Chapter 3.

Restricted Edge Effects in Root-Controlled Accent Systems

3.1 Restricted Edge Orientation

3.1.1 Factorial Typology

Much of the discussion of the previous chapter focuses on the consequences of culminative accent in Cupeño. The over-arching requirement that words have a single stress-accent in this language creates a competition in words with more than one inherent accent. Furthermore, the resolution of accent in multiply accented words, which I will refer to as Accent Resolution (AR), leads to the identification of a set of factors which determine which lexical accent is retained. The novel aspect of the analysis of Cupeño is that a role for word structure is recognized in AR. Thus, the finding that root accent overrides affix accent is argued to derive from a principle of root-control, according to which retention of a root accent is favored over retention of accent in an affix. Root-controlled AR is apparently not typical, however, as many have argued for a phonological principle at work in AR. For example, in a very influential paper, Kiparsky & Halle 1977 argue that AR in many Indo-European languages is governed by directionality: a word level prominence is assigned to the lexical accent that is closest to the beginning of the word (1a). Likewise, Poser's 1984 rule of Accent Resolution in Tokyo Japanese is characterized in terms of directionality, favoring retention of a leftmost lexical accent.

(1) Accent Resolution with Directionality

a. Basic Accentuation Principle (Kiparsky & Halle 1977): If a word has more than one accented vowel, the first of these gets the word accent. [If a word has no accented vowel, the first vowel gets the word accent.]

b. Accent Resolution (Poser 1984): Delete all but the leftmost accent within a minor phrase.

The existence of root-controlled AR in Cupeño, alongside directional AR, raises the question of whether Universal Grammar countenances both morphological and phonological principles in the characterization of this accentual phenomenon. Furthermore, if this question is answered affirmatively, are there principles which can predict when the morphological principle of root-control applies, as opposed to the phonological principle of directionality?[1]

The way to approach these typological questions in Optimality Theory is to consider the implications of the only mechanism for language variation in OT, constraint permutation, for the constraints at work in each type of AR. Starting first with directional AR, this type of pattern implies a constraint, EDGEMOST, which sets a premium for accent that appears at a designated edge (after Prince & Smolensky 1993; see also McCarthy &

[1]See Beckman 1995, 1997 [1998] for discussion of a related issue concerning various factors at work in vowel harmony.

Prince 1993a). In §1.2.1.1, two distinct types of edge effects are identified: categorical edge tropism and gradient edge orientation. The type of edge effect predicted by the EDGEMOST constraint is in large part due to the rank of EDGEMOST in the system (though the way its violations are interpreted is also important — see Zoll 1996a and Gafos 1996b). Thus, if EDGEMOST is undominated, the result is edge-tropic accent that is co-extensive with the favored edge. The rules in (1), by contrast, are characterized by the second type; they favor accent which is as close as possible to the left edge, yet allow for non-initial accent. EDGEMOST has a role in yielding this type of edge effect too, but in these contexts, it is dominated by other constraints in the system.

The EDGEMOST constraint is also ranked on a language particular basis in relation to the constraints at work in root-controlled AR, i.e., the MAX-PROM constraints from §1.2.2.1. Furthermore, the fact that root accent takes precedence over affix accent entails that there is a natural ordering between Root and Affix Faithfulness. The explanation of overriding root accent given in §2.4 rests on this universal ordering because it provides a basis for understanding root-controlled AR in Cupeño as a special case of a more general pattern of root privilege. Therefore, three constraints are at work in the analysis of directional and root-controlled AR: EDGEMOST, MAX-PROM$_{Root}$, and MAX-PROM$_{Affix}$; also, MAX-PROM$_{Root}$, by hypothesis, always ranks above MAX-PROM$_{Affix}$ because of the universal ordering Root Faith >> Affix Faith.

These background assumptions, together with the assumption that the EDGEMOST constraint may be freely re-ranked relative to the two MAX-PROM constraints, yields the following factorial typology. The resulting typology is characterized in (3) with a brief description for each grammar.

(2) Factorial Typology with Decisive EDGEMOST Constraint

(A)	>>	MAX-PROM$_{Root}$	>>	(B)	>>	MAX-PROM$_{Affix}$	>>	(C)
↑				↑				↑
EDGEMOST				EDGEMOST				EDGEMOST

(3) Grammars Resulting from Factorial Typology

Grammar A: accent is delimitative (always coincides with a designated edge) in all contexts; accent is not contrastive.

Grammar B: accent is contrastive in roots, but delimitative in words with unaccented roots. In words with more than one accented root, the edgemost (i.e., closest to a designated edge) accented root wins.

Grammar C: accent is contrastive in roots and affixes, but a root accent takes precedence over an affix accent. In words with more than one accented morpheme of the same morphological class, the edgemost accent wins. In words with no accented morphemes, accent is delimitative.

If accent is not contrastive in a languages described by these grammars, it is edge-tropic, or locked into an edgemost position, because of the unmitigated force of EDGEMOST, as in grammar A. The gradual demotion of EDGEMOST, however, brings about a loosening of the edge requirements on accent, and consequently, the emergence of an accentual contrast in roots and affixes (B and C). In the grammars with contrastive accent, a pattern of edge orientation is found. If accent is sponsored by a morpheme of the same morphological class (that is, all are roots or affixes), then the accent which is closest to the favored edge is

retained. Interestingly, this pattern of edge orientation is only permitted under very special circumstances in this factorial typology, which stems from the intrinsic ordering of MAX-PROM$_{Root}$ and MAX-PROM$_{Affix}$. This ranking consequence is stated below and subsequently tested against the three grammars shown above.

(4) Restricted Edge Orientation (REO)

Edge orientation for accent is only observed in contexts where PROS-FAITH is indecisive.

PROS-FAITH is decisive if it predicts which, among possibly many, inherently accented morpheme realizes its lexical accent. In words with accented morphemes of the same morphological class, however, the ordering of MAX-PROM$_{Root}$ and MAX-PROM$_{Affix}$ is indecisive, and so other factors, like phonological directionality, can take effect. REO therefore predicts that root-control is primary because all grammars in which PROS-FAITH is not crucially dominated favor realizing a root accent over an affix accent; directional AR only comes in word types that cannot be resolved on the basis of morphological factors. To show the primacy of root-controlled AR, however, it is necessary to study the characteristics of each grammar more carefully and to see that they are all in fact consistent with REO.

In the illustrations which follow, EDGEMOST is set for the left edge of the word, hence LEFTMOST, to compare these results with a common type of system. This decision is entirely arbitrary, however, and so it is clear that the same points hold of other systems which exhibit different types of edge effects. Starting first with a familiar system, grammar C in many ways resembles accent in Cupeño. Words with an accent on the root in the input realize this lexical accent at the surface, even if the root accent is not leftmost in the word (5a), or if retention of the root accent entails the loss of an affix accent (5b). Importantly, the input-output mapping in (5b) is consistent with REO because the Prosodic Faithfulness constraints are crucial for predicting the outcome, as shown by the conflicting constraint violations for the MAX-PROM constraints. The result depicted in (5c), by contrast, is pure directional AR: the leftmost affix wins. It turns out that this input-output pair is also compatible with REO because in a sequence of accented affixes, Prosodic Faithfulness is not decisive, and so the lower-ranking constraint LEFTMOST takes effect and gives the observed directionality effect.

(5) Grammar C: Root-Controlled Accent with Restricted Edge Orientation

Input		Output	MAX-PROM$_{Root}$	MAX-PROM$_{Affix}$	LEFTMOST
a. /af + róot/	→	af-róot			*
		*áf-root	*!		
b. /áf + róot/	→	af-róot		*	*
		*áf-root	*!		
c. /áf + áf + root/	→	áf-af-root		*	*!
		*af-áf-root		*	
d. /af + áf + root/	→	af-áf-root			*
		*áf-af-root		*!	

This hypothetical example therefore illustrates the primacy of morphological factors in AR: edge orientation is only found in contexts where the ordering of Root and Affix Faithfulness is not enough to predict the winner.

REO is also consistent with a grammar in which LEFTMOST is promoted in the constraint hierarchy to a position above MAX-PROM$_{Affix}$. Like grammar C, such a constraint system also favors retention of a root accent over leftmost accent, as illustrated in (6a) and (6b). The principle difference between this system and that described by grammar C is that only the latter has an accentual contrast in affixes. In grammar B, affix accent is predictable, and so accent on a non-initial affix is lost (6d), which contrasts with the outcome above in (5d). What these two grammars have in common, however, is that edge orientation only occurs when Prosodic Faithfulness is not relevant in deciding the winner. Thus, the role of the MAX-PROM constraints in negotiating between two accented morphemes is only apparent in (6b) where the favored pattern of edge orientation is not observed; in (6c), by contrast, neither MAX-PROM constraint is active, and so the pattern of leftward edge orientation emerges.

