is of course a very general one, as a great deal of research in generative phonology has been concerned with the issue of explaining locality effects in phonological processes. Indeed, many developments in metrical and autosegmental phonology may be understood as a means of solving certain problems that arise in a strictly linear approach to stress and tone systems (see Hayes 1995, Odden 1995, and Goldsmith 1990 and references therein).¹⁵ In this line of research, however, the central focus is on the observed closeness between two phonological objects. The issue faced in Luo, by contrast, concerns the proximity of the affected element with a morphological entity, e.g., the base-mutating plural suffix. In sum, Luo shows that phonological units like segments may interact with morphological categories like affixes; we therefore require a notion of locality between morphological and phonological categories.

This qualification invites a comparison with so-called derived environment effects (DEE) of the morphological type (Kiparsky 1982b). In morphological DEE, the application of a morphological process P_m feeds a phonological one P_p , which entails that they be local in some sense. Concretely, since the elements introduced by P_m must be in the structural conditions of P_p , and further, since there are substantive restrictions on the distance between the target and trigger of P_p , it follows that the introduced morphological category will be ‘close’ enough to the element affected by the process. To make this logic explicit, consider the morphological conditions on First Velar Palatalization (FVP) in Polish. FVP turns velars into post-alveolars before high vocoids. FVP only applies in heteromorphemic words, however, because its structural conditions must be met by morpheme concatenation, as shown below.

¹⁵Building on these results, a number of researchers have worked towards a set of conditions governing the proximity of various formal objects in a phonological process (Archangeli & Pulleyblank 1987, Selkirk 1988, Myers 1987a, Odden 1994, Suzuki 1998), leading to highly restrictive claims on spreading processes (Ní Chiosáin & Padgett 1997, Gafos 1996a, Walker 1998). See also Frisch, Broe, & Pierrehumbert 1996 for the use of probabilistic functions in the analysis of locality effects, and Bailey 1995 for various ‘edge biases’ in stress rules.

(34) Morphologically Derived Environment Effects in Polish (Rubach 1984)

a. Tautomorphemic: FVP does not apply

/xemik/

↓

[xemik]

b. Heteromorphemic: FVP applies

/xemik + ek/

↓

[xemič -ek]

It is the velar's closeness to the affix which allows palatalization in (34b), showing the importance of a locality condition relative to morphological category. While it is difficult to see consonantal polarity in Luo in precisely these terms, as there is no straightforward sense in which the conditions for the voicing exchange are met through rule prior application, the fundamental ideas are still at work. In Luo, the voicing exchange is predicated on the presence of morphological categories, namely the plural and appertentive. Further, the affected element appears to be a neighbor to these morphological categories (though the appertentive has no overt realization). It seems fruitful, therefore, to approach these two types of morpho-phonological alternations with the same basic toolbox.

I will not pursue this connection within Lexical Phonology (LP) for the following reasons. The LP approach to DEE is inherently derivational, as it involves an interleaving between morphological and phonological processes; as such, LP is inconsistent with the program set forth in TCT for cyclic effects. Furthermore, an analysis of Luo in LP is inherently problematic because the phonological alternation must be described in terms of a possible rule in a cross-linguistic theory of rule types. But no language has phonological exchange rules of the type encountered in Luo. While it is common in the early generative literature to encounter alpha-switching or 'flip-flop' rules in descriptions of thorny problems, Anderson & Browne 1973 (see also Anderson 1975, 1991 and Moreton 1996) argue convincingly that such exchanges always mention a morphological or morpho-syntactic environment. For Luo, therefore, the LP theory requires a phonological rule which is otherwise unmotivated in the world's languages.

A new approach to DEE has recently been proposed in Lubowicz 1998, which provides a non-derivational alternative to LP and provides the principles needed to account for the observed locality restrictions on morpho-phonology. Roughly speaking, the idea is that DEE, of both the phonological and morphological type, involves a 'piling up' of the constraint violations in a local context (with obvious functional benefits for recoverability). In particular, morphological DEE involve the combination of an Anchoring constraint and a Markedness constraint through a process of Local Conjunction (36); when affixation triggers a violation of Anchoring, this violation leads to the activation of the Markedness constraint in the neighboring environment of the Anchoring violation. In essence, DEE can be characterized as avoiding 'the worst of the worst' (Prince & Smolensky 1993), by bundling two constraints and limiting their application to a local environment.

These ideas are applied to DEE in Polish in Lubowicz 1998 in the following way. The constraint VPAL, which prohibits dorsals before high vocoids, is locally conjoined with a constraint demanding stem-to-syllable anchoring at the right edge of the stem (37). The formula for Anchoring constraints given in (35) below entails that the right edge of the syllable has a correspondent in the right edge of the stem (see McCarthy & Prince 1993a,b for motivation of such a constraint and McCarthy & Prince 1995 for subsequent reinterpretation of Alignment constraints in terms of Anchoring).

(35) Formula for Anchoring Constraints (McCarthy 1997, McCarthy & Prince 1995)

ANCHOR(Cat₁, Cat₂, P), where P is one of {Initial, Final, Head}.
 If $\xi_1 \in S_1$, and $\xi_2 \in S_2$, and $\xi_1 R \xi_2$, and ξ_1 stands in position P of Cat₁,
 then ξ_2 stands in position P of Cat₂.

(36) Local Conjunction of C₁ and C₂ in Domain D (Smolensky 1993, 1995, 1997)

C₁ &_l C₂ is violated when there is some domain of type D in which both C₁ &_l C₂ are violated.

Following Smolensky's formulation of Local Conjunction, the conjoined constraint has the effect of shunning the banned sequence specifically at the stem + affix juncture, as it is only in this context that stem-to-syllable Anchoring is violated. The local context here is characterized in terms of the notion of Root Adjacency (RA), i.e., adjacent root nodes or segments.¹⁶

(37) (VPAL & ANCHOR(Stem, σ , Final))_{RA} = VPAL_{Adj Seg}
 Avoid dorsals before high vocoids (VPAL) & a violation of stem: syllable anchoring in adjacent segments.

As depicted below, when the attachment of a suffix yields a dorsal following by a high vowel, faithful treatment of this sequence leads to a violation of the conjoined constraint in adjacent segments (38a), thereby motivating the alternation. In tautomorphemic words, however, there is no violation of Anchoring, and therefore VPAL is inactive (38b).

(38) Morphological Derived Environment Effects as Local Conjunction (Lubowicz 1998)

Input	Output	VPAL _{Adj Seg}	IDENT(cor)	VPAL
a. /xemik + ek/	→ xe.mi.[č -i]k		*	
	*xe.mi.[k-i]k	*!		*
b. /xemik/	→ xe.mik			*
	*š e.mik		*!	

In sum, the approach taken in Lubowicz 1998 is a fully non-derivational approach to DEE, achieved as an effect of constraint activation through Local Conjunction. Furthermore, this theory gives the required type of locality effects, i.e., a notion of locality between morphological and phonological categories.

A related approach can be applied to the analysis of the morphologically conditioned exchange in Luo, though the Markedness constraint must be substituted for an Anti-Faithfulness constraint.¹⁷ Thus, while morphological DEE derives from the conjunction of $\mathbb{M}$ & $\mathbb{A}$ (for $\mathbb{M}$ a Markedness constraint and $\mathbb{A}$ an Anchoring constraint), morphologically conditioned exchanges derive from the conjunction $\neg\mathbb{F}$ & $\mathbb{A}$. Both types of constraint conjunction lead to the piling up of Faithfulness violations in discrete domains. With

¹⁶See Suzuki 1998 on the incorporation of adjacency relations such as this in the definition of Local Conjunction.

¹⁷The inadequacy of the treatment of Luo as a morphological DEE follows from Moreton's theorem (Moreton 1996): no ranking of just Markedness and Faithfulness constraints will yield the exchange.

affixation, for example, the attachment of a suffix will incur a violation of ANCHOR(Stem, PrWd, Final) because suffixation entails that the stem-final element is not longer final in the prosodic word. Conjunction of an Anti-Faithfulness constraint with ANCHOR(Stem, PrWd, Final) therefore correctly predicts the application of an exchange process in the local environment of the affix, as spelled out in the following constraint.

- (39) $(\neg \text{OO-IDENT}(\text{VOI}) \ \& \ \text{ANCHOR}(\text{Stem}, \text{PrWd}, \text{Final}))_{\text{Seg}} \equiv \neg \text{OO-IDENT}(\text{VOI})_{\text{Fin Seg}}$
 In morphologically related words, attachment of an affix must be accompanied by a violation of IDENT(VOI) in the stem-final segment.

Working through the complex constraint, the Anti-Faithfulness constraint $\neg \text{IDENT}(\text{VOI})_{\text{OO}}$ requires a violation of Faithfulness. The conjunction of this constraint with ANCHOR(Stem, PrWd, Final) entails that a violation of Anti-Faithfulness is not tolerated in the same local domain, namely the segment, as a violation of Stem: PrWd Anchoring. Since suffixation generally induces a violation of the Anchoring constraint, then the attachment of a plural suffix will trip a violation of ANCHOR(Stem, PrWd, Final), thereby activating the Anti-Faithfulness constraint in the stem-final segment.¹⁸ This effect is illustrated below.

(40) Locality of Anti-Faithfulness Effect through Local Conjunction

Base	/bat + e/	$\neg \text{OO-IDENT}(\text{VOI})_{\text{Fin Seg}}$	IDENT(VOI) _{IO}
bat	<u>p</u> e[t]-e	*!	*
bat	<u>p</u> e[<u>d</u>]-e		**!
→ bat	be[<u>d</u>]-e		*

In the above tableau, all of the derived words incur a violation of ANCHOR(Stem, PrWd, Final) because all of them have the plural suffix -e, which leads to a mis-match between the right edges of the stem and the PrWd. But only the last two satisfy Anti-Faithfulness by mutating the segment that also incurs the Anchoring violation (which is in square brackets). The first candidate, therefore, violates the conjoined constraint because it violates both of the constraints in the conjunction specifically in the stem-final segment. Underlining here indicates a mutated consonant, which therefore leads to the satisfaction of the TAF constraint. Furthermore, the doubly mutated candidate, *ped-e*, with a total reversal of consonant voicing, is ruled out because it has a gratuitous violation of low-ranking Faithfulness. With the characterization of Anti-Faithfulness in which the negation takes wide scope over the Faithfulness requirement, satisfaction of the constraint simply involves a single violation of Faithfulness; additional Faithfulness violations do not help in any way and are therefore ruled out by Faithfulness. To summarize, the conjunction of an Anti-Faithfulness constraint and Stem-to-PrWd Anchoring correctly defines the locality requirements on the exchange process.

This theory of the locality conditions on morpho-phonological alternations leads to an interesting question: since the Anti-Faithfulness constraint is activated by the attachment of an affix (which results in a violation of Anchoring), how are morpho-phonological alternations to be modelled which do not involve affixation at all? For example, eclipsis mutation in Irish affects the initial consonant of words appearing in certain morpho-syntactic environments, but these words do not reliably receive a set of affixes. And yet

¹⁸It is important to be clear that the role of ANCHOR(Stem, PrWd, Final) is not a morphological one — this is the function of the TAF constraint. The conjunction of ANCHOR(Stem, PrWd, Final) with the TAF constraint, in this case, simply accounts for the locality effects observed in the exchange.

the mutation consistently appears on the initial consonant of the word.¹⁹ How is the target of the mutation process to be localized in this case, where there is no neighboring affix to predict the locus of the mutation? The current theory affords several options. First, one obvious tack is to assume that some mutations of this kind simply involve Transderivational Anti-Faithfulness, unconjoined with an Anchoring constraint. Thus, the Anti-Faithfulness constraint requires an overt difference in the form and other constraints in the grammar ensure that it is the initial syllable which undergoes the process. While several examples examined below are approached in precisely this way, this line of analysis does not look so attractive for Irish word-initial mutation as it is common for languages to actually be more faithful for word-initial segments (see especially Beckman 1997 [1998]). Another option is to posit a non-overt affix in the neighborhood on the mutation, which, through the means described above, incurs a Faithfulness violation and thereby activates Anti-Faithfulness. This approach is clearly not highly explanatory, given that there is no independent means of testing the position of the affix (beyond historical studies), but it appears to be a prudent approach to Irish, given the bizarre nature of the initial mutation.

A third option, more in line with the first, is to assume that the Anti-Faithfulness constraint is likewise unconjoined, and that the target of the mutation is achieved through the negation of a Positional Faithfulness constraint in the sense of Beckman 1997 [1998]. In this theory, a set of Faithfulness constraints target specific locations in a form, effectively accounting for the fact that these positions generally license a wider range of contrasts (and therefore require higher-ranking Faithfulness). Taking the null hypothesis given above, namely that there is a Anti-Faithfulness constraint for every Faithfulness constraint, *CON* will also have Anti-Positional Faithfulness constraints which in effect require a mutation in the privileged position targeted by the Positional Faithfulness constraint. Returning to Irish eclipsis, the mutation in the initial segment can be explained straightforwardly as a response to the negation of the word-initial segment Faithfulness constraint, i.e., $\neg$ FAITH-SEG₁. Indeed, such mutations may even have the same functional basis as Positional Faithfulness: by requiring the phonological change in a phonologically salient position, the coding properties of the mutation will be more reliably heard. Extending the application of Anti-Positional Faithfulness, this line of analysis may prove very useful in the analysis of spreading from an affix to a stressed syllable, as found in languages like Chamorro and Montañés Spanish (see Chung 1983 and McCarthy 1984 and references therein). The motivation for the process in these cases involves, by hypothesis, the negation of Faithfulness in stress syllables, effectively requiring an alternation in this salient position in the word.

To summarize these ideas concerning mutation without affixation, there are several possible approaches to this type of mutation within the theory developed here. Such mutations can be modelled in one of the three following scenarios: (i) pure unconjoined Anti-Faithfulness where the other constraints in the grammar give the target of the mutation, (ii) Anti-Positional Faithfulness, or more conservatively, (iii) an abstract segment may be posited to predict the location of the change. Each option of course has different empirical predictions, and so each case will require careful study before choosing among these alternatives.

¹⁹The set of meaningful phonological processes described in Woodbury 1987 for Central Alaskan Yupik may also be cases of 'affix-free' Anti-Faithfulness. While the expressive aspect of these processes is rather different than the truth-conditional meanings typical of the cases examined here, the observed changes are correlated with a change in meaning, and yet there is no consistent set of affixes involved.

4.3.3 Implications of Transderivational Anti-Faithfulness

There are a number of predictions that TAF theory makes which distinguish it from plausible alternatives to morphologically governed phonology. These predictions will be reviewed here, in abstract form, before they are confronted in real life examples in subsequent discussions.

The first kind of pattern predicted in the TAF model developed here has to do with the target of the structural change in the morpho-phonological process. One general prediction, codified in the following thesis, is that mutation processes specifically affect the ‘base’ of the morphological process, i.e., the root or stem.

(41) Thesis of Strict Base Mutation (SBM)

Transderivational Anti-Faithfulness may only affect the base of affixation.

To see this effect, consider the following hypothetical example. With simple suffixation, the bare root forms the base for the derived form [root + af]. If the affix is changed, indicated here with capitalization, then the base of affixation is no different than the simplex base, and therefore Anti-Faithfulness is violated. On the other hand, if the root is mutated, as in the first candidate, it does incur a violation of OO-Faithfulness, and as a result, Anti-Faithfulness is satisfied.

(42) Illustration of Strict Base Mutation Effect

Base	Derivative	¬OO-FAITH	OO-FAITH
→ root	ROOT-af		*
root	root-AF	*!	

SBM effects such as these are very general, and this result holds regardless of the character of the Faithfulness constraint. Thus, if ¬OO-FAITH is the negation of a Featural Identity constraint, as with the case of Luo, then the Anti-Faithfulness constraint will demand lack of Faithfulness in the segmental make-up of the base. Likewise, if ¬OO-FAITH is a constraint of the MAX variety, then the negation of OO-FAITH will necessarily bring about a deletion of some element in the base. Finally, if ¬OO-FAITH is a DEP-type constraint, then the Anti-Faithfulness constraint is only satisfied by the insertion of some feature in the base. This last point follows from the assumption that only the base stands in correspondence with the base subconstituent in the derived form (see §4.2). Thus, if a feature is inserted into the affix, as in the loser above, then ¬OO-FAITH is violated because the segments which stand in correspondence with the base have not changed.

This result is by no means trivial and it will be crucial in the formal analysis of various types of morpho-accentual processes. For example, it is a common finding that pre- and post-accentuation is a property of affixes and not of bound roots and stems.²⁰ Also, dominant morphemes seem to be linked exclusively to morphological processes like affixation. Thus, it is common to find accent-deleting affixes, but I know of no language with roots which idiosyncratically cause the deletion of an accent of a neighboring affix (see Inkelas 1996 for a consistent view), a point which is returned to in §5.3.4. Also,

²⁰An apparent counterexample to this claim is the existence of so-called post-accenting stems in Russian. As argued in chapter 3, however, there is a more insightful analysis of these stems as unaccented bases, and so Russian does not counter-exemplify this claim.

affix-controlled accentual shifts are always triggered by an affix and have the effect of shifting the base accent. Affix-controlled accentual processes are manifestly base-mutating, and this observation receives a natural explanation in TAF theory.

A second important prediction also concerns the target of the morpho-phonological process. All things being equal, the structural change induced by the process should be towards a language particular default structure (see Alderete et al. 1998 on the characterization of default structure). For example, dominant affixes in Russian cause a deletion of the stress of the base, and if they are themselves unaccented, the result is default ending stress. In other words, the output of this type of dominance effect is the same as the output of a word with no underlying accent: /púz + ač_{Dom} + u/ → *puz-ač-ú* ‘man with paunch’, cf. /stol + u/ → *stol-ú* ‘table (dative singular)’. Dominance effects in Russian are thus grammar dependent in the sense that they are governed by the independently attested constraints giving a default stress pattern, in this case POST-STEM-PROM (see §3.2 for the definition and motivation of this constraint).

Grammar dependence follows directly from the assumptions inherent to TAF theory. The TAF constraints require a change in the base, in this case a deletion of base prosody, and the rest of the constraint system predicts how the change is accommodated. Thus, the attachment of the dominant suffix -ač triggers the activation of the TAF constraint -OO-MAX-PROM, but the stress pattern resulting from this deletion is due to an additional constraint in the system, namely POST-STEM-PROM, as illustrated below.

(43) Dominance Effect with Language Particular Default

Base	/púz + ač + u/	-OO-MAX-PM	OO-MAX-PM	POST-STEM-PROM
a. púz-u	[púz-ač]-u	*!		
b. púz-u	[puz-áč]-u		*	*!
c. → púz-u	[puz-ač]-ú		*	

In this way, the direction of the mutation is predicted to be towards a language particular default pattern. In Russian, the default pattern is for words to have ending stress; dominance effects also bring about default ending stress because their output is governed by the same constraint system. Several additional examples can be explained in this way. Pre-accentuation in Cupeño, for example, yields an accent on the rightmost syllable of the root; the rightward orientation of the inserted accent is consistent with the general trend for rightmost accent in the language, as evidenced by the fact that in words with more than one accented affix, the rightmost one realizes its inherent accent. Another interesting example, studied in §5.4, is accent shift in the Jivoroan language Aguaruna. In this language, certain suffixes cause a shift of the stem accent one mora to the right. Moreover, bounded rightward accent shift is in fact the default pattern, as the accent of vowels which are deleted by a regular rule of syncope also shift one mora to the right. In sum, a wide range of morpho-accentual alternations involve a change towards a language particular default pattern. This fact is explained here with the assumptions intrinsic to TAF theory: the negation of Faithfulness requires a change, yet the independently active constraints in the language dictate how the change is rendered.