(6) Grammar B: Contrastive Accent in Roots and Predictable Accent in Affixes

Input		Output	MAX-PROM$_{Root}$	LEFTMOST	MAX-PROM$_{Affix}$
a. /af + róot/	→	af-róot		*	
		*áf-root	*!		
b. /áf + róot/	→	af-róot		*	*
		*áf-root	*!		
c. /áf + áf + root/	→	áf-af-root			*
		*af-áf-root		*!	*
d. /af + áf + root/	→	áf-af-root			*
		af-áf-róot		*!	

The last case, grammar A, also accords with REO because the MAX-PROM constraints are crucially dominated by LEFTMOST. In this system, accent is delimitative, and so regardless of the lexical properties of roots and affixes, accent always marks the left edge of the word.

(7) Grammar A: Delimitative Leftmost Accent

Input		Output	LEFTMOST	MAX-PROM$_{Root}$	MAX-PROM$_{Affix}$
a. /af + róot/	→	áf-root		*	
		*af-róot	*!		
b. /áf + róot/	→	áf-root		*	
		*af-róot	*!		*
c. /áf + áf + root/	→	áf-af-root			*
		*af-áf-root	*!		*
d. /af + áf + root/	→	áf-af-root			*
		af-áf-root	*!		

In this scenario too, then, the patterns of edge orientation observed in cases like (7b-c) arise when Prosodic Faithfulness is not a predictor of which lexical accent is retained in the surface form.

The finding here is thus that no ranking of MAX-PROM$_{Root}$, MAX-PROM$_{Affix}$, and LEFTMOST gives a purely directional pattern of AR. That is, the ranking of LEFTMOST relative to the intrinsically ordered Prosodic Faithfulness constraints never produces a system with contrastive accent and where edge orientation completely ignores the internal structure of words. If this theory is correct, then in systems with contrastive accent, inherent accent in roots should always take precedence over inherent accent in an affix; edge orientation is thus only found among morphemes of equal status with respect to the morphologically dispersed Faithfulness constraints. The rest of this chapter studies the implications of this restriction on the scope of edge orientation, both in the context of close formal analyses of accent in two languages, Russian and Japanese, and from a broader perspective on Accent Resolution in a wider range of languages developed directly below.

3.1.2 Empirical Issues

The predictions of Restricted Edge Orientation appear, at first glance, to be a rather strong, as there are several examples which have been described precisely in terms of directional AR. As mentioned above in (1), directionality is integral to the analyses given in Kiparsky & Halle 1977 (K&H) of AR in the Indo-European languages Russian, Lithuanian, and Sanskrit. The principle argued to be at work in these systems, the Basic Accentuation Principle (BAP), is a straightforward pattern of leftward edge orientation. Furthermore, BAP has been a very influential tool in describing AR in non-Indo-European languages. A very similar idea is employed in Poser 1984 for Japanese minor phrases, in Idsardi 1992 for stress placement in Shuswap, Spokane, and Moses-Columbia Salish, cf. Czaykowska-Higgins 1993, in Hualde & Bilbao 1993 for Getxo Basque, and in Payne 1990 for the Jivaroan language Aguaruna (p. 181). The loss of all but the first high tone in many Bantu languages, rather like Poser's Accent Resolution, is also often described in terms of leftward edge orientation. Finally, while not described in precisely these terms, the tonomechanics of Northern Tepehuan (Uto-Aztecan) given in Bascom 1959 show a pattern of AR similar to that found in Japanese and Bantu.

(8) Accent Resolution with Straight Leftward Edge Orientation

a.	Russian	Halle 1973, 1996, K&H, HV, Melvold 1990, Idsardi 1992
b.	Lithuanian	K&H, HV, Blevins 1993, Halle 1996
c.	Sanskrit	K&H, Kiparsky 1982c, 1984b, HV, Halle 1996
d.	Japanese	Poser 1984
e.	Interior Salish	Carlson 1976, 1989, Czaykowska-Higgins 1993, Black 1996
f.	Getxo Basque	Hualde & Bilbao 1992, 1993, Hualde 1991
g.	Aguaruna	Payne 1978, 1990, Larson 1956
h.	Northern Tepehuan	Bascom 1959, 1965, Woo 1970, Kim 1996
i.	Misc. Bantu	See Myers 1997 for a survey

If these systems present valid cases of purely directional AR, which is oblivious to word structure, then the theory of root privilege developed here will have to be modified to accommodate them. However, upon closer inspection, there are reasons to doubt the analysis of these systems in terms of directionality, and so these cases, in fact, may not refute the restricted theory of edge effects embodied in REO. In the interest of pursuing this more restrictive theory, therefore, it is worthwhile to probe further into the characterization of edge effects in these systems.

The first problem is that most accounts of these languages do not give the crucial evidence required to show a pattern of directional AR. As mentioned above, most of the languages are said to follow a BAP-type principle with leftward edge orientation. Considering a sample of the sequences of accented morphemes consistent with this pattern, only one runs counter to the patterns predicted by Restricted Edge Orientation.

(9) Some Affixed Structures in Directional Accent Resolution

a.	/róot + áf/	→	róot-af	
b.	/áf + róot/	→	áf-root	≠ REO
c.	/root + áf + áf/	→	root-áf-af	

If the root accent is retained over a suffix accent, as in (9a), this pattern is of course compatible with both directional and root-controlled AR, and so it is inconclusive. Moreover, the retention of accent in the first of a sequence of two accented suffixes (9c), as found for example in Getxo Basque (Hualde & Bilbao 1993) and Russian (Melvold 1990), is also inconclusive. This pattern of AR is consistent with REO because in these affixed structures, the morphemes are of equal status, and so Prosodic Faithfulness is indecisive. However, the pattern shown in the prefixed structure in (9b), if found across the board, is diagnostic of directional AR because PROS-FAITH is relevant in such a context and prefix retention is contrary to the expected pattern. How then do these prefixed structures behave in the languages in (8) above?

Many of these systems only have a few prefixes, or lack prefixation altogether, which precludes using these affixed structures as a reliable test for directional AR (though this is clearly not the case for Bantu languages). For example, Basque (King 1994) and Aguaruna are exclusively suffixing[2] and so they are consistent with REO. In other languages, like Russian and Japanese, prefixes are productive or mildly productive in certain word classes, but fully unproductive in others, providing little help in determining the scope of edge orientation. In these systems, a common strategy is to mark the prefixes as outside the domain of accentual rules. Thus, Melvold 1990 assumes that prefixes in Russian verbs are non-cyclic, and hence do not trigger a second pass of stress assignment, or do so only under special circumstances. Also, Carlson 1989: 204 notes that prefixes are never stressed in Spokane, which requires a similar set of assumptions to those needed for Russian. Finally, while Northern Tepehuan appears to have directional AR, as noted in Woo 1970: 19, prefixes play no role in tone assignment, so they too are outside the scope of tonal resolution in this system. To summarize, it appears that the evidence from prefix + root sequences in these languages does not give strong support for an analysis in terms of directional AR, and hence, they do not directly contradict REO.

There is another fact about these systems which is curious in a purely phonological analysis of AR. Most, if not all, of the accent systems listed in (8) exhibit a specific pattern of directionality, namely leftward edge orientation. It is the leftmost inherently accented morpheme which surfaces with stress in Russian and a pitch fall in Japanese, and this pattern is duplicated in each of the accent systems listed above.[3] Unlike other types of

[2]Though David Payne (personal communication) notes that Aguaruna has a semi-productive prefix which forms causatives. As a derivational affix, however, it may not be helpful in diagnosing directionality in this language.

[3]Some Salishan languages show a pattern of rightward orientation for stress in a sequence of so-called 'strong' suffixes, which adds an additional complication in these cases. However, in Moses Columbia Salish, this pattern is in conflict with the leftward pattern for stress found elsewhere in the language, which

directionality in phonology, as in the assignment of prosodic structure, directional AR in these cases seems to always be set for the left edge. If AR is a matter of directionality, then the expectation is that there should also be patterns of AR showing rightward edge orientation.[4]

A brief look at a set of cases previously treated in terms of directional AR therefore turns up two interesting findings. First, the analyses of these systems often lack the evidence from prefix + root sequences which is needed to show that they must be governed by directionality. Second, a directional asymmetry is found in these cases, showing a strong preference for leftward edge orientation. The conclusion that I draw from these findings is that these systems need to be examined in more detail before they can be taken as counterexamples to REO, and the next two sections give special attention to affixed structures in Russian and Japanese with this issue in mind. A second, perhaps more speculative, inference that can be drawn is that these cases are amenable to an analysis very much in line with the one given for Cupeño in chapter 2. Indeed, the lack of a class of prefixes which override accent in a following root is exactly the predicted pattern if these systems have root-controlled AR. Furthermore, the morphological analysis of AR can also make sense of the observed directional asymmetry. Languages often show a preference for suffixes over prefixes (see Greenberg 1966, Hawkins & Gilligan 1988), a trend sometimes expressed in terms of implicational statements like, 'if a language has prefixes, it also has suffixes'. The absence of a robust set of prefixes in a root-controlled system may thus give the appearance of a directionality effect in AR because the root is always word-initial. If the cases mentioned above are truly root-controlled, then the preference for suffixing morphology found in these systems (except Bantu) would give the illusion of leftward edge orientation. Of course, this pattern is just an illusion because if the Root-Controlled Accent hypothesis applies to these cases as well, then they are fully symmetric: they all favor retention of a root accent over an affix accent.

From these considerations, the notion of root-control may indeed have some currency beyond the accent system of Cupeño. First, the absence of a class of prefixes whose inherent accent takes precedence over the root accent is expected. Second, the apparent directional asymmetry may be accounted for in terms of a general preference for suffixing morphology. Moreover, the analysis of AR in these systems explains the pattern of root retention in terms of a general pattern of root privilege, accounting for AR with the same basic assumptions at work in root-controlled vowel harmony and dissimilatory phenomena. I therefore propose to examine two of the accent systems listed above in more detail and consider the hypothesis that these systems too have root-controlled accent.

3.2 Extended Case Study: Modern Russian

The section has two goals. The first goal is to present an analysis of the stress patterns in Modern Russian which is consistent with one of the restrictions on edge effects derived in §3.1, namely that edge orientation effects are only observed in contexts where Faithfulness is not decisive. As discussed above, Russian has formerly been approached as a case of unrestricted edge orientation, i.e., in terms of an analysis in which 'the leftmost inherently accented morpheme wins'. I argue below, however, that an alternative to this analysis is also viable, which is consistent with the restrictive theory of edge effects; thus, this alternative is superior to the previous approach on theoretical grounds. The second

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shows that the behavior of these special suffixes requires a different treatment (see Czaykowska-Higgins 1993 and Idsardi 1992, and §4.1).

[4]Myers 1997b suggests that this directional asymmetry is due to a perceptual difficulty with non-initial high tones, though this approach is not extended to stress languages.

objective here is to construct an analysis of the basic stress system which can be called upon in §5.2.3 in the analysis of de-accenting suffixes. The theory of accent-deleting affixes proposed in chapter 5 makes the prediction that the accentual pattern resulting from de-accentuation is a default structure in the language. It is therefore necessary to establish a language particular default for Russian stress in order to test this prediction. The accentual defaults will be deduced from the constraint rankings given below for the analysis of stress in inflected words, and their role will then be extended to a wider range of data in chapter 5, including certain minor accentual patterns involving a shift of stress in inflectional paradigms and derived nouns and verbs.

The rest of this section is organized as follows. The first subsection provides the necessary linguistic background on Russian, essentially stating my assumptions about Russian morphology and the phonetics of accent. The next subsection, §3.2.2, presents an analysis of the major stress patterns in underived nouns, which is a necessary point of departure because these patterns form the core of any description of Russian stress. Finally, §3.2.3 broadens the empirical scope further, examining the implications of the analysis for stress in verbs and prefixed words. It will be shown here that the analysis of Russian stress in terms of root-control is consistent with the findings in these areas, and therefore this analysis is consistent with the more restrictive theory of edge effects proposed here.

3.2.1 Preliminaries

Let us begin the study of Russian nominal stress with some preliminaries of Russian word structure from Townsend 1975: IC. First, roots in Russian typically have the shape CVC, where C stands for one or more consonants and V stands for one vowel. Roots of Church Slavonic origin always end in consonants, but a few are vowel-initial. Some roots have the shape CVRVC, with the medial R representing a resonant consonant. In most cases, however, there is a related Church Slavonic root with a single syllable. Other polysyllabic roots are often derivatives from roots with one syllable or borrowings.

Nouns are formed by attaching to the stem a set of inflections for gender, case, and number, as shown in the sketch below. The term ‘stem’ thus refers to the word minus inflections, which in this section simply involves a bare root.

(10) Morphological Frame for Underived Nouns

$$[\ \text{Root}\ ]_{\text{Stem}} + \text{Infl}$$

Suffixation plays a very important role in word-formation, and as I will show in §5.2.3, noun-forming suffixes interact in interesting ways with the root accent. It is necessary, however, to determine the basic accentual principles in underived nouns before examining derived nouns. In contrast to suffixation, prefixation is much less important in nouns. While there are many prefixes, they are typically unproductive or have a low degree of productivity (Townsend 1975), which is probably why they are rarely taken into consideration in discussions of noun accentuation. Prefixed nouns and prefixed verbs have some important similarities, and so prefixed nouns will be addressed in §3.2.4., where I examine verb stress as well as the accentual properties of prefixes generally.

With respect to the phonetics of stress, Russian words have a single stress prominence per word, and this prominence is realized as a peak in intensity and greater duration than the neighboring syllables (see Jones & Ward 1969 for more details). Russian also has a phonological pattern of vowel reduction in which non-high vowels are reduced

in unstressed syllables. These patterns suggest that vowel quality may also have a role in cueing stress.

3.2.2 Noun Stress: The Basic Patterns[5]

As illustrated below, a fundamental observation in many nominal paradigms is that stress is fixed on the stem. The words with disyllabic stems given below, while somewhat rare in Russian, illustrate that stress may either fall on the first or second syllable, e.g. *kómnat-a* versus *tetrád'*.

(11) Fixed Stem Stress (by Declension Class)

SG	I	II	III	IV
Nominative	rák	kómnat-a	tetrád'	bl'úd-o
Accusative	rák-a	kómnat-u	tetrád'	bl'úd-o
Genitive	rák-a	kómnat-i	tetrád'-i	bl'úd-a
Dative	rák-u	kómnat-e	tetrád'-i	bl'úd-u
Instrumental	rák-om	kómnat-oj	tetrád'-ju	bl'úd-om
Locative	rák-e	kómnat-e	tetrád'-i	bl'úd-e
PL				
Nominative	rák-i	kómnat-i	tetrád'-i	blúd-a
Accusative	rák-ov	kómnat-i	tetrád'-i	blúd-a
Genitive	rák-ov	kómnat	tetrád'-ej	blúd
Dative	rák-am	kómnat-am	tetrád'-am	blúd-am
Instrumental	rák-am'i	kómnat-am'i	tetrád'-am'i	blúd-am'i
Locative	rák-ax	kómnat-ax	tetrád'-ax	blúd-ax
	'crayfish'	'room'	'exercise book'	'dish'

This pattern of fixed stress accounts for roughly 92% of the nominal paradigms in all declension classes. For a significant majority of nouns, therefore, stress is fixed on a stem vowel.

A second important stress pattern in nouns is fixed stress on the inflectional ending. Since most of the inflections are monosyllabic, this stress pattern gives stress on the first vowel following the stem, as shown below.

(12) Fixed Inflection Stress

stól	č 'ert-á	vešč 'estv-ó	Nominative Singular
stol-ú	č 'ert-é	vešč 'estv-ú	Dative Singular
stol-ám	č 'ert-ám	vešč 'estv-ám	Dative Plural
'table'	'characteristic'	'substance'	

There is a small percentage of nouns, mostly from declension class II, with fixed inflection stress, but with initial stress in the nominative plural, e.g., *skovorod-á* 'frying pan (nom sg)', cf. *skóvorod-i* (nom pl), or in both the nominative plural and the accusative singular, e.g., *borod-á* 'beard (nom sg), cf. *bórod-u* (acc sg), *bórod-i* (nom pl). Since these forms constitute less than a tenth of one percent of the total number of nouns, I will simply treat them as exceptions which are lexically marked for initial stress in the appropriate grammatical cases.

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[5]Most of the data presented in this section are from Brown et al. 1996, which differs from many generative descriptions of noun stress in classifying the nominal paradigms by declension class, rather than by gender markings (as in, e.g., Melvold 1990). I am convinced by the arguments presented in Brown et al. (and references cited therein), and I follow this work in classifying the data in this way. However, the argumentation presented here does not hinge crucially on this choice of data organization.

The frequencies for these two patterns given below support the following generalization (based on the generalizations formulated in Brown et al. 1996): stress is either fixed on a stem vowel or on the first vowel of the inflectional ending.