A third important prediction of this approach is not inherent to TAF, but rather a general prediction in Optimality Theory. The prediction is that Anti-Faithfulness effects may apply non-uniformly across types of strings. Anti-Faithfulness constraints are well-formedness constraints which are ranked relative to a whole ensemble of constraints in a language particular grammar. When the Anti-Faithfulness constraint has high rank in the

system, the result is morphologically triggered phonological processes. In contrast, when Anti-Faithfulness is low ranking, no such process is predicted, and morphologically related forms are phonologically similar. However, some grammars will rank the Anti-Faithfulness constraint between two sets of constraints, as shown below, which results in a different type of grammar dependence where Anti-Faithfulness is blocked in certain contexts.

(44) Non-Uniformity of Anti-Faithfulness

$$\mathbb{C}_1 \gg \text{Anti-Faithfulness} \gg \mathbb{C}_2$$

With a word type which is not subject to $\mathbb{C}_1$, Anti-Faithfulness will get its way and induce a mutation. But Anti-Faithfulness will not have an effect in forms where $\mathbb{C}_1$ is relevant, which yields the non-uniform morpho-phonological pattern. Put differently, the above ranking results in ‘structure-preserving’ grammar dependence: a mutation is predicted, but not if it would result in structures or mappings that are prohibited in the language as a whole.

As will be shown in the next chapter, morpho-accentual rules abound in such patterns of non-uniformity. An example that is observed in languages as different as Cupeño, Russian, and Basque, is pre-accentuation that only in words with unaccented stems. Hence, when the pre-accenting suffix in Cupeño, -*í* ‘objective’, is attached to a root with no inherent accent, the suffix posits an accent on the root, e.g., /né-*ʃ* ula-*ʔ*a-*í*/ → [ne-*ʃ* ulá-*ʔ*ai] ‘my fingernails’. When the same suffix attaches to an inherently accented root, however, the root accent overrides the accent contributed by the pre-accenting suffix as in: /*ʔ*ísi-l*ʔ*-*í*/ → [*ʔ*ísi-l*ʔ*i] ‘coyote’. This pattern of non-uniformity can be explained if we simply substitute MAX-PROM_{Root} for $\mathbb{C}_1$ in (44) above. Thus, in words with unaccented stems, Anti-Faithfulness has an effect and causes the insertion of an accent in these forms because MAX-PROM_{Root} is irrelevant. Anti-Faithfulness is kept in check, however, in words with accented roots because it is dominated by Root Faithfulness. The heterogeneous behavior of these pre-accenting suffixes is therefore derived directly through constraint domination.

A rather different type of non-uniformity effect can be modelled by ranking two related Faithfulness constraints differently relative to Anti-Faithfulness. To fully understand this point, it is necessary to give a bit of background on features in OT. It is common to distinguish between two kinds of Faithfulness constraints which make reference to the same feature. Thus, MAX and DEP may govern the behavior of the same features, but they are independently rankable in the constraint hierarchy. Likewise, a number of researchers, including Pater 1996, Urbanczyk 1996, and McCarthy 1997 have proposed different dimensions of IDENT-type constraints. For example, Pater distinguishes between IDENT[-voi → +voi] and IDENT[+voi → -voi] in his theory of post-nasal voicing alternations. Now, if two related Faithfulness constraints, e.g., $\mathbb{F}(+A \rightarrow -A)$ and $\mathbb{F}(-A \rightarrow +A)$, are ranked differently relative to the corresponding Anti-Faithfulness constraint, the prediction is that the mutation effected by the Anti-Faithfulness constraint will only go in the direction allowed by the relevant Faithfulness constraint(s). The ranking for this type of mutation is given below.²¹

²¹For ease of exposition, I have grouped the two Anti-Faithfulness constraints together in a single constraint. But technically speaking, the complex constraint $\neg \mathbb{F}(+A \rightarrow -A; -A \rightarrow +A)$ represents two independent constraints which correspond to the related Faithfulness constraints given in the same ranking.

(45) Uni-Directional Mutations: $-A \rightarrow +A$, but not $+A \rightarrow -A$

$$\mathbb{F}(+A \rightarrow -A) \gg \neg \mathbb{F}(+A \rightarrow -A; -A \rightarrow +A) \gg \mathbb{F}(-A \rightarrow +A)$$

This ranking predicts that $/-A/$ will go to $[+A]$ in the relevant morphological contexts because the Anti-Faithfulness constraint requiring this mutation dominates $\mathbb{F}(-A \rightarrow +A)$. The opposite pattern of mutation, however, is not allowed: high-ranking $\mathbb{F}(+A \rightarrow -A)$ rules out this possibility. In sum, ‘one-way’ mutations can be successfully modelled in this way, and that is exactly the way I will approach such cases below.

It is worthwhile illustrating this last prediction with some well-known vowel length alternations. Many languages with contrastive vowel length also have a set of suffixes which induce lengthening on the preceding vowel, rather similar to pre-accentuation in accent systems. For example, Slovak has a contrast between long and short vowels, but this contrast is neutralized before certain pre-lengthening suffixes (see Rubach 1993 and references therein). Two aboriginal languages of Australia also display these same features, namely Gidabal (Geytenbeek & Geytenbeek 1971) and Yidiñ (Dixon 1977). Consider the following examples from Yidiñ in which the presence of the anti-passive ending, *-Di-n*, triggers lengthening of the preceding vowel.

(46) Morphologically Conditioned Lengthening in Yidiñ (Dixon 1977)²²

- a. wawa-l ‘see, look’, cf. wawa:-Di-n, wawa:-Diñu (past), wawa:-DiN (present)
- b. wuNaba-n ‘hunt’, cf. wuNaba:-Di-n

The important point here is that the anti-passive suffix induces lengthening of short vowels but no shortening of long vowels. We have here a uni-directional mutation, and equipped with the schematic ranking given above, we can explain this case in terms of constraint domination of the Anti-Faithfulness constraint.

Following Urbanczyk 1996, we distinguish between two kinds of Length Faithfulness constraints, i.e., *SHORTENING and *LENGTHENING. If Anti-Faithfulness for vowel length is ranked between these two constraints, as shown below, then the mutation triggered by the Anti-Faithfulness constraint will only induce lengthening.

(47) Uni-Directional Length Mutation in Yidiñ

$$*\text{SHORTENING} \gg \neg\text{LENGTH-IDENT} \gg *\text{LENGTHENING}$$

Walking through the ranking, morphologically triggered lengthening is allowed because *LENGTHENING is dominated by the Anti-Faithfulness constraint. But shortening is not permitted because this component of Length Faithfulness is top-ranked in the hierarchy. In sum, the fact that some morphologically induced alternations only go in one direction is explained as a consequence of two basic tenets in OT: constraint ranking and violability.

In this way, Anti-Faithfulness can take over some, or even all, of the work of constraints encouraging the overt realization of a morphemic unit. Commonly used constraints include MORPH-REAL from Samek-Lodivici 1993 and MORPH-DIS from McCarthy & Prince 1995. In traditional Item-and-Arrangement-style morphology, cases like the length-inducing suffixes in Yidiñ are said to involve a floating unit of length,

²²The comparison between a disyllabic and a trisyllabic stem shows that the length alternation is not rhythmically governed, another important factor in length alternations. Also, /D/ is a laminal stop.

which, because it cannot be realized on the suffix itself, docks to a nearby vowel. The role of MORPH-REAL in such an analysis is thus to ensure that the floating mora is overtly realized, effectively distinguishing the base from the derived form with the lengthening suffix.

The functional purpose of the lengthening is of course to mark a contrast between the base and its derivative, and Anti-Faithfulness therefore offers an interesting alternative to the Floating Feature analysis. Thinking of Yidiñ again in terms of TAF, there is no need to posit a floating mora as the morphological exponent of ‘derivedness’. Rather, by employing Anti-Faithfulness, the alternation in length can be induced through constraint interaction. In other words, the phonological alternation is a response to well-formedness constraints requiring difference, rather than as the realization of an underlying element. The analysis in terms of TAF is therefore less abstract, which is an argument in its favor.²³

A further important implication of the theory of morpho-phonological alternations developed here is that it predicts that said alternations may be subject to locality conditions which are specified in terms of different prosodic (and potentially morphological) categories. The TAF constraints which bring about a mutation of the base may operate independently, in which case there are no locality restrictions and the target of the morpho-phonological operation is towards a language particular default (discussed above). Or, following Lubowicz 1998, the TAF constraints may be locally conjoined with an Anchoring constraint, which has the effect of ‘activating’ the TAF constraint in a unit which appears at the edge of the base which borders the base-affix juncture (see §4.3.2 for details). The prediction of this theory is that different specifications for domain of Local Conjunction may result in different locality domains for the pattern of Anti-Faithfulness. For example, in contrast to the segment-based locality restriction found in Luo, if the conjunction of the TAF and Anchoring constraint is defined for the syllable, then the mutation must be in an edgemost syllable of the base. The examination of morpho-accentual phenomena in the next chapter shows that this prediction is indeed borne out, as the range of possible locality domains are attested. All of the prosodically defined locality restrictions (excluding the segment)²⁴ are integral in the analysis of specific affix-controlled processes.

(48) Locality Effects in Affix-Controlled Accent

- a. Mora-based locality: the dominant enclitic *no* in Japanese (§5.2.4)
- b. Syllable-based locality: pre- and post-accentuation in Japanese (§5.3.3.1), dragging tone mutation in Limburg Dutch (§5.4.2)
- c. Foot-based locality: pre-accentuation in Cupeño (§5.3.2), accent shift in Aguaruna (§5.4.4)

As discussed in detail in Poser 1984, the dominant morpheme *no* in Tokyo Japanese is subject to a locality restriction, namely that it only causes the deletion of accent in a neighboring mora. Moving up the Prosodic Hierarchy, ACA may also have syllable-based locality restrictions, essentially entailing a mutation of the base prosody in the stem syllable

²³It is important to emphasize that this argument applies even if a null morpheme is required in conjunction with a TAF constraint, which was one of the possibilities entertained above in the analysis of Irish. In this case, the null morpheme does not have a phonological function because it does not sponsor a phonological feature.

²⁴The absence of segment-based locality in ACA is not at all a surprise, given that segments do not typically sponsor accentual categories like stress and tone.

which is adjacent to the relevant affix. In addition to the syllable-based locality in Japanese post-accenting prefixes and pre-accenting suffixes, there is the striking case of the dragging tone mutation in certain Dutch dialects where a retraction of the (non-stress) accent is only observed in stem-final syllables which about the accent-shifting suffixes. Finally, two other affix-controlled accentual processes seem to be limited to the final foot of the stem which shares the base + affix border with a special suffix. Taken together, these cases present a strong case of the proposed theory of locality used in restricting the application of morpho-phonological operations because they attest to the full range of locality domains predicted by Smolensky's theory of Local Conjunction.

The following list summarizes the implications of TAF theory fleshed out above.

(49) Predictions of Transderivational Anti-Faithfulness

- a. Strict Base Mutation Effects: TAF constraints encourage dissimilarity specifically in the base of the morphological process.
- b. Outputs as Language Particular Defaults: in cases where Anti-Faithfulness is not decisive, other constraints in the system dictate the direction of structural change to a language particular default structure.
- c. Non-Uniformity Effects: Anti-Faithfulness effects may be non-uniform, applying to only a subset of the range of possible word types.
- d. Locality Effects: Anti-Faithfulness effects may be required to be 'close enough' to the base-mutating affix.

The theory of Transderivational Anti-Faithfulness has a number of properties which make it special and distinguish it from alternative approaches to morpho-phonology. First, TAF constraints induce changes to the base of a morphological process — this result stems from the basic premise of the theory, namely that TAF constraints operate in base-derivative pairs. Second, all else being equal, the direction of the change triggered by TAF constraints will be towards a language particular default structure. Thus, dominance effects in Russian require a deletion of stress, and the independently needed constraint POST-STEM-PROM dictates the stress pattern resulting from this deletion. Third, Anti-Faithfulness may apply non-uniformly across word types. That is, one class of words may undergo the mutation, while certain others may not, and the dividing line between these two classes of phonological behavior is negotiated through constraint ranking. The last two effects fall under the general rubric of grammar dependence, where the independently needed constraints in the grammar interact with the Anti-Faithfulness constraint, predicting the locus of the mutation, the patterns resulting from deletion, or whether or not the morpho-phonological operation is blocked in a specific context. Finally, Anti-Faithfulness effects may be subject to locality requirements which entail that the mutation occur in a position which is in the proximity of the base-mutating affix.

Chapter 5.

The Role of Transderivational Anti-Faithfulness in Morpho-Accentual Phenomena

In chapters 2 and 3, the phenomenon of root-controlled accent was studied and analyzed in terms of the interaction of Faithfulness constraints in Optimality Theory. This analysis draws on an important development in OT, namely the notion of Root Faithfulness, and explains the very common pattern of overriding root accent in terms of a universal ordering of Root and Affix Faithfulness constraints.

This approach to root-controlled accent also clarifies an independent body of facts which might be dubbed ‘affix-controlled accent’, i.e., morpho-accentual processes which correlate with the attachment of an affix. Root-controlled accent and affix-controlled accent (RCA and ACA respectively) are clearly different phenomena because they exhibit strikingly different formal properties. As brought to the fore in §4.1, a basic difference is that RCA is systematic and applies across the board, while affix-controlled phenomena are non-systematic and triggered by particular morphemes. This distinction, among several others examined here, leads to the conclusion that the two types of morphologically governed accentual phenomena must receive separate treatment. This conclusion is further supported directly below with a review of some basic properties of affix-controlled phenomena. In the following sections, I will develop a theory of affix-controlled morpho-accentual processes which shows a clear role for Prosodic Anti-Faithfulness constraints in each case. This theory explains the properties of affix-controlled accentual processes and unifies ACA as a class that distinguishes itself from RCA.

5.1 Towards an Integrated Theory of Affix-Controlled Accent

5.1.1 Properties of Affix-Controlled Accent

(A) **Lexically Idiosyncratic** To begin where I left off in §4.1, it is an idiosyncratic feature of a given affix whether or not it induces a morpho-accentual process, and therefore, this feature must be lexically listed. For example, the dominant/recessive distinction in Russian suffixes must be lexically-specified because this distinction does not always correlate with a given phonological or morphological property. Thus, the accented/unaccented contrast is orthogonal to the distinction between dominant/recessive affixes, as shown by the fact that in Tokyo Japanese, and several Indo-European languages, there are both dominant accented and dominant unaccented affixes. Also, while dominant affixes are sometimes derivational, this morphological property is not a reliable predictor of dominance. In Russian, for example, the plural suffix *-a* used in technical jargon is dominant, and yet it is clearly inflectional; furthermore, many derivational suffixes in Russian are recessive, showing that dominance is not always a property of category-changing affixes.

Other common affix-controlled processes, such as pre- and post-accentuation, are likewise lexically idiosyncratic. In Cupeño, accented suffixes are either auto-stressed or

pre-stressing, requiring a lexical distinction between the two classes of accented suffixes. Moreover, the fact that there are both dominant pre-accenting and recessive pre-accenting suffixes in Japanese shows that this contrast is orthogonal to the dominant/recessive distinction. The same point holds for processes of accentual shift: in languages like Japanese and Aguaruna, accent-shifting suffixes must be distinguished from auto-accented and accent-neutral suffixes, and this contrast is clearly a lexical property.

(B) Morphologically Triggered A second important property of affix-controlled accentual processes is that they always correlate with the application of a morphological process, and as a result, these processes may serve as an important cue for ‘derivedness’. While affix-controlled processes are often correlated with the attachment of an affix, the morpho-accentual phenomena examined here may also correlate with non-affixal morphology, such as compounding and root-and-pattern morphology. Stated differently, a relationship is established between the base and its derivative in which certain prosodic patterns obtain; different affix-controlled processes specify different types of prosodic requirements.

The dominant/recessive distinction in affixes may be captured in terms of this relationship between a base and its related derived form. Dominance effects thus cause an obligatory deletion of the base prosody, which yields an opposition in base-derivative pairs when the base itself has an accent. Compare this requirement to the Faithfulness effect by stress-neutral affixation which enforces preservation of the base prosody in derived forms. Also, pre- and post-accentuation and accentual shifts are described straightforwardly in terms of this morphological relationship. Pre-accenting suffixes, for example, require the insertion of an accent on a nearby syllable in the derived form, thereby distinguishing the derivative from its base with an epenthetic accent. Likewise, accent-shifting affixes require an overt shift in the derived form, again instantiating a morphological contrast between a base and its derivative.²⁵

(C) Base Mutating A third important property, which is a general property of many morpho-phonological alternations, is that the affected element in an affix-controlled process is always the base of the morpho-accentual process, i.e., the basic formative to which the process applies. Since roots and stems are generally the bases for these operations, they are always the target of the phonological change. Thus, as observed in Inkelas 1996, the dominant/recessive contrast cross-classifies affixes which induce a change in the base to which they attach, but there are no roots which idiosyncratically cause the deletion of an accent in a neighboring affix. Furthermore, while pre- and post-accenting affixes abound in the case studies examined in this thesis, pre- and post-accenting stems are far less common, and perhaps completely unattested. In Cupeño, for example, many suffixes are pre-accenting but no roots trigger the insertion of accent on a neighboring affix. Finally, the morphologically triggered accent shifts in Tokyo Japanese and Aguaruna always affect the base of affixation, and so they pattern with the other two types of affix-controlled accentual processes.

(D) Grammar Dependent Fourth, the output of affix-controlled processes is often constrained by the independently necessary constraints on accent. While these processes appear to give rise to otherwise exceptional accentual patterns, the affected element is not

²⁵Of course there are numerous accentual shifts, typically involving a pitch accent, which are purely phonological, as exemplified in Kikuyu (Clements & Ford 1979), Shona (Myers 1987a), Winnebago (Miner 1979), and various Micronesian languages (Rehg 1993), and these processes are in fact crucial to the synchronic description of the surface prosody. As phonological shifts, however, these cases can be straightforwardly treated through the domination of Faithfulness by Alignment constraints which favor accent at a given edge (see Myers 1997a and Bickmore 1996 for some leading ideas).

completely outside the bounds of the system. Indeed, there are often components of the processes which are directly predicted by the independently needed constraints on the distribution of accent. Thus, dominant morphemes idiosyncratically trigger de-accentuation, but the pattern which emerges from this process is invariably a default pattern. In Russian, for example, the grammar of accent characterizes ending stress as a default position. Further, when dominant suffixes delete the stem accent, default ending stress emerges. Similar patterns arise in Tokyo Japanese where the dominant affixes bring about a default accentual pattern.

Pre- and post-accentuation and accentual shifts are also grammar dependent in that the output of these processes is often governed by the independently required constraints on accent. In Cupeño, for example, the accent introduced by the pre-stressing suffixes is preferentially aligned with the right edge of the stem. This fact accords with the general rightward orientation of stress in the language, as evidenced by the fact that in words with two inherently accented affixes, the rightmost affix wins. Accent shift in Aguaruna is particularly interesting in this light: accent-shifting suffixes cause a rightward shift of the base accent. Furthermore, there is a general rightward orientation for accent in the language, as shown by the fact that the accent of a deleted vowel typically follows the same pattern, shifting one mora to the right. The same pattern of grammar dependent accent shift is found in Tokyo Japanese, where accent-shifting suffixes induce a rightward shift in accent, which, as I argued in §3.3 on the basis of compound accent, is the default edge orientation for accent in the language.