(13) Frequencies for Predominant Stress Patterns (*n* = 43,996; from Zaliznjak 1977)

Fixed Stem Stress	92%
Fixed Inflection Stress	6%

This generalization accounts for roughly 98% of the nouns, and when considering the size of Zaliznjak's corpus, it is sensible to assume that these two patterns of fixed stress constitute the core set of stress patterns. Furthermore, the remaining nominal paradigms conform to a basic pattern which distinguishes them from the major patterns examined here. Thus, in contrast to the fixed stress patterns here, the residual nominal paradigms exhibit two patterns of mobile stress, both of which have an opposition between the singular and plural case forms, as shown below with some partial paradigms.

(14) Mobile Stress Patterns

a. Stem-Initial/Inflection Stress		b. Inflection/Stem-Final Stress		
tél-o	kólokol	dir-á	kolbas-á	Nominative Singular
tél-u	kólokol-u	dir-é	kolbas-é	Dative Singular
tel-á	kolokol-á	dír-i	kolbás-i	Nominative Plural
tel-ám	kolokol-ám	dír-am	kolbás-am	Dative Plural
'body'	'bell'	'hole'	'sausage'	

The pattern of mobile stress in (14a) has initial stress in singular forms, but ending stress in the plural. Likewise, the mobile stress patterns in (14b) show a related pattern of mobile stress: singular forms have ending stress while the plural forms have stem-final stress. While a handful of nouns stray from these two patterns in having anomalies within the singular or plural sub-paradigms, the basic pattern here is that the singular inflected forms have a fixed stress pattern, as do the plural inflected forms, and that these two fixed patterns are different (see Stankiewicz 1962 and references therein for discussion of this opposition). It appears therefore that the mobile stress patterns, constituting roughly 2% of the data, can be safely set aside and analyzed in a different way. I will return to the analysis of mobile stress in chapter 5 when the theoretical background for understanding these patterns has been sufficiently established.

The general strategy for analyzing Russian noun stress is the same as with the analysis of Cupeño: stress is 'root-controlled' in the sense that it is governed by the accentual properties of the obligatory constituent of the stem. With the Prosodic Faithfulness constraints for roots top-ranked, as shown below, root stress will override affix stress. Thus, in a word with an accented root, inherent accent in the root will be preserved throughout the paradigm, giving the observed pattern of fixed stress. Furthermore, because the Root Faithfulness constraints dominate other prosodic well-formedness constraints, the position of stress may contrast in polysyllabic roots.

(15) Root-Controlled Stress in Russian

a. MAX-PROM$_{Root}$ >> PHONO, MAX-PROM$_{Affix}$

b. NO-FLOP-PROM$_{Root}$ >> PHONO

The Root Faithfulness constraints given above have no say in words with unaccented roots, and so in such contexts the low-ranking constraints play a decisive role. In particular, a purely phonological constraint, which I will now motivate, becomes active and requires stress to appear on the ending.

In characterizing the constraint responsible for ending stress, it is helpful to briefly compare this pattern in Russian with a related pattern in Sanskrit. In Sanskrit thematic nouns (nouns which have a theme vowel), there is also a basic distinction between stems which have a fixed accent on the stem and stems which have an accent on a post-stem vowel, namely the theme vowel. For the latter class of stems, the so-called 'oxytone stems', Kiparsky 1973 argues for a post-stem accent rule which specifically posits an accent on the vowel directly following the stem. The evidence for the restriction to the directly following vowel is that it limits accent to the first syllable of polysyllabic suffixes, which, while not significant for the case endings, is correctly borne out for verbal suffixes (Kiparsky 1973: 810). It would seem, then, that a parallel constraint is at work in Russian, which is the spirit in which I propose the following constraint (see also 'the Oxytone Rule' of Halle 1973).

(16) POST-STEM-PROM (PSP) ≡ ALIGN (PROM, L, Stem, R)
The left edge of the stress prominence must coincide with the right edge of some stem.

POST-STEM-PROM is formulated as a subcategorization type constraint in the constraint schemata provided in Generalized Alignment (McCarthy & Prince 1993). The effect of stress on the first vowel of the inflectional ending is thus the same type of effect observed in suffixation generally: the left edge of a prominence (i.e., the left edge of the vowel dominated by a grid mark) must co-incide with the right edge of the stem, giving post-stem stress. Formulated as a gradient Alignment constraint, PSP requires a prominence on the first vowel of the inflectional ending, or as close as a prominence can get to this position, which will be crucial in the analysis presented below.[6]

The results of these constraint rankings will now be illustrated in a series of tableaux. First, words with fixed stem stress are assumed to have an inherently accented root, and so *√rák* shown below is endowed with a lexical prominence. Assuming that the plural ending is inherently accented as well (a possibility we must entertain, given Richness of the Base), these two morphemes compete for the unique word prominence. The inherent ranking between Root and Affix Faithfulness gives overriding root stress because, as with the parallel set of facts in Cupeño, failure to preserve the root accent leads to a fatal violation of MAX-PROM$_{Root}$.

[6]This constraint finds additional support in Pierrehumbert & Beckman's 1988 analysis of 'initial lowering' effects in Tokyo Japanese, where the boundary tone of a preceding minor phrase appears on the initial mora of the following phrase; hence, the operative constraint appears to be ALIGN(L%, L, Minor Phrase, R).

(17) Overriding Root Stress in Russian

x_1 x_2 /rák + í/	MAX-PROM$_{Root}$	MAX-PROM$_{Affix}$
x_2 rak-í	*!	
→ x_1 rák-i		*

If, on the other hand, the plural ending is unaccented, the outcome is the same. Since MAX-PROM$_{Root}$ dominates PSP, inherent root stress wins over default stress on the inflectional ending.

Root Faithfulness has another role in the analysis, namely that it ensures that the accent of the root does not shift forward to the favored post-stem position. As shown below, if the root accent flops to the inflection, this option leads to a violation of NO-FLOP-PROM$_{Root}$, and since this constraint dominates PSP, the winning candidate is the form which does not undergo the shift.

(18) Lack of Accent Shift

x_1 x_2 /rák + í/	NO-FLOP-PROM$_{Root}$	POST-STEM-PROM
x_1 rak-í	*!	
→ x_1 rák-i		*

Because of the rank of NO-FLOP-PROM$_{Root}$, the root accent does not shift. This result leads to a further prediction which is borne out in Russian, namely that polysyllabic roots will show a contrast in accent position within the root. As shown with the input-output mappings below, disyllabic roots show such a contrast because failure to preserve the accent, and realize it in a position corresponding to its lexical position, leads to violation of either MAX-PROM$_{Root}$ or NO-FLOP-PROM$_{Root}$.

(19) Positional Contrast in Disyllabic Roots

Input	Output	MX-PM$_{Rt}$	NO-FLOP-PM$_{Rt}$	PSP	MX-PM$_{Af}$
a. /kómnat + í/ →	kómnat-i			*	*
	*komnát-i		*!	*	*
	*komnat-í	*!			
b. /tetrád’ + í/ →	tetrád’-i			*	*
	*tétrad’-i		*!	*	*
	*tetrad’-í	*!			

Other stem-internal elements, such as derivational suffixes, also participate in this contrast, but since their Faithfulness properties are not governed by Root Faithfulness, they are treated in §5.2.4., where the derivational suffixes are analyzed.

So far we have only been concerned with the ranking consequences of the grammar in (15) above for words with accented roots. In words with unaccented roots, however, the Root Faithfulness constraints such as MAX-PROM$_{Root}$ are irrelevant because there is not an underlying accent to realize. The lower-ranking constraints therefore become active in these word types and give default ending stress. For example, a word with an unaccented root such as *vstol*, receives stress on the first vowel of the inflectional ending because this is the position prescribed by POST-STEM-PROM. As shown below, this result is obtained even if the inflectional ending is unaccented. Thus, the two plural endings *-i* and *-am'i* get a stress on the first vowel because this structure properly aligns the surface prominence with the right edge of the stem

(20) Default Ending Stress with Unaccented Root

Input		Output	MAX-PROM$_{Root}$	POST-STEM-PROM
a. /stol + i/	→	stol-í		
		*stól-i		*!
b. /stol + am'i/	→	stol-ám'i		
		*stol-am'í		*!

The same result holds for most cases if the endings are inherently accented, which will be illustrated at the close of the discussion where the accentedness of the endings is clarified.

The constraint POST-STEM-PROM also has a role in words with unaccented stems and null inflections. As exemplified below, if a noun with fixed inflection stress has a null inflection, as with the nominative singular in first declension nouns, stress falls on the next closest vowel, i.e., the stem-final vowel.