(E) Subject to Locality Requirements A final important property of morpho-accentual processes is that there may be locality conditions on the triggering affix and the element undergoing the structural change of the process, though this is not a necessary condition for ACA. For example, pre- and post-accentuation often have locality requirements. Thus, pre- and post-accenting affixes in Tokyo Japanese only insert an accent on an immediately adjacent syllable (see Poser 1984 for discussion of the bounded nature of morpho-accentual rules). Locality conditions are also in effect in morphologically triggered accent shifts. In Aguaruna, there is a threshold on the triggering effect of the accent-shifting suffixes noted in Payne 1990, namely the stem accent must be ‘close enough’ to the accent-shifting suffix in order to trigger the process, showing the need for locality in morphologically triggered shifts as well. A similar restriction is found in Limburg Dutch where the retraction of certain tonal types is limited to the syllable directly preceding the base-mutating suffix.

As for dominance effects, such locality requirements are perhaps less common, but there is one clear example in Tokyo Japanese which is subject to a condition on the distance between the mutating morpheme and the accent to be deleted. The genitive particle *no* triggers de-accentuation specifically in the final mora of a disyllabic stem; non-final accents are left alone. Thus, this particle clearly induces a dominance effect that is limited to the mora closest to *no*. In sum, while locality effects are not a necessary condition for diagnosing an affix-controlled accentual process, they constitute a property of ACA which unifies a heterogeneous set of patterns as a class.

The following list summarizes the properties of affix-controlled phenomena discussed above.

(1) Formal Properties of Affix-Controlled Accent

- a. Lexically idiosyncratic: the application of affix-controlled processes is unpredictable and must be specified in the lexical entry of individual morphemes.
- b. Morphologically triggered: affix-controlled processes correlate with the application of a morphological process.
- c. Base-mutating: affix-controlled processes affect the base of a morphological process.
- d. Grammar dependent: the output of an affix-controlled accentual process may be predicted by independently attested grammar of accent.
- e. Subject to locality requirements: in some affix-controlled processes, the target of the process must be 'close enough' to the triggering morpheme.

Before developing the theory of these phenomena, it is important to emphasize that this list of features shows that affix-controlled accent forms a class that is distinguished from root-controlled accent. Thus, while ACA is lexically idiosyncratic, RCA is fully predictable from the morphological structure of the word. In contrast to affix-controlled accent which must be lexically listed, root-controlled de-accent applies across the board in all words containing accented roots.

Furthermore, ACA is clearly associated with the application of a morphological process, which is not necessarily the case with RCA. As clarified above, affix-controlled processes have a morphological function in that they create oppositions in base-derivative pairs. RCA clearly works against this pressure to realize morphological contrast, bringing about uniformity within a paradigm. Indeed, one of the basic predictions of the RCA hypothesis is that root accentedness results in fixed accent within a paradigm (see §3.1). Therefore, the underlying functions of these two types of morpho-accentual processes underscore the fundamental difference between RCA and ACA. A related difference between the two is that ACA specifically requires mutation in the base of affixation, while RCA actively suppresses such mutations because the basic constraints involved in RCA assert special Faithfulness privileges to roots, which are typical bases of affixation. Thus, the basic function of RCA is again at odds with the morphological function of ACA.

The properties of grammar dependence and locality effects also distinguish ACA from RCA. Grammar dependent affix-controlled processes trigger a change which often leads to a default or unmarked accentual pattern. This improvement of the overall markedness of a form in ACA is to be contrasted with the greater markedness resulting from RCA. Succinctly, RCA assigns special Faithfulness properties to roots, which allows marked structures to emerge. Moreover, while ACA may be subject to locality conditions, this is not the case with RCA. Overriding root accent, like that found in Cupeño, affects all accented affixes, regardless of their proximity to the root accent.

5.1.2 Affix-Controlled Accent as Prosodic Anti-Faithfulness

Affix-controlled accent behaves in a way that sets it apart from RCA. The explanation of this finding offered here is that the constraints responsible for these different types of morpho-accentual phenomena are completely different. RCA is due to the effects of high-ranking Prosodic Faithfulness constraints for roots, which are generally felt in the

input-output dimension of Faithfulness. ACA, on the other hand, derives from constraints which have a very different character, namely Transderivational Anti-Faithfulness constraints. However, before implementing these constraints, it is instructive to point out an interesting parallel between ACA and another affix-controlled phenomenon which we have already examined in detail, namely accent-neutral affixation.

As illustrated in chapter 4, section 1, there is a basic difference between stress-neutral and non-neutral affixes in English, and this difference must be lexically represented. Moreover, the Faithfulness effects induced by stress-neutral affixation (SNA) may be characterized as a relationship between base-derivative pairs: these affixes require that the prosody of the base be the same as the prosody of the derived form. Comparing this type of affix-controlled phenomenon with dominance effects, the differences between the two are readily statable in terms of a base-derivative coupling: dominance effects require deletion of base prosody, while stress-neutral affixation requires preservation of base prosody. Thus, consistent with other affix-controlled phenomena, the differences lie in the statement of the prosodic requirement. In sum, it appears that SNA should be grouped with the affix-controlled phenomena examined here.

The explanation for these related facts, namely that ACA differs formally from RCA, but resembles stress-neutral affixation, I argue, lies in the analysis of ACA in terms of Transderivational Anti-Faithfulness (TAF). To begin, the fact that affix-controlled processes are lexically idiosyncratic follows from the assumption that they are a response to TAF constraints. Thus, on a par with stress-neutral affixes, affixes which trigger a morpho-accentual process subcategorize for a specific surface-to-surface correspondence relation, and the TAF constraints defined on this relation bring about the observed pattern of Anti-Faithfulness. The lexical idiosyncrasy of both ACA and SNA derives from subcategorization in the lexicon.

The fact that both ACA and SNA are morphologically triggered also follows from the general theoretical assumptions in Transderivational Correspondence Theory. Both Transderivational Faithfulness and Anti-Faithfulness operate between morphologically related words; thus, from this basic premise, it follows that the effects derived from these constraints are associated with morphological processes. Moreover, as will be demonstrated shortly, the various phonological patterns observed in ACA can be directly described in terms of the negation of the already existing Prosodic Faithfulness constraints, and so there is a symmetry in the theoretical mechanisms used to describe both Faithfulness and Anti-Faithfulness effects. The observed symmetry is significant because the premise that there is an Anti-Faithfulness constraint for every Faithfulness constraint predicts this very outcome.

Two of the remaining properties of ACA follow from the basic principles of the theory of Transderivational Anti-Faithfulness. Thus, the fact that ACA is generally base-mutating follows from Strict Base Mutation (spelled out in chapter 4). Affix-controlled processes generally affect the base of a morphological process because ACA is a special type of morpho-phonological operation, and such operations generally affect the base. Furthermore, the locality effects observed in ACA are again a consequence of the general fact that morpho-phonological operations may be subject to locality constraints. Therefore, in regard to these two last properties, ACA is just a special kind of morpho-phonological alternation.

Lastly, the fact that the output of an affix-controlled process is grammar dependent follows from the nature of Anti-Faithfulness and the basic tenets of Optimality Theory. On par with the morpho-phonological operations discussed in §4.3, the TAF constraints generally induce a phonological change in base-derivative pairs, but often other constraints

active elsewhere in the system will have a say in how this change is realized. This result, where the entire system of constraints conspire together to achieve a larger result, is a direct consequence of the basic assumption in OT that constraints are ranked and violable. Thus, in the analysis of dominance effects presented below, we will see that a high-ranking TAF constraint triggers de-accentuation of base accent, but it is the low-ranking Faithfulness and Markedness constraints which determine the accentuation of a de-accented word. Furthermore, the output of pre-/post-accentuation and accent shifts are likewise governed by dominated constraints, which explains the fact that these morpho-accentual processes are also grammar dependent. Finally, undominated constraints in the system may also influence the direction of the structural change, as we will see in the analysis of the dragging tone mutation in Limburg Dutch. In this dialect of Dutch, certain suffixes condition a flop of the high tone in the preceding syllable, but this mutation never results in a rising tone structure because this structure is ruled out in the tonal inventory of the system as a whole.

To recapitulate the above discussion, the theory of Transderivational Anti-Faithfulness explains the basic properties of ACA in a way that shows how ACA is similar to accent-neutral affixation but different from root-controlled accent. A very important point here is that this accomplishment is achieved without appeal to mechanisms or constraints that are specific to the theory of accent. That is, the formal properties of ACA are explained in exactly the same way as the affix-controlled segmental processes discussed in chapter 4 are treated. The theory provides the necessary constraints for describing morpho-phonological alternations, namely Transderivational Anti-Faithfulness constraints, and when these constraints are applied in the domain of prosody, the result is a fully formal theory of morpho-accentual processes. In the remainder of this section, I will present the Prosodic Anti-Faithfulness constraints which define this theory, giving structure to the analyses that will be proposed throughout the rest of the chapter.

An important assumption made in §4.3 is that there is an Anti-Faithfulness constraint for every Faithfulness constraint. Anti-Faithfulness constraints involve wide scope negation of the proposition expressed by the corresponding Faithfulness constraint. With these two assumptions, the theory proposed here predicts the following Prosodic Anti-Faithfulness constraints.

(2) Prosodic Anti-Faithfulness

- $\neg$ MAX-PROM $\rightarrow$ Obligatory deletion of prominence
 It is not the case that every prominence in S_1 has a correspondent in S_2 .
- $\neg$ DEP-PROM $\rightarrow$ Obligatory insertion of prominence
 It is not the case that every prominence in S_2 has a correspondent in S_1 .
- $\neg$ NO-FLOP-PROM $\rightarrow$ Obligatory shift in prominence
 It is not the case that every corresponding prominence must have a corresponding sponsor.

Thus, the three Prosodic Faithfulness constraints argued for in §1.2.2.1, MAX-PROM, DEP-PROM, and NO-FLOP-PROM, each have a negated counterpart, and these negated constraints, when defined for the correct correspondence relation, give the basic ingredients for describing the phonological patterns observed in ACA.

To sketch how these constraints will be employed in subsequent analyses, consider the following schematic rankings, which characterize the constraint hierarchies used below.

(3) Schematic Rankings for Affix-Controlled Accentual Processes

- a. $\neg\text{OO-MAX-PROM} \gg \text{OO-MAX-PROM} \quad \sim \text{Dominance Effects}$
- b. $\neg\text{OO-DEP-PROM} \gg \text{OO-DEP-PROM} \quad \sim \text{Pre-/Post-Accentuation}$
- c. $\neg\text{OO-NO-FLOP-PROM} \gg \text{OO-NO-FLOP-PROM} \quad \sim \text{Accentual Shifts}$

With the obligatory deletion constraint, $\neg\text{OO-MAX-PROM}$, ranked above the corresponding Transderivational PROS-FAITH constraint, OO-MAX-PROM , a deletion of prominence in the base of affixation is predicted, and so this ranking will be at the core of the analysis of dominant morphemes. Likewise, when $\neg\text{OO-DEP-PROM}$ is ranked above OO-DEP-PROM , the result will be the obligatory insertion of accent in base-derivative pairs, which is the morpho-accentual pattern observed in pre- and post-accentuation. Finally, with the Anti-Faithfulness constraint $\neg\text{OO-NO-FLOP-PROM}$ top-ranked, an accentual shift is predicted in morphologically related words. In §5.3.3, a wider range of constraint permutations will be illustrated and the predictive factorial typology will be given.

The rest of this chapter is organized as follows. In the next section, the problem posed by dominant morphemes will be studied in more detail and a theory of dominance effects will be proposed which shows a fundamental role for Transderivational Anti-Faithfulness. This theory will be applied in an analysis of dominant affixes in Tokyo Japanese and Modern Russian, which will distinguish the TAF theory of dominance effects for other plausible alternatives. In §5.3, I will consider the affix-controlled process of pre- and post-accentuation from various angles, focusing in particular on pre-accenting suffixes in Cupeño, and I will also conclude in favor of an analysis in terms of TAF. The discussion in §5.4 extends the scope of TAF constraints to morphologically triggered accent shifts, arguing that this approach again has some major advantages over the available alternatives and that this last body of facts shows the pervasiveness of Transderivational Anti-Faithfulness in morpho-accentual processes.

5.2 Dominance Effects as Transderivational Anti-Faithfulness

In this section, the problem posed by morphologically induced dominance effects is studied and analyzed in terms of Transderivational Anti-Faithfulness. Following a brief introduction to the problem, an analysis of dominant suffixes in Tokyo Japanese is presented in §5.2.2 as an illustration of the basic theory, which is followed in §5.2.3 by a case study of dominant morphology in Russian as further empirical support for the overall approach. Next, some important implications of the basic approach are examined in §5.2.4, which will enable me to contrast the TAF analysis of dominance effects with some plausible alternatives in §5.2.5.

5.2.1 The Problem

Dominant, or accent-deleting, affixes are very common in accentual systems. Dominant affixes trigger the deletion of an accent in the base to which they attach, and if they are themselves unaccented, they bring about a default, or unmarked, accentual pattern. To begin with a now familiar system, dominant suffixes in Tokyo Japanese are of two basic types. As exemplified in (4) below with the adjective-forming suffix *-ppó*, dominant accented suffixes are always accented, regardless of the accentedness of the base to which they attach. Dominant unaccented suffixes, on the other hand, trigger a de-accentuation of the stem and create default unaccented words. This behavior is illustrated in (5) with the

suffix *-kko*, which forms words with the meaning ‘indigène of X’, where X stands for the base toponym.

(4) Dominant Accented Suffix

- | | | | | |
|----|-------------------|---|-------------|--------------|
| a. | /abura + ppó + i/ | → | abura-ppó-i | ‘oily’ |
| | /kaze + ppó + i/ | → | kaze-ppó-i | ‘sniffly’ |
| b. | /adá + ppó + i/ | → | ada-ppó-i | ‘coquettish’ |
| | /kíza + ppó + i/ | → | kiza-ppó-i | ‘affected’ |

(5) Dominant Unaccented Suffix

- | | | | | |
|----|-------------------|---|---------------|----------------------|
| a. | /edo + kko/ | → | edo-kko | ‘Native of Tokyo’ |
| | /niigata + kko/ | → | niigata-kko | ‘Native of Nigata’ |
| b. | /kóobe + kko/ | → | koobe-kko | ‘Native of Kobe’ |
| | /nyuuyóoku + kko/ | → | nyuuyooku-kko | ‘Native of New York’ |

The two suffixes, therefore, have in common the property of causing a deletion of base prosody, often referred to as a ‘dominance effect’, and differ only in whether or not they carry their own inherent accent.

A basic property of dominance effects is that they are grammar dependent; the structures resulting from the process are governed by independently attested constraints in the accent system. Grammar dependence is most perspicuous in structures resulting from dominant unaccented affixes because the affix itself does not have an accent of its own to realize. For example, the suffix *-kko* creates completely unaccented words, which as we have seen in §3.3, is the accentual default in Japanese, i.e., the structure assigned by the grammar to unaccented words. Thus, the anti-insertion constraint, DEP-PROM, which is responsible for default unaccented words, is in full force here, ensuring that de-accented words are likewise unaccented at the surface. This pattern of deletion plus default accent assignment is in fact a very general property of dominant morphemes, as exemplified in several cases throughout this dissertation. For example, dominant (unaccented) affixes in Russian yield words with stress on the inflectional ending, as shown by the behavior of *-ač* in /púz + ač + u/ → *puz-ač -ú* ‘man with paunch (dative singular)’. That stress on the ending is the default position is supported by the fact that words with unaccented stems generally receive stress in this position (see §3.2 for detailed argumentation).

To summarize this discussion, the following two questions are central in the treatment of dominance effects:

1. How is the morphologically conditioned deletion achieved?
2. How is the default accentual pattern predicted as the result of this deletion?

The proposal I will argue for here is that dominance effects are explained as a response to the Transderivational Anti-Faithfulness constraint $\neg$ OO-MAX-PROM, which specifically requires a deletion of base prosody in morphologically related words. When properly integrated in an OT grammar, the TAF constraint $\neg$ OO-MAX-PROM predicts the

observed deletion, but the independently necessary constraints in the grammar give the accentual default, as illustrated in the following tableau.²⁶

(6) Dominance Effects as Transderivational Anti-Faithfulness

Base	/kóobe + kko/	¬OO-MAX-PROM	OO-PROS-FAITH	DEP-PROM
a. kóobe	kóobe-kko	*!		
b. kóobe	koobé-kko		*	*!
c. → kóobe	koobe-kko		*	

The TAF constraint ¬OO-MAX-PROM is transderivational; it evaluates base-derivative pairs in a way similar to OO-Faithfulness constraints, with the important difference that ¬OO-MAX-PROM requires a deletion in derived forms. The first base-derivative pair is faithful to the prosody of the base, and it therefore incurs a fatal violation of the TAF constraint. The remaining two candidates satisfy this constraint by mutating the base through deletion of the base accent. Only the last candidate, however, achieves the required deletion without a violation of the independently motivated constraint, IO-DEP-PROM, and so the derived word is unaccented by default.

While there are still some formal issues to be addressed here, it is clear from this brief sketch how the TAF theory of dominance effects accounts for the observed grammar dependence. A Transderivational Anti-Faithfulness constraint requires a change in the derived form, in effect nullifying the force of the otherwise undominated Faithfulness constraints. The ultimate result of the phonological change, however, is dictated by the independently necessary constraints on the distribution of accent, which results in the observed accentual default. Moreover, it should be clear how the analysis of dominance effects in TAF theory will explain additional properties of dominant morphemes in a way that relates this phenomenon to other kinds of affix-controlled accentual processes. Highlighting three important properties, affix-controlled accentual processes are morphologically triggered, base-mutating, and lexically idiosyncratic. Dominance effects are morphologically triggered on this theory because the Anti-Faithfulness constraints which bring about the change are transderivational, and thus they necessitate a change specifically in base-derivative pairs. Furthermore, dominance effects are base-mutating because TAF constraints can only bring about a change in the base, which is a direct consequence of the thesis of Strict Base Mutation (see chapter 4, section 2). Finally, the fact that dominance effects are lexically idiosyncratic, i.e., must be specified in the lexicon, will follow from the assumption that dominant morphemes subcategorize for a OO-correspondence relation upon which a high-ranking TAF constraint is defined. In short, the proposed analysis of dominance effects is quite on a par with the analysis of stress-neutral affixation in English, and as we will see, all other affix-controlled phenomena.

The theory of dominance effects developed below represents the first step towards the larger goal of providing a general theory of affix-controlled accentual processes: it explains the behavior of dominant affixes with the same machinery used in the analysis of other affix-controlled morpho-accentual phenomena like pre- and post-accentuation and morphological accent shifts. This unification of the treatment of dominance effects and other affix-controlled phenomena will be made more explicit in the analysis of dominance

²⁶In the tableaux throughout this chapter, base-derivative pairs are arranged vertically in a single complex tableau, as shown here. While these tableaux clearly illustrate the relationship between the base and its related output, they obscure the role of the constraint system in determining the base form. To clarify this role, each case study begins with a brief description of the formal account of the basic (underived) words.

effects in Japanese and Russian, which is presented in the next two subsections. Furthermore, the unified analysis of ACA will be central in distinguishing the analysis of dominance effects in terms of TAF from other possible alternatives, an issue which is addressed in the last subsection.

5.2.2 The Proposal: Dominance Effects as the Negation of MAX-PROM

We return now to the facts of dominant morphemes in Tokyo Japanese as an illustration of the analysis of dominance effects within TAF theory. The analysis builds on the constraint system developed in §3.3, and explains grammar dependent dominance effects by incorporating a set of Transderivational Anti-Faithfulness constraints into this system. The discussion below starts with a brief recap of accent in underived words, and then moves to the analysis of the distinction between dominant and recessive affixes.

Accent is contrastive in two ways in Japanese: the position of accent may introduce contrast in otherwise identical words, and further, lexical accent contrasts accented and unaccented words. Therefore, in words with n number of syllables, the number of possible contrasts is $n + 1$, e.g., a three-way contrast in disyllabic words: *hási* ‘chopsticks’, *hasí* ‘bridge’, *hasi* ‘edge’. Ignoring certain irrelevant ranking details, the following partial ordering of constraints accounts for the basic facts.

(7) Japanese Word Accent

a. MAX-PROM, NO-FLOP-PROM >> Alignment, NONFINALITY

b. DEP-PROM >> HEADEDNESS(PrWd)

The first ranking accounts for the fact that Faithfulness to lexical prosody outweighs the constraints effecting a left or right edge bias for accent and the constraint disallowing final accent. Together with these rankings, the second ranking accounts for the accented/unaccented contrast in underived words by requiring unaccented morphemes to remain unaccented, despite pressure from HEADEDNESS(PrWd), which requires every prosodic word to have a head foot, and thus an accent. This last ranking is important for the discussion which follows because it shows how the grammar of accent in Japanese treats words which are totally unaccented: they are left unaccented by default.

Moving next to derived words, affixes may be either accented or unaccented, and when an accented affix or particle combines with an accented stem, stem accent typically prevails (except with dominant morphemes, discussed below) because of the general pattern of root privilege. Thus, when the accented suffix *-tára* combines with an inherently accented verb stem, it loses its inherent accent, e.g., */yóm + tára/* → *yón-dara* ‘if he reads’, cf. */yob + tára/* → *yon-dára* ‘if he calls’. Likewise, inherently accented enclitics such as *kará* ‘from’ may only realize their accent when they combine with an unaccented stem in the same minor phrase, as in */miyako + kará/* → *miyako kará* ‘from the city’, cf. */ínoti + kará/* → *ínoti kara* ‘from life’. Lastly, as argued extensively in §3.3, prefix + stem sequences are consistent with this pattern of root-control, as most prefixes are either the first member of a compound or create their own minor phrase.

These suffixes and enclitics are therefore recessive in that they lose to an accented stem in a competition for the unique word accent. This behavior contrasts with that of the dominant affixes which cause deletion of a stem accent. Dominant affixes are typically suffixes or enclitics in Japanese, and they can be either accented or unaccented. Dominant accented morphemes are generally accented in every word or phrase that contains them

(except, of course, in words with more than one dominant accented affix). Thus, the adjective-forming suffix *-ppó* mentioned in the introduction always takes the accent of the word, even when it attaches to inherently accented stems (8b).

(8) Dominant Accented Suffix: *-ppó* (Poser 1984: 49)

a.	/abura + ppó + i/	→	abura-ppó-i	‘oily’
	/kaze + ppó + i/	→	kaze-ppó-i	‘sniffly’
	/kodomo + ppó + i/	→	kodomo-ppó-i	‘childish’
	/mizu + ppó + i/	→	mizu-ppó-i	‘watery’
b.	/adá + ppó + i/	→	ada-ppó-i	‘coquettish’
	/netú + ppó + i/	→	netu-ppó-i	‘zealous’
	/honé + ppó + i/	→	hone-ppó-i	‘bony’
	/kíza + ppó + i/	→	kiza-ppó-i	‘affected’

Other dominant accented morphemes include: *-más* ‘politeness marker’, *-rásí* ‘seem’, *gúrai* ‘as much as a X’, *rasíi* ‘like a X’ (see McCawley 1968: 140 ff. and Poser 1984 for more examples).

Dominant unaccented morphemes, on the other hand, do not carry an inherent accent, and as a result, they bring about a default pattern, which in Japanese means forming unaccented words. The suffix *-kko* shows this behavior, as all words with this suffix are unaccented.

(9) Dominant Unaccented Suffix *-kko* ‘indigène of X’ (Poser 1984: 72)

a.	/edo + kko/	→	edo-kko	‘Native of Tokyo’
	/niigata + kko/	→	niigata-kko	‘Native of Nigata’
	/oosaka + kko/	→	oosaka-kko	‘Native of Osaka’
	/tookyo + kko/	→	tookyo-kko	‘Native of Tokyo’
b.	/kóobe + kko/	→	koobe-kko	‘Native of Kobe’
	/kyóoto + kko/	→	kyoto-kko	‘Native of Kyoto’
	/nágoya + kko/	→	nagoya-kko	‘Native of Nagoya’
	/nyuuyóoku + kko/	→	nyuuyooku-kko	‘Native of New York’

Another dominant unaccented suffix is *-teki* which forms adjectival nouns (see Martin 1975 for the details).

The chart below summarizes the main facts of relevance here. Accent is root-controlled in Japanese, and as a result, stem accent wins out over accent in a recessive suffix (10b). Dominant accented suffixes run counter to this pattern, as their inherent accent beats the accent of an accented stem (10c). Dominant unaccented suffixes likewise steal stem accent, but since they are themselves unaccented, they yield unaccented words by default (10d), cf. (10a).

(10) Summary of the Facts

- a. Bare substantives without a lexical accent are unaccented at the surface:

/hasi/ → hasi

cf. /hási/ → hási

- b. Stem accent precludes the realization of accent in a recessive suffix:

/yoN + dára/ → yoN-dára

/yóN + dára/ → yóN-dara

- c. Dominant accented suffixes are always accented:

/abura + ppó_{Dom} + i/ → abura-ppó-i

/adá + ppó_{Dom} + i/ → ada-ppó-i

- d. Dominant unaccented suffixes create words which are unaccented:

/edo + kko_{Dom}/ → edo-kko

/kóobe + kko_{Dom}/ → koobe-kko

While the contrast between (10b) and (10c) appears to pose an empirical challenge for the analysis of Japanese as a root-controlled accent system, it is clear from the comparison of dominant accented and unaccented suffixes that once we have a good understanding of the pattern of deletion in (10d), the analysis of (10c) will come for free.

The phonological operation put into effect by dominant affixes (both accented and unaccented) is the deletion of an accent in the base to which they attach. Ignoring for the moment how the base is targeted for this phonological deletion, dominance effects may be explained as the negation of MAX-PROM, the anti-deletion Prosodic Faithfulness constraint. This result is shown below with the logical statement of $\neg$ MAX-PROM, consistent with the formulation of Anti-Faithfulness constraints developed in chapter 4.

- (11) $\neg$ MAX-PROM: For x a prominence, $\neg [\forall x \exists x' [x \in S_1 \rightarrow x' \in S_2 \ \& \ xRx']]$
'It is not the case that every prominence in S_1 has a correspondent in S_2 .'

The negation of MAX-PROM therefore has the effect of requiring deletion of (at least) one prominence. When this obligatory deletion constraint is defined on a transderivational correspondence relation, the deletion is required in the mapping from a base form to its derivative, which is exactly the phonological pattern observed in Japanese. The dominant/recessive distinction can therefore be straightforwardly modelled in terms of the following constraint rankings.

(12) Dominant/Recessive Distinction through Constraint Ranking

- a. Dominant affixes: $\neg$ OO-MAX-PROM $\gg$ OO-MAX-PROM

- b. Recessive affixes: OO-MAX-PROM $\gg$ $\neg$ OO-MAX-PROM

When $\neg$ OO-MAX-PROM is high-ranking, specifically ranked above MAX-PROM defined for OO-correspondence, this ranking will require deletion of the base prosody, as observed in the base-derivative pair [kóobe] $\approx$ [koobe-kko], where the base of affixation for *-kko*, namely the stem *kóobe*, loses an accent in the derivative form. On the other hand, if the

Prosodic Anti-Faithfulness constraint is ranked below OO-MAX-PROM, then stem stress is not deleted, as in the mapping from [yón-da] to [yón-dara]. This last point assumes that the inflected form *yón-da* forms for the base of affixation for derived words, but as discussed in §4.2, in contexts where inflections are obligatory, inflected forms may serve as the base.

Assuming multiple OO-correspondence relations (see §4.2), the schematic rankings can be conflated into a total ordering of constraints, as shown below.

(13) Conflating the Schematic Rankings

$$\neg\text{OO}_{\text{Dom}}\text{-MAX-PROM} \gg \text{OO-MAX-PROM} \gg \neg\text{OO}_{\text{Rec}}\text{-MAX-PROM}$$

I use the subscripts ‘Dom’ and ‘Rec’ to differentiate the correspondence relations referred to by the different $\neg\text{OO-MAX-PROM}$ constraints. The top-ranked TAF constraint $\neg\text{OO}_{\text{Dom}}\text{-MAX-PROM}$ is defined on OO_{Dom} -correspondence, which, as indicated in the lexical entries in (14b-c), is the correspondence relation subcategorized for by dominant affixes. Likewise, the recessive affixes trigger OO_{Rec} -correspondence (14a), and therefore words with these affixes are governed by $\neg\text{OO}_{\text{Rec}}\text{-MAX-PROM}$. It should be emphasized that the subscripts are simply handy mnemonics whose only formal role in the theory is to link up the individual affixes with the TAF constraints which are sensitive to them. The dominant behavior of the different affixes is predicted purely on the basis of the inherent rank of their TAF constraint; thus, the real work in the analysis of dominance effects derives from a fundamental premise in OT, namely that constraints are ordered with respect to each other.

(14) Lexical Entries for Dominant and Recessive Suffixes

a.	<i>-tára</i>	V_{Cond}	[Verb] OO_{Rec} ____]MWd	[Recessive]
	<i>kará</i>	P	[Noun] OO_{Rec} ____]	
b.	<i>-ppó</i>	A	[[Verb] OO_{Dom} ____]Stem	[Dominant Accented]
	<i>-más</i>	V_{Polite}	[[Verb] OO_{Dom} ____]Stem	
	<i>rasíi</i>	Comp	[[Noun] OO_{Dom} ____]	
c.	<i>-kko</i>	N	[[Noun] OO_{Dom} ____]MWd	[Dominant Unaccented]
	<i>-teki</i>	$N_{\text{Adjectival}}$	[[Stem] OO_{Dom} ____]MWd	

To sum up, the link between the individual affixes and the Anti-Faithfulness constraints responsible for the dominance effects is achieved in the lexicon through the subcategorization of OO-correspondence, very similar to Benua’s 1997 [1998] approach to class 1 versus class 2 affixation in English. The dominant affixes are evaluated by the top-ranked TAF constraint, while recessive affixes are subject to the relatively low-ranking TAF constraint. The results of these assumptions will now be illustrated with a series of tableaux.

Starting first with *-ppó*, when dominant accented suffixes attach to unaccented stems, as in /abura + ppó + i/ → *abura-ppó-i*, their behavior is unremarkable as there is no stem accent to be deleted. On the other hand, when *-ppó* attaches to an accented stem, this suffix triggers deletion of the stem accent, as illustrated below, because this suffix

subcategorizes for OO_{Dom} -correspondence, and the TAF constraint which operates on this relation, $\neg OO_{Dom}$ -MAX-PROM, is high-ranking in the system. Thus, a base-derivative pair which preserves the base prosody, as in (15a), incurs a fatal violation of the TAF constraint, which rules out this option. The remaining candidates here satisfy $\neg OO_{Dom}$ -MAX-PROM by losing the accent of *adá*, but since the dominant suffix itself is accented, the winning candidate is the pair of outputs which preserves accent in *-ppó*, namely (15c).

(15) Dominance Effect with Dominant Accented *-ppó*²⁷

Base	/adá + ppó + i/	$\neg OO_{Dom}$ -MAX-PM	OO-MAX-PM	IO-MAX-PM
a. adá	adá-ppo-i	*!		*
b. adá	ada-ppo-i		*	**!
c. → adá	ada-ppó-i		*	*

The application of TAF theory to dominant accented enclitics is directly parallel with this result. For example, when the dominant accented particle *rasíi* combines with an accented stem, e.g., *inoti rasíi* ‘like a life’, the correct results are obtained by extending the application of the TAF constraints to stem + enclitic structures. Thus, $\neg OO_{Dom}$ -MAX-PROM is active in the mapping of [inoti] to [inoti rasíi], which results in the observed deletion here. Importantly, the dominance effect observed here cannot be attributed to the accentuation of compounds, as sometimes suggested, because compounds never preserve accent in the final syllable of the second member, which runs counter to the examples with *rasíi*.

Moving next to the behavior of recessive morphemes, because these morphemes subcategorize for OO_{Rec} -correspondence, they do not condition a deletion of base prosody: the TAF constraint defined on this correspondence relation is ranked below OO -MAX-PROM. As shown below, therefore, derivatives formed with the recessive suffix *-tára*, lose to the accent of the stem because of high-ranking OO -Prosodic Faithfulness.

(16) Lack of Dominance Effect with Recessive Accented *-tára*²⁸

Base	/yóm + tára/	OO-MAX-PROM	$\neg OO_{Rec}$ -MAX-PROM
a. yón-da	yon-dára	*!	
b. → yón-da	yón-dara		*

In short, the distinction between dominant and recessive morphemes is determined by the rank of the TAF constraint assessing the Anti-Faithfulness properties of base-output pairs. Dominant suffixes such as *-ppó* trigger OO_{Dom} -correspondence, so they induce a dominance effect because of the rank of $\neg OO_{Dom}$ -MAX-PROM. In contrast, suffixes such

²⁷The dominant suffix *-ppó* is attached simultaneously with the inflection *-i* here for ease of exposition; the inflection could trigger an additional recursion. It turns out that this assumption is of little consequence here, as the dominance effect is predicted in both cases. This issue, however, raises the question of what the predictions of the TAF model are in words with sequences of dominant and/or recessive affixes, and this question is addressed in detail in §5.2.4.

²⁸I assume that the base of formation of words with *-dára* is the past tense form as this form has the same allomorph as the one found in the conditionals here. Using the notion of Base Optimization developed in §4.2, this assumption entails that the past is the unmarked tense in the system. Other bases, however, such as the present tense form, would achieve the same effect, as they preserve the lexical accent also, and so would require preservation of the accent in the base of the larger form.

as *-tára* do not condition deletion of base prosody because they select OO_{Rec} -correspondence and the TAF constraint operating on this dimension of Faithfulness is too low-ranking to have an effect.

To complete the analysis, let us consider how the assumptions laid out so far apply to dominant unaccented morphemes. These morphemes are dominant, and therefore they subcategorize for OO_{Dom} -correspondence, which in turn accounts for the observed deletion of the accent of the base with these suffixes. As discussed above, the words resulting from this de-accentuation are always unaccented, which shows that the dominance effect is grammar dependent. This default pattern is therefore not the responsibility of the TAF constraints, but the larger constraint system on a whole. The accentual default therefore follows from the same ranking which is responsible for unaccented words in the inventory of underived words, namely $IO-DEP-PROM \gg HEADEDNESS(PrWd)$, as shown in the following tableau. The fully faithful base-output pair in (17a) is eliminated from the candidate set because it fails to delete the base accent, and therefore violates top-ranked $\neg OO_{Dom}-MAX-PROM$. The candidate in (17b) satisfies the TAF constraint by deleting the base accent and inserting an epenthetic accent in the derived form, but this option leads to a violation of $IO-DEP-PROM$ by inserting an accent not present in the input. Because $IO-DEP-PROM$ dominates the constraint which would encourage such an insertion, i.e., $HEADEDNESS(PrWd)$, the base-derivative mapping in (17c) is chosen as the winner.

(17) Dominance Effect with Dominant Accented *-kko*

	Base	/kóobe + kko/	$\neg OO_{Dom}-MAX-PM$	DEP-PROM	HEAD(PrWd)
a.	kóobe	kóobe-kko	*!		
b.	kóobe	koobé-kko		*!	
c. →	kóobe	koobe-kko			*

In sum, the TAF constraint induces a deletion of base prosody in derivatives with accented bases, and since the suffix itself is unaccented, the default structure for words without a lexical accent is predicted, which is a completely unaccented form at the surface.

As summarized in the following chart, dominance effects in Japanese exhibit many of the formal properties characteristic of other affix-controlled morpho-accentual processes.

(18) Dominance Effects in Japanese

<u>Lexically idiosyncratic:</u>	→	Subcategorized correspondence relations
<u>Morphologically governed:</u>	→	Transderivational Anti-Faithfulness
<u>Grammar dependent:</u>	→	Unitary grammars
<u>Base-Mutating:</u>	→	Strict Base Mutation

The de-accentuation triggered by the dominant suffixes was observed to be lexically idiosyncratic, and the analysis of this fact involved the specification of various correspondence relations in the subcategorization frame of individual affixes. Furthermore, the dominance effects observed here are morphologically governed, and this fact is explained in the above analysis as an effect the TAF constraint $\neg OO_{Dom}-MAX-PROM$, which operates exclusively between a base and its derivative.

Another very significant property of dominance effects in Japanese is that they are grammar dependent, meaning that the independently attested constraints on the distribution of prominence dictate the structure of the output resulting from de-accentuation. Grammar dependence is most clearly attested in structures with dominant unaccented morphemes, as the accentual default can be independently verified by examining underived forms which lack a lexical accent. Concretely, the accentual default for lexically unaccented words is to remain unaccented at the surface, and this pattern is exactly the observed pattern in words with the dominant unaccented suffix *-kko*. Dominance effects brought about by dominant accented morphemes are also grammar dependent in that the independently necessary IO-Faithfulness constraints demand realization of the accent in the affix itself. The main difference between these two types of grammar dependence is that only the type governing dominant unaccented morphemes predicts a correlation between the result of de-accentuation and the accentual default in the language as a whole. Grammar dependence with accented dominant affixes simply shows the emergence of an accentual contrast in affixes, which also has independently testable predictions, i.e., that dominant affixes will have a contrast in accentedness if recessive ones do as well.

This basic fact of grammar dependence is explained in the above analysis by assuming that there is one and only one constraint system governing accent. Thus, the fact that the accentual default is the same in derived and underived words follows from the assumption that derived and underived words are governed by the same grammar, i.e., the same language particular ranking of constraints. In Japanese, therefore, the ranking DEP-PROM >> HEADEDNESS(Ft) holds in both morphological contexts, and as a result, unaccented words (either underlyingly or as an effect of Anti-Faithfulness) remain unaccented at the surface. If, on the other hand, this ranking of constraints was permuted in the analysis of the different word types, this result does not obtain.

Lastly, a final important property of dominant morphemes in Japanese is that they are always base-mutating. Thus, there are dominant suffixes which induce deletion of a stem accent, but no analogous dominant roots or stems. Concretely, what the latter state of affairs would entail is a dominant/recessive distinction which actually cross-classifies roots or stems, e.g., some roots steal an accent from a neighboring affix (even a dominant affix), while others do not. Contrast this type of idiosyncratic dominance with the systematic dominance of roots observed elsewhere in the system. This observation is, in fact, a very general one, as I will argue in some detail in §5.2.4. Thus, Russian has a dominant/recessive contrast for suffixes, but not for roots. Likewise, in Spokane (Interior Salish), certain types of suffixes may be dominant or not, but roots do not show this contrast. This fact lends strong support to the overall approach here because on the analysis that dominance effects are due to Transderivational Anti-Faithfulness constraints, the facts could not be otherwise. The up-shot is that the fact that dominant morphemes are always base-mutating is explained as a Strict Base Mutation effect, which applies to all morpho-phonological operations.