(21) Fixed Inflection/Stem-Final Stress

topór	slovár'	p'iróg	karás'	Nominative Singular
topor-ú	slovar'-ú	p'irog-ú	karas'-ú	Dative Singular
topor-ám	slovar'-ám	p'irog-ám	karas'-ám	Dative Plural
'axe'	'dictionary'	'pie'	'carp'	

Because of the gradient nature of PSP, this observation receives a natural explanation in terms of the minimal violation of this constraint. As illustrated in the tableau below, the candidate with stem-final stress is the winner because it posits the accent closer to the right edge of the stem than the available alternative.[7]

[7]This result also provides an argument against employing the constraint DEP-PROM$_{Root}$ in the analysis of fixed inflection stress, in effect banning the insertion of accent in roots in words with no inherent accent and leaving the inflection as the only viable option. This anti-insertion constraint is clearly irrelevant in the analysis of stem-final stress in words with null inflections, so the analysis with PSP covers more empirical ground.

(22) Minimal Violation of POST-STEM-PROM

/topor + ∅/	PROS-FAITH$_{Root}$	POST-STEM-PROM
tópor-∅		**!
→ topór-∅		*

Furthermore, as we will see in §5.3, PSP plays a crucial role in the analysis of certain patterns of mobile stress. In both of these patterns, ending stress is found throughout either the plural case forms or the singular case forms, providing further evidence for ending stress as a default. While it is impossible to establish this claim without an analysis in hand, it is clear that a constraint such as POST-STEM-PROM will have a role in the analysis of these patterns as well.

As discussed in §1.2, given Richness of the Base, it is necessary to derive the inventory of possible stress patterns without imposing a Russian-specific constraint on underlying representations. The analysis presented here meets this requirement, as the constraint rankings motivated above will generate all and only the observed stress patterns without language-particular restrictions on the input. Thus, the following illustration shows the predicted outcomes in all possible input-output mappings, factoring in both the accentedness of roots and endings. I assume, for ease of exposition, that accentual shifts are not possible here, which is a safe assumption, given the ranking of NO-FLOP-PROM$_{Root}$ in the grammar.

(23) Inventory of Noun Stress Patterns

	Inputs		Outputs	MAX-PROM$_{Root}$	PSP	MAX-PROM$_{Affix}$
a.	/rák + i/	→	rák-i		*	
			*rak-í	*!		
a'.	/rák + í/	→	rák-i		*	*
			*rak-í	*!		*
b.	/stol + i/	→	stol-í			
			*stól-i		*!	
b'.	/stol + í/	→	stol-í			
			*stól-i		*(!)	*(!)

The point to be emphasized here is that the winning output form is predicted purely on the basis of the accentual properties of the root. Thus, if the input contains an accented root, the prediction is that the root will realize its accent in the output, regardless of the accentedness of the ending (23a-a'). Likewise, if the input is a word with an unaccented root, the resulting output has inflection stress, even if the ending is itself unaccented (23b).

We have not as yet determined the ranking of POST-STEM-PROM relative to MAX-PROM$_{Affix}$, or any of the Affix Faithfulness constraints, as this issue has not as yet been directly relevant for the empirical matters at hand. The evidence needed to settle this ranking issue is the presence or absence of an accentual contrast in the position of accent in affixes, and in this area, Russian morphology is not especially helpful. Most all of the endings are monosyllabic, except the instrumental plural *-am'i* and perhaps a few others as

well, if suffixes with yers are counted. This set is clearly not a large enough sample to decide whether Russian affixes have a contrast in the position of accent. Furthermore, there are only about 4 or 5 disyllabic derivational suffixes that are clearly not morphologically complex, which does not add much to the baseline here. It is certainly true, however, that when they are stressed, the polysyllabic suffixes have stress on the initial syllable (a point emphasized in Stankiewicz 1993: 185); thus, if POST-STEM-PROM is ranked above NO-FLOP-PROM$_{Affix}$, this ranking will not make false predictions. Moreover, as alluded to above, when polysyllabic suffixes attach to oxytone stems in Sanskrit, the result is always accent on the first vowel of the suffix. To be consistent with Sanskrit, therefore, I hypothesize that this pattern is also significant in Russian, which justifies the following ranking.

(24) Root-Controlled Accent in Russian

$$\left\{\begin{array}{c}\text{MAX-PROM}_{Root}\\ \text{NO-FLOP-PROM}_{Root}\end{array}\right\} >> \text{POST-STEM-PROM} >> \text{PROS-FAITH}_{Affix}$$

To summarize the results of this constraint system, accent is root-controlled in Russian nouns. That is, in words with accented (simplex) stems, inherent accent in the stem always prevails, as predicted by the ranking of the Root Faithfulness constraints MAX-PROM$_{Root}$ and NO-FLOP-PROM$_{Root}$ above all other constraints. In words with unaccented stems, these constraints are irrelevant, and the decision therefore falls to the next highest constraint in the hierarchy, namely POST-STEM-PROM, which ensures stress on the first vowel of the inflectional ending. The above ranking therefore accounts for the core set of stress patterns, namely fixed stem stress and fixed inflection stress, as a consequence of the accentual properties of the root.

The analysis presented above applies the theory of root-controlled accent to Russian nouns. The next question to be addressed therefore is, how does the analysis apply to the stress patterns found in other word classes? Specifically, does it extend to the accentuation of adjectives and verbs? Concerning adjectives, both Halle 1973a and Melvold 1990 emphasize that the principles of accentuation in adjectives are fundamentally the same as those found in nouns, and so it appears that investigating adjective stress will not turn up a new set of challenges. Stress in verbs, however, presents a new empirical problem, namely the accentuation of prefix + root sequences. Since these sequences may present crucial evidence for or against the root-controlled analysis, it is worthwhile studying prefixed verbs in some detail.

3.2.3 Extending the Analysis: Verb Stress and Prefixed Words

There is a basic distinction between thematic and athematic verbs in Russian. Thematic verbs are derived verbs which are essentially the product of attaching one of a set of theme vowels to a root. Athematic vowels are underived and therefore do not have a theme vowel. As thematic verbs involve certain complications which are irrelevant to the main issues at hand, I will focus exclusively on athematic verbs here, but see Halle 1973a and Melvold 1990 for comprehensive discussions.[8]

[8]Much of the data and descriptive generalizations below are drawn directly from these key works.

The following morphological frame describes the composition of athematic verbs.

(25) Morphological Frame for Athematic Verbs

$$[\ (\text{prefix}) + \text{root} + \begin{Bmatrix} \text{l} \\ \text{e} \end{Bmatrix} + \text{suffix}_{\text{Agr}}\ ]$$

Verbs in Russian have complex inflections consisting of a tense suffix and an agreement suffix. The inflections are shown in the forms below, which illustrate the range of possible stress patterns in verbs.

(26) Stress Patterns in Verbs

a. Present tense verbs

		Pattern A	Pattern B	Pattern C	Pattern D
SG	1	léz-u	pek-ú	ž iv-ú	strig-ú
	2	léz-eš	peč -óš	ž iv'-óš	striž -óš
	3	léz-et	peč -ót	ž iv'-ót	striž -ót
PL	1	léz-em	peč -óm	ž iv'-óm	striž -óm
	2	léz-ete	peč -óte	ž iv'-óte	striž -óte
	3	léz-ut	pek-út	ž iv-út	strig-út
		'crawl'	'bake'	'live'	'shear'

b. Past tense verbs

Masculine	léz	pék	ž í-l	stríg
Feminine	léz-la	pek-lá	ž i-lá	stríg-la
Neuter	léz-lo	pek-ló	ž í-lo	stríg-lo
Plural	léz-li	pek-lí	ž í-li	stríg-li

Using some common alphabetic labels, the descriptions for the patterns exemplified above are given below (after Halle 1973a and Melvold 1990).

(27) Four Basic Patterns

a. Pattern A: fixed stem stress.

b. Pattern B: fixed stress on the inflection (when there is one)

c. Pattern C: stem-initial stress in the masculine, neuter, plural past tense forms, ending stress elsewhere.

d. Pattern D: ending stress in present tense forms, and stem-final stress in the past.

The point to be emphasized here is that the same basic stress patterns in nouns are also found in the verbs shown above. Thus, patterns A and B are exactly on a par with the core patterns observed in nouns: stress is either fixed on the stem or on the inflectional ending. Furthermore, verbs show the same two patterns of mobile stress; compare the verb stress patterns shown above with the nominal paradigms in (14). Pattern C has initial stress in a subset of the past tense forms, and ending stress elsewhere, which is mirrored in the pattern of singular-plural opposition found in stems like *kólokol* 'bell'. Also, pattern D stress is directly parallel to singular-plural opposition in words like *kolbás-a* 'sausage',

ending stress in one grammatical class, and stem-final stress in another. In sum, the range of possible patterns are the same in both verbs and nouns.[9]

At this point, I can only give a partial story for verb stress, as the principles governing patterns C and D stress have not yet been proposed. It is clear, however, that the same basic analysis for nouns may be extended to verb stress, which is satisfactory for the moment. This interim sketch will be sufficient to cover prefixed verbs and nouns, which is the focus of this section. The full range of stress patterns in verbs will be revisited and analyzed in chapter 5, where the principles governing mobile stress are introduced.