We have seen how the TAF theory of dominance effects accounts for the observed properties of dominant morphemes in Tokyo Japanese. Furthermore, a peculiarity of this morpho-phonological system, namely that dominant unaccented affixes create unaccented words, is consistent with a finding in the larger phonological system, as unaccented words are the accentual default in bare substantives. This same correlation between default patterns in derived and underived words is also found in Modern Russian; as further support for the basic approach taken here, the next subsection studies the phenomenon of dominant affixes in this language.

5.2.3 Case Study: Dominance Effects in Russian

To begin with a recap of the basic facts of Russian stress, accent is root-controlled in Russian, which means that underived words with inherently accented stems have fixed stem stress throughout the paradigm, as illustrated in (19a). If the word has an unaccented stem, on the other hand, the canonical pattern is fixed stress on the first vowel of the inflectional ending, as in (19b). Also, when the inflection is null, words with unaccented stems receive stem-final stress, as illustrated with the nominative singular form in (19c).

(19) Basic Patterns of Russian Stress

a.	/rák + u/	→	rák-u	‘crayfish (dative singular)’
	/rák + am’i/	→	rák-am’i	‘order (instrumental plural)’
b.	/stol + u/	→	stol-ú	‘table (dative singular)’
	/stol + am’i/	→	stol-ám’i	‘table (instrumental plural)’
c.	/topor + Ø/	→	topór	‘axe (nominative singular)’
	/topor + u/	→	topor-ú	‘axe (dative singular)’
	/topor + am’i/	→	topor-ám’i	‘axe (instrumental plural)’

The analysis of these patterns given in §3.2 is characterized with the following ranking.

(20) Root-Controlled Accent in Russian

MAX-PROM_{Root} >> POST-STEM-PROM >> MAX-PROM_{Affix}

With MAX-PROM_{Root} top-ranked, the accentuation of the basic constituent of the stem, namely the root, determines the stress patterns observed in paradigms. Thus, if a form has an accented root, then MAX-PROM_{Root} requires realization of the lexical accent in all words with that root. In words with unaccented roots, in contrast, MAX-PROM_{Root} has no force, and therefore the next highest constraint in the hierarchy, POST-STEM-PROM, which specifically requires stress on the first vowel of the inflectional ending, yields default ending stress. Furthermore, this constraint has a role in mappings like /topor + Ø/ → *topór*, where the absence of an overt ending leads to stem-final stress as a ‘best attempt’ at satisfying gradient POST-STEM-PROM.²⁹

Extending the discussion now to derived words, one finds that certain suffixes require special attention because they run counter to the pattern of root-controlled accent just described. I will argue, however, that these special suffixes are dominant suffixes in the sense that they are sensitive to high-ranking TAF constraints; by incorporating the schematic rankings for dominance effects employed above into the constraint system for root-controlled accent, the properties of dominant suffixes in Russian can be explained in a natural way. Much of the data and analytical insights into word derivation in Russian

²⁹This brief sketch of stress in paradigms does not account for the mobile stress patterns, but as argued in §3.2, these minor patterns are best understood in connection with constraints which require an opposition between singular and plural forms; the Prosodic Anti-Faithfulness constraints employed here make this connection in the analysis developed below.

discussed here derive from two key works on the subject, namely Halle 1973a and Melvold 1990. I depart from these works, however, concerning certain underlying analytical assumptions which are very much a part of their descriptions, especially Melvold's characterization of the accented/unaccented contrast in dominant suffixes. These empirical issues will be made clear in the analysis presented below.

The first set of suffixes to be examined are recessive in the same sense as discussed above in connection with the inflectional endings. The behavior of recessive suffixes is exemplified below in words derived with the feminine noun-forming suffix *-íc*, which are compared with an underived form to determine the accentedness of the stem. This suffix is unstressed when it attaches to an inherent accented stem (21a), but realizes its inherent accent when it combines with an unaccented stem (21b). This behavior is further supported in (22) with nouns derived from adjectives (the feminine plural predicative, or "short", form of the adjective is given here), where we again observe stem stress with an accented stem (22a), otherwise suffix stress (22b).

(21) Diminutives with Recessive Suffix *-íc*

a.	lůž -a rý b-a	lůž -ic-a rý b-ic-a	'puddle (diminutive) 'fish (affective)'
b.	č ast' vešč	č ast' -íc-a vešč -íc-a	'particle' 'thing (diminutive)'

(22) Derived Nouns, with Recessive Suffix *-íc*

a.	leníva, lenívy	lenív-ic-a	'lazy/lazy woman'
b.	golá, góly molodá, mólody tupá, túpy	gol-íc-a molod-íc-a tup-íc-a	'naked/unlined leather mitten' 'young/married peasant woman' 'dull/dimwit'

The augmentative suffix *-išč* behaves similarly, in that it does not affect inherent accent on a stem, e.g., *kníž -išč -a* 'book (augmentative)', cf. *kníga* 'book', but with an unaccented stem, it receives stress, as in *gor-íšč -a* 'big mountain', from *gorá* 'mountain'. An important empirical point here is that not all recessive suffixes are themselves accented. For example, Melvold 1990: 50 ff. argues in detail that the suffix *-ost'*, which forms abstract nouns from adjectives, is recessive and unaccented. This fact shows that stem-forming suffixes actually support a contrast in accentedness. To sum up then, derivational suffixes in Russian may be either accented or unaccented, but these suffixes behave like most of the inflectional suffixes in not causing deletion of the stem accent.

The behavior of the recessive suffixes contrasts with the behavior of the dominant suffixes, so-called because they dictate a particular stress pattern in all the words that contain them. The dominant suffixes in Russian are of two basic types: those which are themselves stressed, or 'auto-stressing', and those which require stress on the following vowel of the inflectional ending, hence the term 'post-accenting'. The first type is exemplified below with words formed with the derivational suffix *-úx*, which typically forms nouns from verbs or adjectives.

(23) Auto-Stressed Dominant Suffix -úx

a. Accented Stem + úx

/gólod + úx + a/	→	golod-úx-a	‘hunger’
/ryž + úx + a/	→	ryž -úx-a	‘redhead’
/s’ív + úx + a/	→	s’iv-úx-a	‘raw alcohol’
/gr’ázn + úx + a/	→	gr’azn-úx-a	‘slob’
/krásn + úx + a/	→	krasn-úx-a	‘German measles’
/str’áp + úx + a/	→	str’ap-úx-a	‘cook’

b. Unaccented Stem + úx

/vekov + úx + a/	→	vekov-úx-a	‘spinster’
/molod + úx + a/	→	molod-úx-a	‘young married woman’
/skak + úx + a/	→	skak-úx-a	‘frog’
/vos’m + úx + a/	→	vos’m-úx-a	‘1/8 pound’
/voln + úx + a/	→	voln-úx-a	‘type of mushroom’
/serp + úx + a/	→	serp-úx-a	‘type of weed’

As with dominant accented *-ppó* in Tokyo Japanese, all words with auto-stressing *-úx* have stress on this suffix, regardless of the accentedness of the base to which it attaches. Other suffixes showing this behavior include the suffix *-án*, which creates nouns denoting a type of person (cf. *-ánin*, used in describing a person’s nationality), and the suffix *-jág*. Lastly, the prefektivizing prefix *vi-* ‘out’ is also dominant and accented as it causes deletion of the stem accent and surfaces with stress (see §3.2.3 for discussion); thus, it patterns with the above noun-forming suffixes.

The behavior of the auto-stressing suffixes contrasts with that of the post-accenting suffixes, such as the suffix *-ač*, which generally forms masculine nouns denoting a type of person. As a post-accenting suffix, *-ač* requires a stress on the following inflectional ending, as illustrated with the examples below. In these examples, I distinguish between the so-called ‘oxytone’ (class 1 unaccented) and ‘circumflex’ stems (class 2 unaccented) to show that the dominance effect with consistent ending stress illustrated here is independent of this division employed in the traditional three-way classification of stems (in which ‘oxytone’ stems also give ending stress).

(24) Post-Accenting Dominant Suffix -ač

a. Accented Stem + ač

/púz + ač + u/	→	puz-ač -ú	‘man with paunch’
/rífm + ač + u/	→	rifm-ač -ú	‘poetaster’
/tr’úk + ač + u/	→	tr’uk-ač -ú	‘stuntman’

b. Unaccented Stem (Class 1) + ač

/izb + ač + u/	→	izb-ač -ú	‘village librarian’
/trub + ač + u/	→	trub-ač -ú	‘trumpeter’
/gorb + ač + u/	→	gorb-ač -ú	‘hunchback’

c. Unaccented Stem (Class 2) + ač

/borod + ač + u/	→	borod-ač -ú	‘man with beard’
/golov + ač + u/	→	golov-ač -ú	‘man with big head’
/nos + ač + u/	→	nos-ač -ú	‘man with big nose’

The mildly productive or unproductive suffixes *-un* (which forms masculine nouns), *-ež* (which forms masculine nouns), and *-ak, -jak* (which form diminutives) behave similarly, inducing deletion of the stem accent and consistent ending stress.

An important factual point, which will be directly relevant for the discussion of alternatives in §5.2.5, is that, while most dominant suffixes are derivational, this is not always the case. For example, the plural suffix *-a*, often used in technical jargon, is a dominant suffix, as shown by the examples below formed with inherently accented stems, and yet this suffix is clearly inflectional.

(25) Dominant Nominative Plural Suffix *-a*

/rukáv + a/	→	rukav-á	‘sleeves’
/máster + a/	→	master-á	‘foremen’
/jákor’ + a/	→	jakor’-á	‘anchors’
/obš lág + a/	→	obš lag-á	‘cuffs’
/ókrug + a/	→	okrug-á	‘regions’
/stórož + a/	→	storož -á	‘watchmen’

That this suffix is dominant is further supported by the fact that stems which take both *-a* and the standard first declension plural ending *-i*, have ending stress with *-a* but stem stress with *-i*, as in *prómysl-i* ‘trade, business (nominative plural)’, cf. *promysl-á*. Thus, the pattern of ‘stem stress in the singular, ending stress in the plural’ observed in words with *-a* cannot be attributed to a mobile stress pattern (i.e., ‘pattern C’ stress discussed in §3.2), because the standard forms have fixed stem stress. Moreover, I have suggested that pattern C mobile stress in §3.2 is in fact a dominance effect, arising out of a need to realize a morphological contrast between singular and plural case forms. If this analysis is indeed correct, then the standard plural endings also trigger a deletion, which further substantiates the claim that inflectional suffixes may be dominant. To sum up, dominant suffixes in Russian are of two types: auto-stressing, as in *-úx*, or post-accenting, as exemplified by *-ač*. Furthermore, there is no correlation between dominant suffixes and derivational suffixes: there are recessive derivational suffixes, such as *-íc*, and there are inflectional dominant suffixes, as exemplified above by the plural ending *-a*.

In approaching the distinction between auto-stressed and post-accenting dominant affixes, it would appear that the most natural assumption would be to treat this contrast like the related pattern observed in Japanese, namely in terms of a contrast between accented and unaccented dominant suffixes, and this is the tack I will take here.³⁰ Thus, auto-stressing suffixes such as *-úx*, are dominant accented, and thus, because they bring about a deletion of the stem accent, they are always themselves accented. In contrast, the post-accenting suffixes, such as *-ač*, are assumed to be unaccented, and they bring about default ending stress as a consequence of deletion.

The following chart summarizes the facts of derived and underived words in Russian, including the underlying analytical assumptions concerning the accentedness of dominant suffixes. As shown in (26a), accent in Russian is root-controlled. That is, the accentuation of the basic formative in underived words determines the accentuation of the larger word: words with accented roots have fixed stem stress, while words with

³⁰This analytical classification differs somewhat from the one given in Melvold 1990, which distinguishes among three classes of dominant affixes: dominant accented, such as *-úx*, dominant post-accenting, as in *-ač*, and dominant unaccented affixes, the only representative of the latter case being *-En*. Since this last suffix is unproductive and all of the examples seem to involve deverbal nouns from affix-stressed or initial-stressed stems (Robert Rothstein, personal communication), it is not clear that there is robust empirical evidence in support of this third class, and so I will ignore it in the present discussion.

unaccented roots have default ending stress. Certain derivational suffixes, such as *-íc*, pattern with most of the inflectional suffixes in that they also lose to an accented stem in the competition for the unique word accent (26b). However, the dominant suffixes idiosyncratically trigger deletion of the stem accent, either allowing the suffix to realize its own inherent accent, as with *-úx* in (26c), or bringing about a default stress pattern, as exemplified with *-ač* in (26d).

(26) Summary of the Russian Facts

- a. Underived nouns without a lexical accent receive ending stress by default:

/stol + u/ → stol-ú

/rák + u/ → rák-u

- b. Root accent precludes the realization of accent in a recessive suffix:

/lúž + íc + a/ → lúž -íc-a

/č ast' + íc + a/ → č ast' -íc-a

- c. Dominant accented (=‘auto-stressed’) suffixes are always accented:

/s'ív + úx + a/ → s'ív-úx-a

/skak + úx + a/ → skak-úx-a

- d. Dominant unaccented (=‘post-accenting’) suffixes create words with default ending stress:

/púz + ač + u/ → puz-ač -ú

/borod + ač / → borod-ač -ú

The analysis of this body of facts is the same as the analysis of the parallel set of observations in Tokyo Japanese given above, with an additional well-motivated assumption concerning the role of stems in the characterization of Prosodic Faithfulness (discussed below). The distinction between dominant and recessive accentual behavior is derived through the constraint rankings given in (27a). Also, the top-ranked TAF constraint must also outrank the IO-Prosodic Faithfulness constraint for roots (27b), as dominant suffixes can bring about a deletion of the root accent.

(27) Dominant/Recessive Distinction in Russian through Constraint Ranking

- a. $\neg\text{OO}_{\text{Dom}}\text{-MAX-PROM} \gg \text{OO-MAX-PROM} \gg \neg\text{OO}_{\text{Rec}}\text{-MAX-PROM}$

- b. $\neg\text{OO}_{\text{Dom}}\text{-MAX-PROM} \gg \text{MAX-PROM}_{\text{Root}}$

The lexical entries shown in (28) indicate which suffixes are dominant, and hence sensitive to $\neg\text{OO}_{\text{Dom}}\text{-MAX-PROM}$, and which suffixes are recessive and sensitive to $\neg\text{OO}_{\text{Rec}}\text{-MAX-PROM}$. The distinction between auto-stressed and post-accenting dominant suffixes is encoded simply in terms of accentedness: auto-stressing suffixes are inherently accented, while the post-accenting suffixes are not.

(28) Lexical Entries for Dominant and Recessive Suffixes³¹

a.	-úx	N	[[Adj/VerbOODom ____]Stem	[Dominant Accented]
	-án	N _{Masc}	[[StemOODom ____]Stem	
	-jáǵ	N	[[StemOODom ____]Stem	
b.	-ač	N _{Masc}	[[N/V/AdjOODom ____]Stem	[Dominant Unaccented]
	-un	N _{Masc}	[[VerbOODom ____]Stem	
	-a	N _{Plural}	[[NounOODom ____]Stem ____]MWd	
	-ež	N _{Masc}	[[VerbOODom ____]Stem	
c.	-íc	N _{Fem}	[[N/AdjOORec ____]Stem	[Recessive Accented]
	-ĩšč	N _{Fem/Neut}	[[N/AdjOORec ____]Stem	

With these lexical distinctions, the contrast in phonological behavior may now be modelled in terms of the rank of the relevant Anti-Faithfulness constraint, as I will illustrate below.

Before presenting the results, however, it is necessary to consider the accentual contrast found in stem-forming suffixes, i.e., the derivational suffixes examined above, as it is not clear at present which constraints account for the Faithfulness properties of these affixes. The Root Faithfulness constraints have no role here; derivational suffixes are not roots (at least not synchronically), and so the realization of inherent accent in these suffixes is not governed by MAX-PROM_{Root}. Furthermore, I claim in §3.2 that the inflectional endings do not support a positional contrast in inherent accent, which is derived by the ranking POST-STEM-PROM >> MAX-PROM_{Affix}; thus, the accentual contrast found in the stem-forming suffixes cannot be due to low ranking MAX-PROM_{Affix} because this ranking would neutralize the observed contrast. Furthermore, we cannot re-rank these constraints, as in MAX-PROM_{Affix} >> PSP, to account for the contrast because this tack will not account for the fact that the derivational suffixes win out over (possibly) accented endings: these suffixes are of equal status by Affix Faith, which incorrectly gives e.g., /č ast' + íc + á/ → *č ast'-ic-á, by low-ranking PSP.

Rather than posing an intractable formal problem, however, the presence of an accentual contrast exclusively in the stem-forming suffixes provides the crucial evidence for a different set of Positional Faithfulness constraints anticipated in chapter 2, section 2. In particular, the presence of a contrast in stem-internal suffixes shows that MAX-PROM for stems is sufficiently high-ranking in the grammar, as shown in the expanded ranking below.³²

(29) Prosodic Faithfulness for Roots and Stems in Russian

MAX-PROM_{Root} >> MAX-PROM_{Stem} >> POST-STEM-PROM >> MAX-PROM_{Affix}

³¹The various morphological restrictions encoded in these entries are based on the characterization of these suffixes given in Townsend 1975, but nothing crucial depends on these restrictions.

³²An alternative approach is to endow the derivational suffixes themselves with special Faithfulness properties, as in Revithiadou 1997. While fully consistent with the facts of Russian, I adopt an analysis in terms of Stem Faithfulness because of the clear parallels between this notion and Root Faithfulness.

With the appropriate Stem Faithfulness constraint correctly ranked, the analysis accounts for the observed ‘chain of command’ in the resolution of the competition for the unique word accent: a root accent beats out a (non-root) stem accent, and a stem accent (potentially outside the root), can cause non-ending stress. This result is illustrated in the following two tableaux.

First, when an accented derivational suffix such as *-íc* attaches to an accented root, the inherent accent in the root is realized: to do otherwise would result in a fatal violation of $\text{MAX-PROM}_{\text{Root}}$.

(30) Root-Controlled Accent in Derived Nouns

/[lůž + íc] + a/	$\text{MAX-PM}_{\text{Root}}$	$\text{MAX-PM}_{\text{Stem}}$	POST-STEM-PROM
a. [luž -íc]-á	*!	**	
b. [luž -íc]-a	*!	*	*
c. → [lůž -íc]-a			*

However, when the accented stem-internal suffix combines with an unaccented root, it may realize its inherent accent, despite the violation of POST-STEM-PROM this candidate incurs.

(31) A Role for Stem Faithfulness in Derived Nouns

/[č ast' + íc] + a/	$\text{MAX-PM}_{\text{Root}}$	$\text{MAX-PM}_{\text{Stem}}$	POST-STEM-PROM
a. [č ast'-íc]-á		*!	
b. → [č ast'-íc]-a			*

The presence of an accentual contrast in derivational suffixes differs from the behavior of the inflectional suffixes, which do not support a contrast; this observation motivates the introduction of an additional Positional Faithfulness constraint for stems. Below, we will see an additional role for $\text{MAX-PROM}_{\text{Stem}}$ in the analysis of the dominant accented suffix *-úx*, which is also stem-forming.