The patterns of fixed stress, i.e., patterns A and B, are covered by the constraint system developed in the previous section, as I will now demonstrate. First, fixed stem stress (pattern A) may be straightforwardly analyzed as the realization of inherent accent in roots. Hence, regardless of the accentuation of the inflections, if one assumes that the root *v́léz* is inherently accented, then the grammar given in (24) for nouns will preserve the root accent, giving fixed stem stress (28a). Moreover, fixed inflection stress in verbs is treated in exactly the same way as nouns: if one assumes that in such words the root is unaccented, then it will receive default inflection stress, as shown in (28b).

(28) Fixed Stress in Verbs: Patterns A and B

Input		Output	MAX-PROM$_{Root}$	POST-STEM-PROM
a. /léz + u/	→	léz-u		*
		*lez-ú	*!	
b. /pek + u/	→	pek-ú		
		*pék-u		*!

Importantly, these results do not depend on the accentedness of the inflections: if the present tense inflection here was inherently accented, it would still go unstressed in the case of *léz-u*, and it would still be stressed in the case of *pek-ú*. This result follows from the rank of the Root Faithfulness constraints, as it was observed in root + inflection sequences in nouns in §3.2.2.

As for patterns C and D stress, these patterns of mobile stress resemble the corresponding nominal patterns in that they show oppositions between well-defined grammatical classes. An obvious comparison is seen in pattern D stress with verbs like *v́stríg* where present tense forms have fixed ending stress, which contrasts with the related past tense forms which have stem-final stress. The opposition in pattern C in verbal paradigms like *vž́ ív* is more subtle, but equally coherent. Thus, there is a basic opposition again between present and past tense forms, except in this pattern the opposition goes in a different direction. Specifically, past tense forms generally have initial stress (excluding feminine past tense forms), while present tense forms have ending stress. As for the ending stress in the feminine forms, this pattern is the manifestation of a different morphological opposition, namely between masculine and feminine forms. There is abundant evidence in Russian for such an opposition, as illustrated with the following contrasts in derived nouns (see especially Halle 1973a: 340 ff.). In masculine-feminine

[9]According to Halle 1973a, fixed inflection stress is the predominate pattern in athematic verbs, which contrasts with noun stress where fixed stem stress is the most common. It is not clear if this difference is significant, given the vast differences in the baselines for each system (there are far fewer verbs than nouns in Halle's samples).

noun pairs derived with the suffix *-Ok*, for example, if the stem is unaccented the noun pairs differ in stress, e.g., *pastuš kí* versus *pastúš ki* '(dear little) shepherds/shepherdesses'. This pattern is more akin to pattern D stress, as it is an opposition between ending stress (masculine) and stem-final stress (feminine), but the overall point still holds: the stress system is being used to mark an opposition between two grammatical classes. In sum, while pattern C stress appears to be somewhat complicated, the mobile stress patterns in verbs can be cogently described in terms of a contrast between pairs of grammatical classes, which is directly on a par with the singular-plural oppositions found in nominal mobile stress patterns. So, once these tools have been developed for noun stress, they may be straightforwardly extended to verbs, as is done in the case study on Russian derived nouns in chapter 5.

The comparison between noun and verb stress given above shows two things. First, it shows that the principle of root-control employed in the analysis of noun stress applies with equal force in verbs to describe the two patterns of fixed stress (patterns A and B). Second, it draws explicit parallels between the morphological oppositions found in nouns and verbs, which in turn suggests that these patterns of mobile stress (i.e., patterns C and D) should be treated together. The productive patterns of prefixation in verbs present a further empirical domain in which to test the RCA hypothesis because such patterns yield prefix + root structures which are directly relevant for this analysis. Remarkably, it turns out that the only pattern of verb stress that is affected by prefixation is pattern C (Melvold 1990). That is, fixed stem stress and fixed ending stress are generally not affected by prefixation (excluding one prefix to be discussed below). Furthermore, pattern D stress is generally not changed in prefixed verbs. This finding is highly significant because if the Russian stress is modelled in terms of root-control, prefixes should have no effect on fixed stem stress at all, as I have shown above with the inflectional suffixes. In what follows, I examine the effect of prefixation on pattern C stress and consider its implications for root-controlled accent in Russian. Then, the discussion is generalized to prefixes in nouns, which are far less productive, but show a related pattern.

Verbs which show pattern C stress show a related pattern when the verb root is combined with a prefix, as illustrated below with some past tense forms.

(29) Past Tense forms with *√ž iv* 'live'; *pro-ž iv* 'live (a period of time)'

Masculine	ž í-l	pró-ž i-l	pro-ž í-l
Feminine	ž i-lá	pro-ž i-lá	pro-ž i-lá
Neuter	ž í-lo	pró-ž i-lo	pro-ž í-lo
Plural	ž í-li	pró-ž i-li	pro-ž í-li
		Standard	Colloquial

Recall from above that pattern C stress shows root-initial stress in all the past tense, save the feminine past form. In prefixed verbs, the same pattern of mobile stress may hold, which appears to correspond to a more prevalent, perhaps colloquial usage. Alternatively, initial stress in the non-feminine forms may be extended to word-initial stress, with stress falling on the first syllable of the prefix, which corresponds roughly to the standard pronunciation one might learn in school.[10] It is clear, however, that these two patterns are simply different realizations of pattern C stress, with some variation in the delimitation of the domain to which initial stress is assigned.

[10]Melvold 1990: 299 mentions in passing that it appears that if a 'standard' pronunciation is possible, so too is the 'colloquial' stress pattern. Perhaps this tendency reflects a regularization of root-initial stress in the non-feminine forms.

This pattern of variation, while it may yield stress on the prefix, is fully consistent with the assumption that accent is root-controlled. Succinctly, the roots in these contexts cannot be inherently accented, and so the prefix is not 'in competition' with an accented root. To flesh out the logic more concretely, the chief diagnostic for accented roots is fixed stem stress; pattern C stress does not have fixed stem stress, and so it follows that the verb roots with pattern C mobile stress are not inherently accented. Furthermore, since overriding root accent is only found in words with both an accented root and an accented affix, these data do not reveal anything about the hypothesis that accent is root-controlled in Russian. This reasoning is more or less consistent with most previous generative approaches to this pattern because mobile stress of this kind is only possible in words with unaccented roots (Halle 1973, 1996, Melvold 1990, Idsardi 1992). In §5.2.3, I will also develop an analysis with this assumption, which will establish this point more solidly with a specific analysis.

There is one prefix that is consistently accented in certain contexts, which may even have the effect of stealing the accent from an inherently accented root. This is the prefix *vi-* 'out-', which perfectivizes the stem it attaches to (a general property of verbal prefixes in Russian). As illustrated below, *vi-* is always stressed in the perfective, but never in the imperfective.[11]

(30) Derived Verbs with *vi-*

	Perfective	Imperfective	
p'isát'	ví-p'isat'	vi-p'ísivat'	'write/write out'
skazát'	ví-skazat'	vi-skázivat'	'say/express'
vest'í	ví-vest'i	vi-vod'ít'	'lead out

This verbal prefix therefore appears to pose a challenge to the root-controlled analysis because it competes with an accent from a root and wins in perfective forms. However, the accentuation of derived imperfectives shows that the pattern is more complicated, involving an intricate interplay between the imperative to stress *vi-* and the patterns of stem and ending stress required in the imperfectives. Given that *vi-* is the sole prefix showing this pattern in the entire language (including some twenty productive verbal prefixes), rather than abandon the root-controlled analysis, it seems sensible to construct an analysis of *vi-* which accounts for its peculiar behavior. In chapter 5, I analyze this prefix on a par with other affixes which idiosyncratically delete the accent of the stem to which they attach (the so-called 'dominant affixes'). On this analysis, the behavior of the imperfectives falls out quite naturally from the fact that the perfective forms serve as the input to derived imperfectives, which also induce a specific morpho-accentual process, namely pre-accentuation.

Finally, I will conclude the discussion with a brief look at prefixed nouns. Prefixation in nouns and adjectives is far less important than in verbs as most prefixes vary between having a low degree of productivity and being completely unproductive. According to Townsend 1975, there are two basic types of prefixed nouns, shown below.