Returning now to the matters at hand, *-íc* is a recessive suffix, and so it does not bring about a deletion of the base accent, even as a means of satisfying the TAF constraint $\neg\text{OO}_{\text{Rec}}\text{-MAX-PROM}$. This pattern follows from the assumption that *-íc* subcategorizes for OO_{Rec} -correspondence, and so OO-MAX-PROM dominates the TAF constraint which evaluates words with this suffix.³³

(32) Lack of Dominance Effect with *-íc*

Base	/lůž + íc + a/	OO-MAX-PM	$\neg\text{OO}_{\text{Rec}}\text{-MAX-PM}$	PSP
a. lůž -u	[luž -íc]-á	*!		
b. → lůž -u	[lůž -íc]-a		*	**

³³The base for the derived word here is assumed to be the dative singular, but any of the case forms would yield the same result because stress is fixed throughout the paradigm when the stem is inherently accented; thus, there will always be a stem accent to mutate or be faithful to.

The winning candidate is thus the form which preserves the prosody of the base in the derived form, even though doing so results in a violation of low ranking $\neg\text{OO}_{\text{Rec}}\text{-MAX-PROM}$.

This recessive behavior is to be contrasted with the pattern brought about by the dominant accented suffix $-\acute{u}x$. This suffix attaches to adjectival and verbal roots to form nouns, and so the base for OO-correspondence is the corresponding inflected adjective or verb. For concreteness, I assume that the base is the masculine singular form, which is consistent with the principle of Base Optimization if the masculine is the unmarked gender (as discussed in §4.2, see also Halle 1973a). If the base is accented, as with the adjective $s'iv$ 'gray' below, this accent will not be preserved in the derived form because it will be deleted as a means of satisfying high-ranking $\neg\text{OO}_{\text{Dom}}\text{-MAX-PROM}$. The pattern resulting from this morphologically triggered de-accentuation is stress on the accented suffix because this is the pattern predicted by the grammar of accent. Specifically, because $\text{MAX-PROM}_{\text{Stem}}$ dominates PSP, the suffix $-\acute{u}x$ must realize its inherent accent because failure to do so, for example to stress the inflection, leads to a fatal violation of $\text{MAX-PROM}_{\text{Stem}}$; contrast (33b) with (33c).

(33) Dominance Effect with $-\acute{u}x$

Base	/s'iv + $\acute{u}x$ + a/	$\neg\text{OO}_{\text{Dom}}\text{-MAX-PM}$	OO-MAX-PM	MAX-PM _{Stm}	PSP
a. s'iv	[s'iv-ux]-a	*!		**	
b. s'iv	[s'iv-ux]-á		*	**!	
c. $\rightarrow$ s'iv	[s'iv- $\acute{u}x$]-a		*	*	*

The same set of assumptions used for dominant accented $-\acute{u}x$ correctly predicts ending stress in words with dominant unaccented $-a\check{c}$. This suffix is like $-\acute{u}x$ in that it triggers OO_{Dom} -correspondence, and so $\neg\text{OO}_{\text{Dom}}\text{-MAX-PROM}$ evaluates words formed with $-a\check{c}$. In contrast to dominant accented suffixes, $-a\check{c}$ has no underlying accent, and so it does not exert any special Faithfulness privileges. When $-a\check{c}$ attaches to an accented root, therefore, it causes deletion of the root accent, but brings about a default accentual pattern, namely ending stress, as shown below.

(34) Dominance Effect with $-a\check{c}$

Base	/púz + $a\check{c}$ + u/	$\neg\text{OO}_{\text{Dom}}\text{-MAX-PM}$	OO-MAX-PM	MAX-PM _{Stm}	PSP
a. púz-u	[púz- $a\check{c}$]-u	*!			
b. púz-u	[puz- $a\check{c}$]-u		*	*	*!
c. $\rightarrow$ púz-u	[puz- $a\check{c}$]-ú		*	*	

As with the analysis of dominant accented versus dominant unaccented affixes in Tokyo Japanese, both types of dominant suffixes cause a deletion of the stem accent. But dominant unaccented affixes also bring about a default accentual pattern because the result of the de-accented structure is determined by the larger grammar of accent.

The analysis of dominant suffixes in Russian presented above suggests a clear line of analysis for one of the patterns of mobile stress examined in §3.2. Recall from this discussion that there are two patterns of singular-plural opposition, repeated below. Thus,

pattern C stress exhibits an opposition between initial stress in the singular and ending stress in the plural, while in pattern D, the contrast is between ending stress in the singular and stem-final stress in the plural. As noted in §3.2.3, these same patterns of mobile stress are also found in verb conjugations, and thus, the ultimate analysis of nouns will carry over to the verbal system as well.

(35) Stress Opposition between Singular and Plural

a. Pattern C	Singular	$\acute{\sigma} \sigma \dots -V$	kólokol-u
	Plural	$\sigma \sigma \dots -\acute{V}$	kolokol-ám
b. Pattern D	Singular	$\dots \sigma \sigma -\acute{V}$	kolbas-é
	Plural	$\dots \sigma \acute{\sigma} -V$	kolbás-am

Approaching these patterns in a pre-theoretical vein, the two patterns resemble quite closely two very common types of affix-controlled processes. First, pattern C looks like a dominance effect induced by the plural suffixes: the stem accent of the singular forms is deleted in the plural and default ending stress emerges. Russian has several derivational suffixes which show precisely this behavior, as we have just seen. Furthermore, the nominal plural ending *-a* also fits this pattern: it deletes the accent of the stem (which may be lexical), and gives default stress on the inflectional ending. In short, there is a clear parallel between pattern C mobile stress and the independently attested dominance effects, and it seems wise therefore to establish this parallel in a formal way.

Moreover, pattern D stress also resembles a very common morpho-accentual process, namely pre-accentuation. The attachment of an affix often correlates with the insertion of an accent on a neighboring syllable, as we will see in several case studies discussed in chapter 5, section 3. The plural suffixes exhibit precisely this behavior in that they cause the insertion of an otherwise unmotivated accent on the stem-final syllable. It is therefore desirable, as with pattern C, to approach this singular-plural opposition as this common morpho-accentual process; this is exactly the position I take here.

To give structure to the basic analysis, it appears that certain paradigms exhibit sub-regularities in the grammar, perhaps representative of a historically prior stage for the inflectional system, and these sub-regularities are dealt with as one of two patterns of Anti-Faithfulness. Thus, stems showing pattern C stress have an inherent accent, which is realized in the singular (35a). Assuming that the singular forms are the base for the corresponding plural forms (which is predicted by the principle of Base Optimization, see §4.2), the stem accent will be deleted in the plural because the endings in these cases pattern with the plural ending *-a*, triggering a dominance effect (36a). More concretely, I assume that these stems select an allomorph of the same inflections used with other nouns, except this allomorph is a dominant suffix, and accordingly, triggers a deletion of the stem accent. The fact that plural forms with pattern C stress have ending stress therefore follows from the grammar dependent character of dominance effects: they receive a default stress pattern, which in Russian is ending stress. While the introduction of allomorphy brings additional complexity to the analysis, it appears to be unavoidable given the gross differences between the statistically important accentual patterns discussed in §3.2 and the minor patterns showing mobile stress. Furthermore, the analysis sketch here brings formal rigor to the observation frequently made in the literature on Russian accent (see Stankiewicz 1962), namely that mobile stress in these cases is used as a means of enhancing the contrast between singular-plural pairs. The analysis of dominance effects as Anti-Faithfulness, and

affix-controlled processes in general, entails that oppositions such as these are crucially linked to the morphology, requiring an opposition in base-output pairs.

The same pattern of allomorphy in the plural suffix is in effect in pattern D stress, except that a different TAF constraint is at work. Assuming again that the singular forms the base for OO-correspondence, the presence of ending stress in singular forms in (35b) is consistent with an analysis that such stems are unaccented and therefore receive default ending stress. As discussed above with pattern C stress, certain stems select an allomorph of the plural ending which is pre-accenting, and as a result, yield stem-final stress (36b). The analysis of pre-accentuation is developed in the next section and so the analysis can only be sketched informally here. But the parallels between pattern C and pattern D stress is striking: the main difference between C and D is that the analysis of D involves a ranking of a different TAF constraint, $\neg$ OO-DEP-PROM, which requires an insertion of accent into the stem.³⁴ The fact that the inserted accent in plural forms is on the stem-final syllable is again a matter of grammar dependence: the inserted stress must appear on the stem, and the independently motivated constraint POST-STEM-PROM requires that the stress appear as close as possible to post-stem vowel, exactly on par with nouns with null inflections.

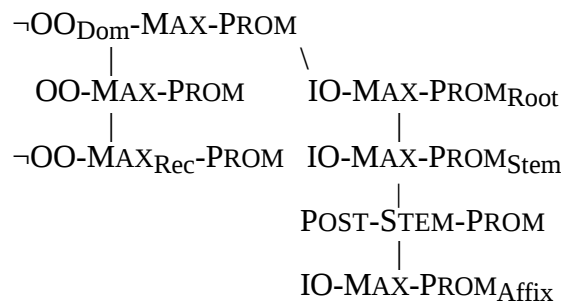
(36) Singular-Plural Oppositions as Anti-Faithfulness

	Base	Derivative	
a. Pattern C	kólokol-u	kolokol-ám	= Dominance Effect by $\neg$ OO-MAX-PROM
b. Pattern D	kolbas-é	kolbás-am	= Pre-Accentuation by $\neg$ OO-DEP-PROM

Thus, while the formal details of Anti-Faithfulness in the singular-plural pairs involve some additional complexities, it is clear that the same basic ideas used in the analysis of affix-controlled accentual processes will apply here as well.

To summarize the analysis, stress in Russian, both in derived and underived nouns, is governed by the following set of constraint rankings.

(37) Summary Ranking for Stress in Russian



The top-ranking TAF constraint $\neg\text{OO}_{\text{Dom}}\text{-MAX-PROM}$ here assesses words which are lexically marked for the correspondence relation OO_{Dom} ; as a result of its top-ranked

³⁴Presumably the absence of pre-accentuation (=pattern D) with inherently accented stems is a consequence of root-control, which is again independently motivated in Russian. If an accented stem selects a pre-accenting allomorph then the absence of pre-accentuation can be analyzed on a par with the same pattern in Cupeño: insertion of a non-lexical accent into the base leads to deletion of the stem accent, and hence a fatal violation of Root Faithfulness (see §2.4 and §5.3.2 for discussion of pre-accentuation in Cupeño).

position, this constraint can bring about deletion of a base accent, even if the base accent is lexically sponsored by a root because of the domination of IO-MAX-PROM_{Root}. Affixes which trigger OO_{Rec}-correspondence, on the other hand, are governed by ¬OO_{Rec}-MAX-PROM, and because this constraint is dominated by the OO-Prosodic Faithfulness constraint, such suffixes do not condition deletion. Moving to the results established in the IO-dimension of Faithfulness, the column of constraints on the right describes the observed rank order in the Faithfulness properties of different morpheme classes in Russian. Thus, a root accent wins out over a non-root stem accent, which are both superordinate to an accent in an inflectional ending. Finally, words which are completely unaccented (either underlyingly or through de-accentuation) receive default ending stress as a consequence of the rank of POST-STEM-PROM, which prescribes stress on the first vowel of the inflectional ending.

To assess the larger set of results established here, TAF theory gives us the right set of tools for explaining grammar dependent dominance effects in Russian. Consistent with the analysis presented in the previous section for Japanese, the dominant/recessive distinction in affixes is derived through subcategorization in the lexicon, thus accounting for the lexically idiosyncratic nature of the dominant morphology. Also, dominance effects here have a morphological role; they bring about a morphological contrast between base-derivative pairs that is exclusively base-mutating. This result again follows from the transderivational nature of the Anti-Faithfulness constraints. Finally, dominance effects in Russian are also like dominance effects in Japanese in that they bring about a default accentual pattern. This fact was explained in the analysis above by employing the independently necessary constraint, POST-STEM-PROM. This finding is significant because it lends strong support for the TAF theory of dominance effects developed here, and it further supports the use of this constraint in the analysis of words with no underlying accent.

5.2.4 Implications

The TAF theory of dominance effects proposed here makes a number of restrictive claims, which, as we will see in the next subsection, distinguish this theory from the previous approaches. Among these claims, two predictions stand out. First, TAF theory predicts that dominance effects are grammar dependent, which roughly speaking means that the constraint ¬OO-MAX-PROM demands a deletion of base prosody, but the rest of the grammar determines the accentuation of the de-accented structure. Second, TAF theory, because of its transderivational character, predicts that dominance effects must be base-mutating. In other words, there are affixes which trigger deletion of base prosody, but no bases, e.g., roots or stems, which idiosyncratically induce a deletion in the affixes with which combine. The first question one may ask therefore in assessing the TAF theory of dominance effects is, how does the theory hold up cross-linguistically? I will attempt to answer this question by examining a larger set of languages with the predictions of TAF in mind.

Before proceeding, however, a word of caution is in order. At this point, we have examined the accentuation of derived and underived words in two languages, Modern Russian and Tokyo Japanese, and a thorough study of these systems has permitted a conclusion concerning the properties of the dominant morphemes. It is incumbent on the researcher, however, to have an analysis of the larger system before making a conclusion about dominance effects in the various corners of the morphology, and I do not propose to do so in the present discussion for other languages. Thus, while I am confident about the conclusions I have made concerning accent in Russian and Japanese, the conclusions for

the languages discussed below will have to be of a more speculative nature, as the present work does not bring all of these systems under the scrutiny of a rigorous formal analysis.

Having made this disclaimer, let us focus on the question of grammar dependent dominance effects. In discussions of dominance effects, it is sometimes noted that dominant (unaccented) affixes may bring about a default or unmarked pattern (see especially HV and Revithiadou 1997). Chapter 4, section 2 gives a characterization of grammar dependence in morpho-phonological alternations generally, but how does this apply to dominance effects? For the present purposes, we can be satisfied with the following statement: dominance effects are grammar dependent if the behavior of dominant unaccented affixes is mirrored in the language as a whole in lexically unaccented words, i.e., words which do not have an inherent accent. With this correlation in mind, consider the following chart which surveys some well-known accent systems.

(38) Grammar Dependent Dominance Effects

Language	Behavior of [+dom, -acc] affix	Behavior of [-acc] words
a. Japanese	unaccented	unaccented
b. Russian	ending	ending
c. Lithuanian	initial accent	initial accent (stem-final)
d. Sanskrit	initial accent	initial accent (?)
e. Getxo Basque	unaccented	unaccented
f. Moses Columbia Salish	accent on root	accent on root

We have already seen in Japanese and Russian that the default behavior of unaccented words is reproduced in dominance effects. Enlarging our empirical survey, the Indo-European languages Lithuanian and Sanskrit seem to by and large pattern with Japanese and Russian. HV's account of Lithuanian assigns default initial stress in both unaccented words and words created by dominant unaccented affixes. Furthermore, in Blevins 1993, a thorough review of the various accentual classes in this language turns up a similar default pattern, with the possible exception of a stem-final default in some stem classes (compare Blevin's tonal analysis of the Basic Accentuation Principle with her H-Tone Association rule which docks a floating high tone to the stem-final syllable). In general, however, it appears that the behavior of the dominant unaccented affixes is mirrored in most unaccented words, with the possible qualification that some accentual classes seem to have a different accentual default (which appears to have different defaults depending on accentual class). As for Sanskrit, HV characterize this system on a par with Lithuanian in positing default initial accent in both derived and underived unaccented words.³⁵ Thus, in two additional Indo-European languages, the dominant unaccented affixes also bring about a default pattern.

Turning next to some non-Indo-European languages, Getxo Basque presents the same fundamental pattern as observed in Japanese: unaccented words are unaccented by

³⁵As noted in Poser 1984: 67, however, the status of initial-accenting processes in pitch accent systems (and by extension, descendants of these systems, as in the case with these Indo-European languages) is controversial, and Poser cites Kiparsky 1982c as re-analyzing initial-accenting processes in Sanskrit as a by-product of other necessary rules in Vedic. Thus, while there are some previous analyses which have analyzed dominance effects in Sanskrit as a grammar dependent morpho-accentual process, there is a possible alternative here that should be explored in more detail.

default, and dominant unaccented suffixes create fully unaccented words (Hualde & Bilbao 1992, 1993). Indeed, Hualde & Bilbao 1993 present an analysis of de-accentuation which is fully consistent with the analysis I have presented above for Japanese (though the formal implementation is completely different). A final case are the dominant unaccented affixes found in Moses-Columbia Salish, which according to Czaykowska-Higgins 1993: 235 ff., yield words with accent on the root. This fact is of some interest because root accent is also the pattern observed in words with so-called weak roots and no following accented or dominant suffixes. While the analysis of this fact is a complex and interesting formal problem, the correlation here between default structures with weak roots and the default triggered by dominant unaccented suffixes is consistent with all of the above cases if we analyze the weak roots as unaccented, as proposed in Idsardi 1992: 68. Concretely, if weak roots are unaccented they will trigger a process of default accent assignment, in effect drawing accent to the root as observed.

The conclusion that I draw from this brief survey is that dominance effects are quite generally grammar dependent. That is, the independently necessary constraints on the distribution of accent play a crucial role in the accentuation of morphologically de-accented structures. This finding is strong support for the overall approach taken here because the operative constraint responsible for the deletion of base prosody, $\neg$ OO-MAX-PROM, says nothing about the structures resulting from the deletion. This TAF constraint simply requires a deletion of the base accent, and the rest of the grammar predicts the observed accentual default structure. When coupled with the assumption that derived words are subjected to the same grammar which is at work in the larger system, TAF theory directly explains the correlations observed above. As we will see in the discussion of alternatives, this result distinguishes the TAF theory of dominance effects from other plausible approaches to the problem.

A second important prediction of the TAF model is that dominance effects are always base-mutating. Thus, the Thesis of Strict Base Mutation (given in §4.3) entails that morpho-phonological alternations only affect the base of affixation. Since dominance effects are just a special type of morpho-phonological alternation, this claim makes a concrete prediction, namely that base elements, such as roots and stems, never support a dominant/recessive contrast like that found in Japanese and Russian affixes. In other words, roots or stems will never idiosyncratically steal an accent from a neighboring affix, and so dominance is not a feature which distinguishes one base from another one, as shown below with a hypothetical case.

(39) Dominant/Recessive Contrast in Base

- a. /róot_{Rec} + áf_{Rec}/ → [róot-af] = Effect of Root-Controlled Accent
- b. /róot_{Rec} + áf_{Dom}/ → [root-áf] = Dominance effect due to áf_{Dom}
- c. /róot_{Dom} + áf_{Dom}/ → [root-af] = Dominance effect due to róot_{Dom}

If neither of the morphemes are dominant, as in (39a), the result is overriding root accent, consistent with many case studies in chapters 2 and 3. In (39b-c) however, the affix is dominant, and therefore the properties of the base become crucial. If roots have a dominant/recessive contrast, we would expect to find a contrast here: a recessive root loses to a dominant affix (39b), while a dominant root will (potentially) win out over a dominant affix (39c). The assumption in the last case is that the two dominant morphemes are of equal ‘strength’, and therefore the root stress wins as a consequence of high-ranking Root Faithfulness (though other factors could be at work here as well). This type of root

dominance should therefore be contrasted with intrinsic, or systematic, root dominance, as observed in Cupeño, because the property of overriding the accent in a dominant affix in (39c) is an idiosyncratic property of the root which distinguishes it from other roots.

Interestingly, Inkelas 1996 speculates that this type of root dominance is not attested cross-linguistically. That is, there are no accent systems which have a dominant/recessive contrast in roots like that described above. In support of this conclusion, consider the following list of languages which have a significant number of dominant morphemes.

(40) Base-Mutating Dominance Effects

Language	Contrasts in Roots/Stems	Contrasts in Affixes
a. Japanese	$\pm$ accent	$\pm$ accent, $\pm$ dominant
b. Russian	$\pm$ accent	$\pm$ accent, $\pm$ dominant
c. Lithuanian	$\pm$ accent	$\pm$ accent, $\pm$ dominant
d. Sanskrit	$\pm$ accent	$\pm$ accent, $\pm$ dominant
e. Interior Salish	$\pm$ accent, ($\pm$ extrametricality)	($\pm$ accent,) ³⁶ $\pm$ dominant

Remarkably, every system has a dominant/recessive contrast in affixes, but no parallel contrast in roots or stems. Thus, in every system, there is a two-way contrast in roots and stems, but a four-way contrast in affixes (subject to certain qualifications — see footnote 12).

A possible anomaly in this otherwise general trend is the presence of a contrast in the feature [$\pm$ extrametricality] documented by Czaykowska-Higgins 1993 for roots in Moses-Columbia Salish. In this language, certain roots may idiosyncratically make the following syllable ineligible for stress, even if the following suffix is dominant. While we have not yet seen a locality effect such as this on a dominant morpheme (though a parallel case is presented below for certain particles in Japanese), this fact could readily be treated as a dominant/recessive contrast in roots which is limited to an adjacent syllable. If such an analysis was the correct analysis, this case would surely counter-exemplify the strong claim that all dominance effects are base-mutating: dominant roots (i.e., Czaykowska-Higgins' [$\pm$ extrametrical] roots), in this analysis, affect a non-root. Of course, facts such as this do not directly counter-exemplify this claim, as there are at least two possible alternative analyses that come to mind here. In addition to Czaykowska-Higgins' analysis in terms of extrametricality, Idsardi 1992: 70 suggests that this ineligibility for stress on the vowel following the root is due to a minor rule of syncope triggered by certain roots, an attractive idea given the intricate interplay between vowel deletion and stress assignment observed elsewhere in the language. I tentatively conclude therefore that, in all the languages in my survey, dominance effects are exclusively base-mutating. This finding will also feature in the comparison of alternatives discussed in the next subsection.

A third prediction, anticipated in §5.1, is that dominance effects may be subject to locality requirements. The reason for this is that dominance effects are, by hypothesis, derived as effects of Transderivational Anti-Faithfulness constraints; such constraints can be freely conjoined with Anchoring constraints under certain locality relations, which have

³⁶My reading of Carlson 1989 and Bates & Carlson 1989 does not demand a contrast in accentedness in variable and dominant suffixes, as they could be exclusively accented, but Czaykowska-Higgins 1993 and Idsardi 1992 both distinguish between accented and unaccented suffixes.

the effect of limiting the scope of the Anti-Faithfulness constraint. Indeed, as we will see in §5.3 and §5.4, this application of Local Conjunction plays a crucial role in describing locality effects in other affix-controlled accentual processes. How then do dominance effects compare to these other types of ACA?

At present, I have not found a robust set of examples which argue definitively for locality conditions in dominance effects, but one clear case in Tokyo Japanese shows a role for such a locality condition. As discussed in detail in Poser 1984: §4.1., two morphemes in Japanese having the segmental make-up *no* trigger de-accentuation of a neighboring stem accent, namely the genitive enclitic *no* and the prenominal allomorph of the copula *no*. Poser argues convincingly that this de-accentuation is a post-lexical phenomenon, essentially because this process requires reference to phrasal information. The fact of relevance to the present discussion is that *no* only triggers de-accentuation when the accent of the preceding noun is on a final light syllable (subject to certain qualifications discussed below). Thus, contrast the genitive forms below in (41a) with those in (41b-c). In (41a), the nominal accent appears on a final light, and this accent is lost in the genitive form; in contrast, in cases with non-final accent (41b) or accent on a final heavy syllable (41c), the accent of the base is not lost. This descriptive statement is subject to the following qualifications: (i) there are some exceptions, e.g., *tugí no* in (41a), where the accent of the final light syllable is not deleted, but in these cases it appears that the accent has been shifted to this position, and so it represents an opaque context not described by the principle given above; (ii) some nouns actually lose an accent from a final heavy syllable, as in *nihon no* in (41c), which simply appear to be lexical exceptions; (iii) finally, monosyllabic nouns never lose their accent, as shown by the examples in (41d).

(41) De-Accentuation with *no* (Poser 1984, Haraguchi 1977, Okuda 1971)

a. Accent on final light syllable

/kawá + no/	→	kawa no	‘river’
/atamá + no/	→	atama no	‘head’
/oNná + no/	→	oNna no	‘woman’
cf. /tugí + no/	→	tugí no	‘patch’

b. Accent on non-final syllable

/úmi + no/	→	úmi no	‘sea’
/árasí + no/	→	árasí no	‘storm’
/utíwa + no/	→	utíwa no	‘fan’
/irógami + no/	→	irógami no	‘colored paper’

c. Accent on final heavy syllable

/ehón + no/	→	ehón no	‘illustrated book’
/seNséi + no/	→	seNséi no	‘teacher’
hukóo + no/	→	hukóo no	‘misfortune’
cf. /nihón + no/	→	nihon no	‘Japan’

d. Accented monosyllabic stem

/há + no/	→	há no	‘teeth’
/kyóo + no/	→	kyóo no	‘today’
/hón + no/	→	hón no	‘book’

To give a brief summary, while there are both lexical and systematic exceptions to the process, *no* generally triggers a loss of accent on the final mora of the noun with which it combines. The restriction on the final mora thus accounts for de-accentuation in nouns with accent on the final mora (i.e., in a final light syllable), while exempting nouns with

non-final accent or accent in the final heavy syllable (but not the final mora of the heavy syllable because Japanese generally prohibits accent on the second mora of a heavy syllable — see §3.3).

To re-state the observation above in a more theoretical vein, *no* triggers a dominance effect on the immediately adjacent mora, which therefore presents a clear role for locality conditions in this context. Pressing further, TAF theory gives us the right equipment to account for this type of observation, as I will now sketch. When locally conjoined with the Anchoring constraint, $\text{ANCHOR}(\text{MWd}, \text{MinP}, \text{R})$, which enforces right edge matching between the morphological word and minor phrase, the TAF constraint will yield a pattern of Anti-Faithfulness only in the final mora of the word (see §4.3 for details of the interpretation of Anchoring constraints and Local Conjunction). Thus, by locally conjoining these two constraints in the domain of the mora, as shown below, the obligatory deletion constraint $\neg\text{OO-MAX-PROM}$ will only be active in the neighborhood of the Anchoring violation, i.e., in the final mora of a word that is separated from the right edge of the minor phrase.

- (42) $(\neg\text{OO}_{\text{Dom}}\text{-MAX-PROM} \ \& \ \text{ANCHOR}(\text{MWd}, \text{MinP}, \text{R}))_{\mu} \equiv \neg\text{OO}_{\text{Dom}}\text{-MAX-PROM}_{\text{Fin-}\mu}$
 If a prominence x in the base stands in correspondence with a prominence x' in the related output, and if x' is associated with the mora which is final in MWd, delete x' .

As illustrated in the complex tableau below, when *no* combines with a noun containing an accent on the final mora, as shown in (43a), the conjoined TAF constraint is active and conditions a dominance effect. When the accent of the base appears on a non-final mora, as in (43b) and (43c), the TAF constraint is not active because the accent falls outside of the scope of this constraint. Since deletion of the accent in these last two contexts would lead to a gratuitous violation of OO-Faithfulness, these genitive forms preserve the lexical accent.

(43) Locality Conditions on Dominance Effects for *no*

Base	Derivative	$\neg\text{OO}_{\text{Dom}}\text{-MAX-PROM}_{\text{Fin-}\mu}$	OO-MAX-PROM
a. /kawá/	/kawá + no/		
kawá	kawá no	*!	
→ kawá	kawa no		*
b. /utíwa/	/utíwa + no/		
→ utíwa	utíwa no		
utíwa	utiwa no		*!
c. /hukóo/	/hukóo + no/		
→ hukóo	hukóo no		
hukóo	hukoo no		*!

This analysis leaves monosyllabic genitive-marked nouns unaccounted for. However, once an additional well-motivated constraint ranking is brought into the picture, this fact will have a principled explanation as well. Following Beckman 1997 [1998], I assume that there is a set of Positional Faithfulness constraints which specifically targets root-initial syllables. In particular, Japanese has an IO-Prosodic Faithfulness constraint, $\sigma_1\text{-MAX-PROM}$, which prohibits the deletion of an accent in the initial syllable of a root.

There is in fact additional evidence for such a constraint in Japanese, as the honorific prefix *o-* generally deletes a root accent, unless the accent is in the initial syllable (Martin 1975, Higurashi 1983, cf. Poser 1984). While I will not delve into the ranking details which achieve this result, it is clear from these facts that a constraint which ‘protects’ the accent of the root-initial syllable is independently needed.

The exemption of monosyllabic nouns can be readily explained by ranking σ_1 -MAX-PROM above $\neg$ OO-_{Dom}-MAX-PROM_{Fin-u}, as shown below. Thus, in just these cases, where the accent is both on the final mora and in the initial syllable, the TAF constraint will carry no force because it is dominated by top-ranked σ_1 -MAX-PROM.

(44) Positional Faithfulness Effect in Monosyllabic Nouns

Base	/há + no/	σ_1 -MAX-PM	$\neg$ OO- _{Dom} -MAX-PM _{Fin-u}	OO-MAX-PM
a. → há	há no		*	
b. há	ha no	*!		*

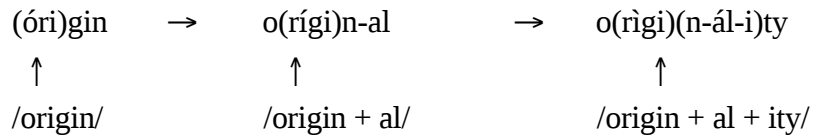
The interim conclusion I will draw from this analysis is that dominance effects may indeed be subject to locality requirements, as such a requirement is in fact crucial in the analysis of *no* constructions in Tokyo Japanese. Furthermore, such requirements provide another reason for grouping dominance effects with other types of affix-controlled accentual phenomena which also show locality effects. As for the attestation of this type of effect in other systems, further examples are not forthcoming, but this apparent gap may in fact be due to the sample of languages in this thesis. Many of the languages studied here, e.g., Russian, Tahltan, Salish languages, show a strong preference for monosyllabic roots; thus, in underived stems, such locality restrictions would be decidedly hard to spot because of a lack of crucial evidence showing a distributional gap. Furthermore, among the languages with an abundance of longer roots, only Japanese has a robust list of dominant affixes (Getxo Basque has only a handful; Aguaruna only has one ‘accent-attracting suffix’). I speculate therefore that a wider survey of languages, specifically including languages with longer roots and stems, will turn up some additional cases of interest here.

The TAF theory of dominance effects also makes predictions concerning the behavior of a sequence of affixes, dominant and/or recessive, and as this type of behavior has played a role in forming different theories of dominance effects (see Inkelas 1996 for a recent review), it is worthwhile considering the implications of TAF on this issue. I show below in §5.2.5 that TAF theory is very much on a par with HV’s cyclic approach to sequences of dominant affixes. A fundamental notion in the TAF analysis of these sequences is Benua’s 1997 [1998] notion of an ‘extended paradigm’ (see also Buckley 1995), which will be reviewed directly below before turning to multiple dominance effects.

In §4.2, Benua’s 1997 [1998] analysis of the behavior of class 1 versus class 2 suffixes in English stress was reviewed. The finding in this discussion was that class 1 suffixes were stress-shifting, and thus that the OO-Prosodic Faithfulness constraints sensitive to words with these suffixes are low-ranked in the grammar. This assumption accounts for the fact that a class 1 suffix like *-al* typically does not induce a preservation of the base prosody in words with this suffix, as shown below in the mapping from [(óri)gin] to [o(rígi)n-al]. However, the attachment of a second class 1 suffix, e.g., *-ity*, does correlate with a preservation of secondary stresses, as shown in the mapping from [o(rígi)n-al] to [o(rígi)(n-ál-i)ty]. These doubly derived forms have an irregular pattern of secondary stress on a non-initial syllable (cf. *Tâtamagóuchi*), and this result is established in Transderivational Correspondence Theory (TCT) with the notion of an extended paradigm. As sketched below, an extended paradigm is composed of a set of ‘sub-

paradigms', i.e., base-output pairs of the usual type. To point out the concrete results in the mapping from [o(rígi)n-al] to [o(rígi)(n-ál-i)ty], primary stress is not preserved here because *-ity* is a class 1 suffix and OO-Prosodic Faithfulness for this class, i.e. OO-PROS-FAITH_I, is ranked below the constraints responsible for positing main stress. However, secondary stress is preserved, as OO-PROS-FAITH_I is ranked above the constraints responsible for predicting secondary stress.

(45) An Extended Paradigm with Class 1 English Morphology (Benua 1997 [1998])



In general, the behavior of the larger word is dictated by the last affix attached in the string. The reason for this is that the type of OO-Faithfulness relating *original* and *originality* is determined by the subcategorization requirements of the affix attached at this recursion. Thus, stress is not preserved as a primary stress in the last leg of the extended paradigm here because *-ity* is a class 1 suffix, and OO-PROS-FAITH_I is not powerful enough to bring about Faithfulness to the primary stress. It is certainly the case, however, that internal affixes may have an influence on the prosody of the larger word, as indeed we have seen here with the preservation of the main stress of *original* as a secondary stress in *originálicity*. But the Faithfulness properties of the external affix are superimposed on the base established on an intermediate recursion, giving the effect that the external affix has the 'last crack' at enforcing a particular pattern.

The TAF theory of dominance effects is developed in TCT, and so the same basic principles at work in this theory apply to the analysis of dominant affixes as well. When a sequence of affixes are attached, the outermost affix will superimpose its Anti-Faithfulness properties onto the larger word. Thus, just as OO-Faithfulness relating *original* and *originality* is due to the subcategorization requirements of *-ity*, the type of OO-Anti-Faithfulness applied in a doubly derived string is determined by the morphologically external affix. Innermost affixes may also condition a dominance effect, but this effect will be subordinated to the effect of an external dominant affix, as illustrated below. In the following set of schematic examples, all of the morphemes are inherently accented in order to make the 'power relations' among the constituents of the word more perspicuous, but the same patterns are also observed with dominant unaccented affixes.

(46) Predictions for Sequences of Dominant/Recessive Affixes

a. Root + Recessive Affix + Recessive Affix: Root Controlled Accent

róot	→	róot + af	→	róot + af + af
↑		↑		↑
/ róot /		/ róot + áf _{Rec} /		/ róot + áf _{Rec} + áf _{Rec} /

b. Root + Dominant Affix + Recessive Affix: Innermost Dominance Effect

róot	→	root + áf	→	root + af + áf; root + áf + af
↑		↑		↑
/ róot /		/ róot + áf _{Dom} /		/ róot + áf _{Dom} + áf _{Rec} /

c. Root + Recessive Affix + Dominant Affix: Outermost Dominance Effect

róot	→	róot + af	→	root + af + áf
↑		↑		↑
/ róot /		/ róot + áf _{Rec} /		/ róot + áf _{Rec} + áf _{Dom} /

d. Root + Dominant Affix + Dominant Affix: Inner or Outermost Dominance effect

róot	→	root + áf	→	root + af + áf
↑		↑		↑
/ róot /		/ róot + áf _{Dom} /		/ róot + áf _{Dom} + áf _{Dom} /

Starting in (46a) with the behavior of a sequence of recessive suffixes, this pattern is somewhat unremarkable in root-controlled accent systems. Because this word type has an accented root and no dominant affixes, the root accent always wins, in accordance with the Root-Controlled Accent Hypothesis. We have already encountered this type of behavior in Russian where the attachment of recessive *-íc* plus an inflection led to the deletion of affix accent with accented roots.

In the extended paradigm in (46b), the dominant affix in the first sub-paradigm brings about a deletion of the root accent, making possible two outcomes in the doubly derived word. Thus, the accent of the innermost affix or the accent of the outermost affix could be preserved; the choice here is not decided by the Anti-Faithfulness constraint, but rather the grammar as a whole. This is because the last affix is recessive, and therefore cannot cause a deletion of the base [root + áf] on its own. The predicted outcome is therefore a culminativity effect, governed by e.g., principles of edge orientation or morphologically sensitive Faithfulness constraints. The behavior of the dominant derivational suffixes *-úx* and *-ač* followed by an inflection ending in Russian also pattern in this way (see the conflated tableaux in (33) and (34) above).

The extended paradigms in (46c) and (46d) are fundamentally the same in that the outermost dominant affix always dictates the observed pattern. Thus, regardless of whether the innermost affix is recessive (46c) or dominant (46d), the last affix attached causes a deletion of the base created in the first BO-mapping, resulting in an accent on the dominant affix if it is accented, as shown here, or in a default accent pattern if it is unaccented. The hypothetical patterns depicted here are consistent with the patterns described for English (Fudge 1984, Burzio 1994), Sanskrit (Halle & Mohanan 1985, HV), and Spokane (with some interpretation of Bates & Carlson 1989). Thus, it is clear that the

TAF theory of dominance effects provides the right tools for describing this very common pattern in sequences of dominant and/or recessive affixes.

To summarize the larger results, while an internal dominant suffix may induce a deletion (46c), the general principle governing the behavior of sequences of suffixes is that the morphologically external affix generally dictates the accentuation of the larger word. If the external affix is recessive, then the grammar of accent is applied to yield the ‘regular’ accentual pattern, as in (46a) and (46b). If, on the other hand, the external affix is dominant, it causes a deletion of the accent in the complex stem, as in (46c) and (46d), and the emergence of affix accent or a default accentual pattern.

5.2.5 Discussion of Alternatives

Now that we have a better understanding of the predictions of the TAF theory of dominance effects, we may compare and contrast this theory to some previous approaches to the problem, and also explore some plausible alternatives that come to mind in an OT framework. In the review of the literature given below, two features of dominance effects separate the TAF theory from the alternative approaches. First, the property of grammar dependence, i.e., that the result of de-accentuation is predicted by the independently motivated grammar of accent, is critical in distinguishing the TAF analysis from its competitors. Equally important is the finding that dominance effects are base-mutating, as this feature too points to a liability of some of the alternative approaches.

An initially attractive theory of dominance effects appears in Prince 1983. Based on certain observations made in Kiparsky & Halle 1977, Prince proposes that accented dominant morphemes involve a grid mark on the highest level of the metrical grid, as depicted below for the dominant accented suffix *-úx* in Russian. In this illustration, both of the lexically accented morphemes here project a grid mark at Level 2, but only the dominant suffix *-úx* projects an additional grid mark at the highest level, thereby accounting for its grid prominence in surface forms.