[11]Browne 1978 notes the following exception: *vígljadet'* 'look like, appear' which is necessarily an imperfective given its inherent meaning.

(31) Two Types of Prefixed Nouns (Townsend 1975)

a. Nouns with prefixes based on prepositions used in prepositional phrases

bez-rabót'ica	'unemployment'	bez rabóti	'without work'
za-kavkáz'o	'Transcaucasia'	za Kavkázom	'beyond the Caucasus'
pod-lésok	'underbrush'	pod lésom	'under the forest'

b. Nouns with prefixes added to independent words

ne-	'non-'	ne-znán'ie	'ignorance'
pod-	'sub-'	pod-grúppa	'sub-group'
pra-	'proto-'	pra-jazík	'proto-language'
so-	'co-'	so-ávtor	'co-author'

Given the paucity of examples, no clear patterns emerge concerning stress in prefixed nouns. A handful of prefixes in my sample, however, surface with stress, e.g., *pr'í-gorod* 'suburb' and *prá-ded* 'great grandfather', which of course requires some thought. One sound line of analysis for these cases is that they pattern with the prefixed verbs discussed above with pattern C stress. This tack is invariably the case with *pr'í-gorod*, as *gorod* is an independent word with mobile stress (and thus has an unaccented root). Moreover, the fact that one type of nominal prefix is derived from a preposition further supports this parallel, as most verbal prefixes are also derived historically from prepositions (Townsend 1975). A final piece of evidence bearing on this comparison between prefixed verbs and nouns is that prepositions were at one time included in the stress domain to which initial stress is assigned in pattern C mobile stress (see Halle 1973a: 318-19). Thus, while the stem *gorod* receives initial stress in the present day prepositional phrases shown below, the historically prior pattern had stress on the preposition.

(32) Stress in Prepositional Phrases

za górod < zá gorod	'out of town (to the countryside)'
za górodom < zá gorodom	'outside of town (in the countryside)'

Thus, it is clear that prefixed nouns with stress on the prefix may be approached in terms of pattern C stress, which, as clarified above, is consistent with the root-controlled accent analysis.

To bring this case study to a close, I have examined the full range of stress patterns in underived nouns and verbs and constructed an analysis of most of these patterns which is consistent with the restricted edge effects derived in §3.1. Thus, while there are many previous analyses of Russian stress which describe certain patterns in terms of unrestricted edge orientation, an analysis in terms of root-controlled accent is also possible, and indeed, highly desired because it is consistent with a restrictive theory of edge effects. Furthermore, I have examined a range of prefixed structures, with an eye towards evidence for or against the two basic analyses, and this investigation has only turned up one context which might pose a problem for the RCA hypothesis, namely verbs with the prefix *vi-*. As I suggested above, the peculiar behavior of this prefix may be analyzed in terms of a morpho-accentual process involving deletion, as will be shown in chapter 5, so this case does not provide compelling evidence one way or the other. I conclude, therefore, in favor of the RCA analysis of Russian, chiefly because it is consistent with Restricted Edge Orientation. Chapter 5 will present additional arguments in favor of this approach.

3.3 Extended Case Study: Tokyo Japanese

The primary goal of this section is to consider the implications of the Root-Controlled Accent (RCA) hypothesis for the accent system of Tokyo Japanese. This goal is achieved by first proposing an analysis of the basic facts of Japanese word accent in terms of root-control and then studying the consequences for accent in affixed words. The analysis of the basic facts also satisfies a secondary goal of this section, which is to establish a consistent set of assumptions which will be necessary in the treatment of the various morpho-accentual processes in Japanese examined in chapter 5.

A first pass through the literature on Japanese accent[12] would lead one to the conclusion that Japanese constitutes a counter-example to the RCA hypothesis as affixed structures have been described in terms of a principle of edge orientation, namely 'the leftmost inherent accent wins'. Thus, a BAP-like (Basic Accentuation Principle, Kiparsky & Halle 1977) rule has been used to account for the fact that stem accent wins out over various inherently accented suffixes, such as the conditional suffix *-tára*, e.g., /yóm + tára/ → *yón-dara* 'if he reads', cf. /yob + tára / → *yon-dára* 'if he calls'. This stem and suffix interaction is of course consistent with a RCA-driven analysis, but the two analyses differ in their treatment of prefix accent. The analysis which employs the BAP predicts that inherent accent in a prefix will override accent in a root. In contrast, the RCA hypothesis predicts the absence of such a pattern and overriding root accent, as seen in Cupeño. The basic finding here is that there are no prefixes which override root accent, which provides empirical support for the analysis in terms of root-control. This analysis is also motivated on theoretically grounds because it is compatible with a restrictive theory of edge effects and explains resolution of accent in Japanese as a general pattern of root privilege.

This section is organized as follows. I begin with the necessary preliminaries in §3.3.1, presenting the essential features of word accent in Tokyo Japanese and some basics of Japanese word structure. The next subsection (§3.3.2) gives a constraint-based analysis of the basic accentual system and clarifies the predictions of the RCA hypothesis. Taking a slight detour, I examine the accentuation of noun-noun compounds in §3.3.3, as compounds are directly relevant to prefix accent, and I present a new analysis of this construction. The set of assumptions motivated up to this point in the study will then be applied in §3.3.4 to the analysis of the various influences of prefixation on word accent. Finally, I close the section by showing that the various types of prefixes are in fact consistent with the predictions of the RCA hypothesis, which supports the overall argument that word accent in Japanese is root-controlled.

3.3.1 Background

A basic fact in Japanese is that accent is contrastive, both for the position of accent and its presence or absence in a word. Thus, accent alone may introduce contrast among otherwise identical words, as shown below with some examples familiar from McCawley 1968.

(33) Contrastive Accent

hási 'chopsticks' hasí 'bridge' hasi 'edge'

[12]The phonetics and phonology of Standard Tokyo Japanese and other Japanese dialects have been extensively investigated; see McCawley 1968, Chew 1973, Haraguchi 1977, 1991, Poser 1984, Beckman 1986, Beckman & Pierrehumbert 1986, Pierrehumbert & Beckman 1988, Kubozono 1988 [1993], and references therein.

The convention I use to mark accent is to place an acute accent directly on the accented vowel, which differs from some work where the accented vowel directly after that vowel, e.g., *ha'si* 'chopsticks'. This accent marks a tonal event in which pitch drops directly after the accented vowel (illustrated below); thus, accent in Japanese differs from accent in Russian and Cupeño, where pitch is not a primary correlate to surface accent.

The position of accent is contrastive in Japanese, but not all positions in a word may bear accent. In syllables greater than a single mora, the pitch accent always falls on the first mora. This restriction on the inventory of accentual contrasts also has important consequences in various accentual rules. For example, foreign words typically receive accent on the syllable containing the third mora from the end of the word. Thus, the pre-antepenultimate mora is accented if it and the subsequent mora are tautosyllabic, e.g. *hambáagaa* 'hamburger'. Based on evidence such as this, Japanese is often referred to as a 'mora-counting', but 'syllable-accenting' accent language (see McCawley 1968: 133 ff. and Poser 1990a for discussion and additional evidence).[13]

A second important qualification concerning the distribution of surface accent is that contrastive accent is largely a property of nouns (see Smith 1997 for extensive discussion and analysis). Other word classes, such as verbs and adjectives, conform to certain regular patterns with accent typically falling on the syllable with the penultimate or antepenultimate mora. Furthermore, loans exhibit some accentual regularities, with accent mostly falling on the antepenultimate, pre-antepenultimate, or initial mora of the word. Following previous accounts (e.g., Katayama 1995, 1998, Kubozono 1995, Smith 1997; see also Zubizarreta 1982, Abe 1981, and Bennet 1981), I assume that these regularities are due to an effect of an Alignment constraint which requires an accentual prominence to appear on the head of a prosodic foot.

Concerning phonological phrasing, words are grouped into phonological constituents, called minor phrases, which are in turn organized into so-called major phrases[14]. Minor phrases are characterized by two important facts. First, a minor phrase may only have a single pitch accent, meaning that there can only be one rise and fall in f0 per minor phrase. Also, in phrases where the first mora is unaccented, there is a rise in pitch to the second mora, which then rises to a following accent, if there is one, and gradually falls to the final syllable if the phrase has no accent. This rise at the onset of a phrase is often referred to as 'initial lowering'. The basic features of minor phrases in Japanese are illustrated by the pitch contours given below.