(47) Dominance Effects as Prominence on the Grid (Prince 1983)

	x			x	3
x	x			x x	2
x	x			x x	1
/s'ív + úx + a/	→			/s'ív + úx + a/	

While this theory is attractive for its overall simplicity, a fundamental premise in this theory leads to two serious descriptive problems. As acknowledged by the author (p. 91), dominance is equated with accentedness because it is a lexical marking made with the same stuff that encodes accent. This theory runs into difficulty, therefore, in languages like Russian and Japanese which have a four-way contrast for affixes, i.e., a cross-classification for the properties dominant/recessive and accented/unaccented. Put differently, the Grid Prominence Theory of dominance effects treats dominance as a culminativity effect, but dominant unaccented affixes show that this is not the case (see §4.1 for explicit argumentation). Another problem with this theory is that, nothing else said, it does not account for Strict Base Mutation effects, i.e., the fact that dominance effects always affect the base of a morphological process. Succinctly, if dominance is purely equated with a lexical marking for prominence on the grid, why are roots not also lexically specified for this prominence, thereby putting a dominant accented root on a par

with a dominant accented affix?³⁷ In sum, the assumptions inherent to the Grid Prominence Theory confront serious empirical challenges when one looks to a wider range of cases.³⁸

Another idea, which solves an important problem with the Grid Prominence Theory, is that dominance effects are linked to word derivation in a fundamental way. In particular, it is sometimes observed that there is a close correlation in some languages between dominant morphemes and derivational or category-changing morphemes (see e.g. Blevins 1993, fn 26). Revithiadou 1997 captures this correlation by endowing derivational affixes with special Faithfulness properties in an account of dominant accented affixes. Thus, building on the insights of Beckman 1997 [1998], Revithiadou proposes a set of Positional Faithfulness constraints for derivational affixes, or morphological ‘heads’ in the sense of Williams 1981. With the head-sensitive Faithfulness constraint top-ranked in the hierarchy, accented derivational affixes, such as Russian $-\acute{u}x_{\text{Hd}}$, will realize their inherent accent over other competing morphemes, as illustrated below.

(48) Dominance Effects as Head Faithfulness (after Revithiadou 1997)

/s'ív + $\acute{u}x_{\text{Hd}}$ + a/	PROS-FAITH _{Head}	PROS-FAITH
s'ív- $\acute{u}x_{\text{Hd}}$ -a	*!	
→ s'ív- $\acute{u}x_{\text{Hd}}$ -a		*

The proposal therefore accounts for one of the major problems with the Grid Prominence Theory, namely the observation that dominance effects are always base-mutating. If only derivational affixes are given special Faithfulness, only they will bring about dominance effects.

While this idea may be well-suited for some languages, the Head Faithfulness approach does not seem to provide a theoretical basis for a cross-linguistic theory of dominance effects. One initially troubling fact is that the correlation between dominance and derivational morphology captured in this theory simply does not hold true in all languages. Thus, as shown in the above case study of Russian, there are both dominant and recessive derivational suffixes, which leaves the recessive suffixes unaccounted for. Moreover, there are inflectional affixes which bring about dominance effects, as for example the plural ending *-a* often used in Russian technical jargon, e.g., /máster + a/ → *master-á* ‘foremen’. Finally, in the account of Hausa tonology given in Inkelas 1996, there are both derivational and inflectional dominant affixes, which presents a second case where the correlation between derivational and dominant affixes breaks down.

A more pressing problem for this theory, however, is the behavior of dominant unaccented affixes, which as shown in detail above, bring about a language particular

³⁷Lexical specification for prominence in this theory is of course distinct for the intrinsic prominence typical of roots, as found in Cupeño. As discussed in §5.2.4, roots systematically take precedence over affixes, which is distinct from lexically idiosyncratic prominence found with dominant accented morphemes. Thus, the inherent prominence of root accent is not the type of prominence which is predicted by the Grid Prominence Theory.

³⁸One interesting insight one can make in this theory, however, is that dominant (accented) morphemes should have a greater impact on ‘local’ prominent syllables, a point which has been discussed above in §5.2.4. This type of locality effect can be straightforwardly treated as an effect of Clash Avoidance constraints for grid prominences (though it is impossible to treat Tokyo Japanese *no* in this way, as it is a dominant unaccented morpheme).

default pattern for accent. While this generalization is noted in Revithiadou 1997, the assumptions inherent to the Head Faithfulness theory do not account for this pattern. I will illustrate this point with the dominant unaccented suffix *-ač* in Russian, which as we have seen in the case study above, gives default ending stress.³⁹ Following Alderete 1996, Revithiadou treats this type of system as ‘root-controlled’, i.e., governed by high-ranking Root Faithfulness, which seems unavoidable given the role of roots in Russian stress. As shown below, even with the Head Faithfulness constraint top-ranked in the system, the ranking consequences of this analysis incorrectly lead to the preservation of the lexical root accent in words with an accented root and a dominant unaccented affix.

(49) Problem: Dominance Effects are not Culminativity Effects

/púz + ač + u/	PROS-FAITH _{Head}	MAX-PROM _{Root}	PSP
[puz-ač]-ú		*!	
(*) → [púz-ač]-u			*

The general problem here is the same as the one which afflicts the Grid Prominence Theory: dominant effects are not culminativity effects, and thus a theory which models the behavior of dominant morphemes in terms of a competition between morphemes of various types (i.e., through the constraint interaction shown here) will invariably fail to account for grammar dependent dominant morphemes.

To give an interim summary, I have discussed two previous proposals for dominance effects, namely the Grid Prominence Theory and the Head Faithfulness theory, and I have shown that the assumptions inherent to these proposals lead to significant problems which distinguish it from the TAF theory. The chief problem with these proposals is that they model dominance effects as the competition between two accented morphemes, which fails to adequately characterize the grammar dependent behavior of dominant affixes. Next, I will consider two further theories which solve this problem in different ways and compare the predictions of these theories with the TAF theory of dominance effects.

Inkelas 1996 proposes that dominance effects arise as an effect of the ‘co-phonology’ of a dominant affix (see also Inkelas 1994, Inkelas, Orgun & Zoll 1995 on the notion of a co-phonology). What this theory entails in OT is that the attachment of a dominant affix induces a re-ranking of Faithfulness and Markedness constraints, which in turn brings about the desired effect of grammar dependence if the re-ranking preserves certain ranking relations (made clear below). The ideas inherent to the Constraint Re-Ranking theory is illustrated below for Russian with a pair of tableaux which in a sense correspond to different levels or strata in the grammar. In the first tableau, PROS-FAITH enjoys a relatively high-ranking position in the hierarchy, and therefore is responsible for the realization of contrast at this stratum in the grammar. At a different level, Level Y, where derived words are formed, PROS-FAITH is demoted below POST-STEM-PROM (the constraint which is necessary to derive ending stress in unaccented words), which results in a default stress pattern at precisely this level. (The second tableau has dominant unaccented affix *-ač*, which as shown in §5.2.3, gives default ending stress).

³⁹Revithiadou follows Melvold 1990 in assuming that dominant unaccented suffixes yield initial stress, but given the weak empirical support for such suffixes (see discussion in §5.2.3 above), I illustrate the problem here with a different dominant unaccented suffix. The choice of the affix does not effect the overall argument however; the default-inducing constraint PSP can simply be exchanged with a constraint requiring initial stress.

(50) Dominance Effects as Constraint Re-Ranking

a. Level X Constraint Ranking: Prosodic Faithfulness is Active

/púz + u/	PROS-FAITH	POST-STEM-PROM
→ púz-u		*
puz-ú	*!	

b. Level Y Constraint Ranking: Prosodic Faithfulness De-Activated

/púz + ač + u/	POST-STEM-PROM	PROS-FAITH
[púz-ač]-u	*!	
→ [puz-ač]-ú		*

It is clear from this brief sketch that the Constraint Re-Ranking theory has the descriptive power to bring about a deletion plus a default accentual structure. It is fair to say, however, that it differs from the TAF approach in that only the latter explains the property of grammar dependence. In TAF theory, the fact that the result of de-accentuation goes towards a default pattern is due to the de-activation of the relevant Faithfulness constraint and the consequent activation of lower-ranking well-formedness constraints. In other words, the default pattern is explained by the premise that there but is a single constraint system, and so, if a base accent is deleted because of high-ranking $\neg\text{OO}_{\text{Dom}}$ -MAX-PROM, the result will always be towards the language particular default for accent. In the Constraint Re-ranking theory, on the other hand, the result of the deletion of base prosody does not automatically go towards the default pattern because of the unrestricted nature of the re-ranking operation. Thus, it is not clear in this theory why the ranking of Markedness and Faithfulness constraints which characterize the default pattern in underived words is left intact in the grammar of derived words, and as a result, the Constraint Re-Ranking approach does not explain the fundamental property of grammar dependence.⁴⁰ Furthermore, while it is certainly possible to introduce further restrictions on constraint re-ranking across levels in order to rectify this situation, e.g., an OT-equivalent to the Strong Domains Hypothesis (Kiparsky 1984b, Myers 1991), such restrictions come as an additional imposition on the basic theory, and so they will not help in explaining the phenomenon.⁴¹

A second important difference between the two theories is in the treatment of strict base mutation effects, i.e., the fact that roots do not idiosyncratically trigger the deletion of an accent in a neighboring affix (see discussion above). Inkelas 1996 accounts for the lack of dominant roots by stipulating that only affixes may be specified for a dominant co-phonology without a principled basis for arriving at this result. In contrast, the transderivational nature of the TAF theory of dominance effects explains this observed gap: it is a direct consequence of the thesis of Strict Base Mutation (§4.3), which follows

⁴⁰See Benua 1997 [1998] for a related criticism of serialist OT approaches to cyclic effects.

⁴¹This conclusion raises the question of how other language internal sub-patterns attributed to constraint re-ranking are accounted for, like the lexical stratification in Japanese modelled in Itô & Mester 1995a as constraint re-ranking. As argued in Fukazawa 1998 (see also Itô & Mester 1998), the range of variation found across levels can be described as a strict ordering of Faithfulness constraints defined on different correspondence relations (compare this idea with the notion of multiple correspondence in Benua 1997 [1998]). Indeed, this approach explains Itô & Mester's key insight into the problem, which is that lexical levels differ only in their Faithfulness properties.

naturally from the Benua's notion of Base Priority. Therefore, we again find that the Constraint Re-Ranking requires an additional mechanism to account for a basic property of dominant affixes, while TAF gives a natural explanation of this property.

A second alternative to TAF theory that successfully accounts for grammar dependence is the proposal for dominance effects given in Halle & Vergnaud 1987a (HV). In this work, dominant morphemes are distinguished from recessive ones through cyclicity. In particular, dominant affixes are 'cyclic' morphemes (cf. Kiparsky 1982b), which are represented on a metrical plane which is distinct from that of other morphemes, as illustrated in 'Cycle 2' below in (52). Furthermore, cyclic affixation triggers a copying process from one metrical plane to the plane of the cyclic affix. This copying is governed by the Stress Erasure Convention (SEC), given below, which essentially states that stresses generated on previous cycles are carried over only if the affixed constituent is not a domain for the cyclic stress rules.

(51) Stress Erasure Convention (Halle & Vergnaud 1987a: 83)

In the input to the rules of cyclic strata information about stress generated on previous passes through the cyclic rule is carried over only if the affixed constituent is itself a domain for the cyclic stress rules. If the affixed constituent is not a domain for the cyclic stress rules, information about stresses assigned on previous passes is erased.

Applying these assumptions to the case of dominant affixes in Russian, a root accent will be consistently deleted when the root bearing this accent is combined with a dominant affix, as depicted below, regardless of whether the affix is accented or unaccented.

(52) Dominant Effects as Stress Erasure (Halle & Vergnaud 1987a)

	Stem + Affix [+dom, +acc]	Stem + Affix [+dom, -acc]
INPUT	/s'ív/	/púz/
Cycle 1	x s'ív-	x púz-
Cycle 2	x s'ív + úx + a x	x púz + ač + u
SEC	s'ív + úx + a x	puz + ač + u
Default Accent Assignment	N/A	puz + ač + ú x
OUTPUT	[s'iv-úx-a]	[puz-ač -ú]

In this illustration, the root accent is represented on a distinct metrical tier than the accent of the dominant affix -úx (the latter accent is placed directly below the relevant form). When information about the make-up of the root is copied at Cycle 2, the accent is lost because the larger constituent forms a domain for the cyclic stress rules (i.e., the Basic Accentuation Principle, see §3.1). Thus, the SEC neutralizes the accented/unaccented contrast in these

roots and allows a default pattern to emerge. In the mapping from the second cycle to the output form, the inherent accent of the affix is preserved in *s'iv-úx-a*, but since words derived with *-ač* are completely unaccented, they receive default ending stress, as in the case of *puz-ač -ú*.

As made clear by this illustration, the Stress Erasure approach resembles the TAF analysis in that both theories treat dominance effects as formal deletion, and the resulting structure is subject to the same principles of accentuation used elsewhere in the system. Thus, HV's theory successfully accounts for the fact that dominant morphemes are always grammar dependent. The two theories are therefore on a par with each other in this respect. Another important empirical domain where the predictions of the two theories intersect is in the treatment of sequences of dominant affixes. The cyclic theory with Stress Erasure also predicts that the morphologically external affix predicts the accentuation of the larger word, a necessary consequence of the serialist approach to affixation and the application of the SEC, which is fully compatible with the TAF approach. Indeed, HV: 86 point out that the SEC approach renders superfluous certain ad hoc deletion rules which were necessary in Halle & Mohanan 1985 for some types of external dominant suffixes.

While the theory of dominance effects as SEC solves some important problems, the bases of this theory do not provide a straightforward means of relating dominance effects to other types of affix-controlled accentual phenomena. As argued at length in §5.1, dominance effects have a host of properties which put them in a class with affix-controlled processes like morphologically triggered accent insertion and accent shift. Transderivational Anti-Faithfulness theory explains the similarities among these accentual processes as Faithfulness reversals; TAF constraints compare a base-derivative pair and the different morphological oppositions stem from reversals of the independently necessary Prosodic Faithfulness constraints. Moreover, because these processes involve forced violations of Faithfulness, they are all predicted to exhibit grammar dependence, as illustrated in detail in this chapter. Lastly, the assumptions inherent to TAF theory predict that affix-induced processes will be base-mutating and subject to locality effects, an empirical point with is also supported by the case studies here.

In contrast to this natural grouping of morpho-accentual processes, the SEC theory does not predict the clustering of properties, nor even the existence of certain accentual processes like the accentual shifts found in Japanese and Aguaruna (§5.4). The SEC approach derives affix-triggered deletion through a multi-planar representation of prosody and certain restrictions on the copying of this prosody from one level to the next. What principles in this ensemble of assumptions predict the insertion of accent, or the shift of accent, between levels? Further, how do said principles ensure that these processes will have all of the properties characteristic of affix-controlled accent? Short of stipulating analogues to the SEC which yield the desired results, e.g., a Stress Insertion Convention, HV's model does not give cogent answers to these questions. Therefore, the notion of Anti-Faithfulness makes connections to other morpho-accentual phenomena that distinguish it from the SEC approach. This result is a significant point in its favor as it provides a fully integrated theory of a range of morpho-accentual processes.

As suggested to me by John Kingston, an alternative to affix-triggered Anti-Faithfulness is for affix-triggered Markedness to act directly in base-derivative pairs, conditioning the change as a way of improving the overall harmony of the output form with respect to a given constraint. In particular, suppose that the deletion observed in the derived form is due to a constraint that bans a prominence, *PROM, and that this constraint refers to the appropriate correspondence relation to model the dominance effect. The best way to illustrate this idea is to consider the force of Affix-Triggered Markedness (ATM) as an operation in a two-level mapping, along the lines of the model developed in Lakoff 1993

and implemented in OT in Orgun 1995 (though the latter model does not encompass two-level Markedness constraints of this kind). In the mapping from Level 1 to Level 2 below, accent is lost because this mapping is characterized by an activation of the constraint *PROM, which actively suppresses a prominence that appears in a morpheme that is present at the two levels.

(53) Two-Level Approach to Dominance Effects

1. púz-u
 ‡
2. puz-ač -ú

The affix-induced Markedness effect here must be relational, assessing the Markedness of corresponding prominences in related forms. Otherwise, *PROM will simply ban a prominence in the base, contrary to many dominance effects which result in a default accentual pattern within the stem. The formulation below achieves the required relational aspect of the constraint through an OO-correspondence relation.

- (54) OO-*PROM: For $x \in \text{prominence}$, $\exists x \in S_1 (= \text{base}) \rightarrow \neg \exists x' \in S_2 (= \text{output}) \ \& \ xRx'$
Avoid a prominence in the output which has a correspondent in the related base.

This constraint is formally distinct from the de-accenting TAF constraint, $\neg \text{OO-MAX-PROM}$. Whereas the TAF approach uses Faithfulness reversals, the Affix-Triggered Markedness theory simply enhances the power of an existing Markedness constraint. Furthermore, the teleological purpose of these constraints underscores their differences: TAF constraints induce an alternation as a means of realizing a contrast. The purpose of ATM constraints, on the other hand, is to improve on the overall harmony of a derived form relative to a given constraint.

The tableau below illustrates how the ATM approach accounts for dominance effects. The last two base-output pairs are separated from the first in that they satisfy OO-*PROM by deleting the lexical accent of the base. The winner is thus the form which deletes this accent and also satisfies low-ranking POST-STEM-PROM, (55c), cf. (55b).

(55) Dominance Effect as Affix-Triggered Markedness

Base	/púz + ač +ú/	OO-*PROM	OO-MAX-PM	POST-STEM-PROM
a. púz-u	[púz-ač]-u	*!		
b. púz-u	[puz-áč]-u		*	*!
c. → púz-u	[puz-ač]-ú		*	

This example also illustrates the chief advantages of the ATM approach. First, dominance effects are base-mutating in this theory because, like TAF theory, the operative constraints are transderivational in nature. As a result, the emergent unmarkedness observed in the derivative is dependent on certain properties of the base, like the presence of an accent in this case. Second, ATM theory also has an angle on grammar dependent dominance effects. As with the TAF theory, the ATM constraint OO-*PROM requires a deletion and the independently needed grammar of accent predicts the result of this de-accentuation (though this is not a natural consequence of this theory — see below).

The advantages of ATM, however, do not outweigh its disadvantages, and so it does not represent a viable alternative to TAF. One significant problem in this approach to

dominance effects is that it appears to require constraints which are not independently motivated. Thus, while other morpho-accentual processes may be brought about by beefing up well-motivated Markedness constraints, like Alignment constraints for pre- and post-accentuation (see §5.3.4), this approach to dominance effects requires a Markedness constraint which prohibits a stress, *PROM. It is not clear, however, that such a constraint is truly necessary in the description of stress. For example, it is sometimes proposed that word-internal clash or line conflation effects (in the sense HV) are due to constraints which ban stress or, similarly, a stress foot (see e.g. Baerman 1998). There are plausible alternatives to these analyses, however, which use independently necessary constraints on the alignment of prosodic categories or the rhythmic distribution of prominence structure (Hung 1994, McCarthy & Prince 1993a, Baković 1998; cf. Crowhurst 1996). Therefore, the underlying function of this approach, i.e., improved Markedness in base-output pairs, has not yet been solidly established.

There is a more basic problem with the ATM theory, however, which stems from the extension of correspondence to the formulation of Markedness constraints. In a way, ATM is a much more radical departure from classical Optimality Theory than TAF theory. TAF theory introduces a new constraint for every Faithfulness constraint by proposing negated Faithfulness constraints. The ATM theory, on the other hand, innovates in a different way, allowing Markedness constraints to refer to correspondence relations. The latter move is clearly a real weakening of the theory because it enables affixes to bring about any type of Markedness effect. Thus, while the enhanced Markedness effect with OO-*PROM illustrated above leads to a deletion plus default stress, grammar dependent affix-controlled processes are not ensured by ATM theory. An activated Markedness constraint may directly dictate the outcome in the derivative. For example, the logically possible OO-Markedness constraint OO-WSP simply requires stress on a heavy syllable in the derivative, regardless of whether or not this constraint played any role in the larger system. To conclude then, ATM is not a likely theory of dominance effects because it is less restrictive than the TAF theory, and the operative constraint in this theory, *PROM, is not well-motivated outside of the analysis of dominant morphemes.