(34) F0 Contours of Minor Phrases

ínoti desu	kokóro desu	atamá desu	miyako désu
'it's a life'	'it's a heart'	'it's a head'	'it's a city'

As shown by the above examples, each minor phrase begins at a low point for f0, rises to a high point over and beyond the second mora of the word. In words with accent on the initial syllable, as with the first example, there is a smaller rise from a higher, or 'weak' low, at the onset of the first mora, an effect which is also observed in phrases which begin with syllables containing two moras (see Pierrehumbert & Beckman 1988 for further

[13]Another restriction on the distribution of accent is that there is an avoidance of devoicing accented vowels. The interaction between accent and vowel devoicing is very complex, involving both phonological and phonetic factors. It is not clear, therefore, to what extent vowel devoicing restricts the phonological inventory of accentual patterns (see Tsuchida 1997 for extensive discussion of this interaction).
[14]The terminology is due to McCawley 1968, cf. 'accentual phrase' and 'intonational phrase' of Pierrehumbert & Beckman 1988.

discussion). In addition, each example has a fall in pitch somewhere in the phrase, and as mentioned above, this fall directly follows the inherently accented vowel.

An important qualification which is needed before we can proceed is that I develop an analysis of accent in words, not minor phrases. While there are important similarities between words and minor phrases, there is also an important difference. As noted in Poser 1984, the generalization concerning edge orientation in Japanese accent is absolute in minor phrases, but this same generalization is subject to exceptions in words. For example, Japanese has a set of so-called 'dominant' suffixes which steal accent from the stem, counter-exemplifying the claim that the leftmost accent wins. For this reason, we focus here on word accent, leaving aside the problem of initial lowering and the observed edge orientation in phrasal accent (as this accent is certainly of the restricted type). The problem of immediate interest therefore is the characterization of the fact that inherent accent is contrastive in Japanese words.

Before moving to the analysis of contrastive accent, I will briefly review some basic features of Japanese morphology which will be relevant in the subsequent analysis.[15] Concerning the concatenative morphology, affixation is mostly agglutinative. While affixes of both Sino-Japanese (SJ) and native origin are common, SJ affixes tend to be more productive (as they have most recently been introduced). Japanese has a rich inventory of suffixes, several of which will be examined in chapter 5, but a great many of these tend to behave like the second member of a compound (see Appendix I of McCawley 1968 for a long list). As for the prefixes, they are fewer in number, and attach mostly to nouns, but a few do attach to adjectives, e.g., *hi-* 'slight', *o-* 'honorific', *ko-* 'slight', and *o-* may also attach to verbs, but the result is an adjective. Japanese also has several recently borrowed English prefixes, as in *suupaa-* 'super-', *nyu-* 'new', *posuto-* 'post', *mini-* 'mini', and these tend to pattern with the Aoyagi prefixes (meaning that words that contain them may have two rises and falls in pitch, see §3.3.4).

Another very important word-forming process in Japanese is compounding. Concerning noun-noun compounds, there appears to be two basic types (see Poser 1984: 47 ff. and Otsu 1980).[16] The first type are the so-called *dvandva* compounds, as in *eda-ha* 'branches and leaves' (eda + ha) and *kúro-siro* 'black and white' (kúro + síro). As illustrated with these examples, *dvandva* compounds involve semantic conjunction of two morphemes and are characterized by the lack of Rendaku voicing in the first obstruent of the second member. Most noun-noun compounds, however, are not of the *dvandva* type. Non-*dvandva* compounds, referred to as 'loose compounds' by Otsu, show sequential voicing and semantically involved modification of one member by another. For example, the initial obstruent is voiced in the following examples: /ori + kami/ → *ori-gami* 'folding paper' and /yama + tera/ → *yama-dera* 'mountain temple'. While the accentuation of *dvandva* compounds is straightforward, following the pattern of 'leftmost accent wins' observed in minor phrases, accent in loose compounds is far less straightforward. As the proper treatment of loose compounds bears directly on the analysis of the accentuation of prefixes, this classic problem will be studied in detail in §3.3.3 where an analysis is proposed in terms of Word Binarity constraints and default-to-opposite edge orientation.

With this linguistic background, we may now proceed to the analysis of the basic accentual system of Japanese.

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[15]This characterization of Japanese morphology draws heavily on Kageyama 1982, Abe 1985, Shibatani 1990 §10 and Bloch 1946a,b.

[16]Otsu actually distinguishes among three types of compounds, including a less well defined class of 'strict compounds' which are semantically opaque and do not undergo Rendaku.

3.3.2 Analysis of Japanese Word Accent[17]

Consistent with the theoretical assumptions laid out in the introduction, the lexical-to-surface mappings for the content words in (34) will be represented as the input-output mappings given below. That is, inherent accent is represented with a lexical prominence (marked here with an acute accent) which is mapped onto surface forms with the corresponding prominence structure. This surface prominence structure is aligned with a pitch accent, H*L, which in conjunction to other rules of phonetic implementation, accounts for the phonetic differences among these words.

(35) Contrastive Accent in Nouns

/ínoti/	→	ínoti	'life'
/kokóro/	→	kokóro	'heart'
/atamá/	→	atamá	'head'
/miyako/	→	miyako	'city'

The lexical-to-surface correspondence in prominence structure is governed by the Prosodic Faithfulness constraints (see §1.2 for the formal definitions). In the usual way, the accentual contrasts observed in Japanese are accounted for by ranking the PROS-FAITH constraints above a set of Markedness constraints: PROS-FAITH >> 𝕄. The dominated Markedness constraints in Japanese are given below.

(36) Dominated Markedness Constraints

ALIGN-L(PM, PrWd): Prominence must be aligned to the left edge of prosodic word.

ALIGN-R(PM, PrWd): Prominence must be aligned to the right edge of prosodic word.

NONFINALITY: The head (foot, syllable) of the prosodic word must not be final.

With these Markedness constraints dominated, the accentual contrasts allowed in the input will be mapped onto corresponding outputs, as depicted below.

(37) Prosodic Faithfulness derives Positional Contrast

	Input		Output	PROS-FAITH	ALIGN-R	ALIGN-L	NONFINAL
a.	/ínoti/	→	ínoti		*		
			*inotí	*!		*	*
b.	/kokóro/	→	kokóro		*	*	
			*kókoro	*!	*		
c.	/atamá/	→	atamá			*	*
			*atáma	*!	*	*	

These input-output pairs do not reveal all of the intricacies of a fully articulated constraint system, which would be too cumbersome here (but see analysis of compounds presented

[17]This analysis presented here has been inspired by the work of Katayama 1995, 1998, Smith 1997, and Kubozono 1995.

below for more detail). However, they do show the important rankings which will be relevant for later analysis. First, the ensemble of PROS-FAITH constraints must outrank the two Alignment constraints. If this ranking did not hold, then non-final accents in the input would be paired with right-aligned accents in the output, as in the failed candidate in (37a); and conversely non-initial lexical accents would be left-aligned (37b). It is also necessary to assume also that PROS-FAITH dominates NONFINALITY because words with accent on the last mora do not shift accent to a non-final mora (37c).

The role of the two Prosodic Faithfulness constraints, MAX-PROM and NO-FLOP-PROM, is clear from this brief illustration: lexical prominences are not deleted or not shifted in these input-output pairs. The role of DEP-PROM, on the other hand, is less transparent, but still crucial in the overall analysis. High-ranking DEP-PROM accounts for the fact that a default accent is not inserted in words like *miyako*, which do not have a surface pitch accent. Therefore, the ranking of DEP-PROM above a constraint calling for a prominence in every word, i.e., HEADEDNESS(PrWd) of Selkirk 1995 [1996] (see §1.2.2.3), accounts for the faithfulness to the absence of underlying accent. Together with MAX-PROM, DEP-PROM effectively accounts for the second accentual contrast between accented and unaccented words.

The positional and accented/unaccented contrasts shown above motivate the ranking of the Prosodic Faithfulness constraints above a set of Markedness constraints. The limitation of accent to the initial mora of a syllable shows that PROS-FAITH is also dominated. For concreteness, I follow Haraguchi 1991 in assuming that this restriction is due to a high-ranking constraint which requires the prominence to appear on the head mora of a syllable, which in a bimoraic syllable is the first mora in Haraguchi's analysis. Thus, I assume that the 'syllable-accenting' character of Tokyo Japanese is accounted for by ranking ACCENT-TO-HEAD(σ) above PROS-FAITH constraints, though nothing crucial hinges on this assumption.

The various Prosodic Faithfulness constraints have not thus far been distinguished for their position in the word, and as entailed by the Root-Controlled Accent hypothesis, these constraints are sensitive to the distinction between roots and affixes. Thus, Japanese, like all languages, has the constraint ranking given below.

(38) Root-Controlled Accent in Japanese

$$\text{PROS-FAITH}_{\text{Root}} \gg \text{PROS-FAITH}_{\text{Affix}}$$

This ranking, which is an inherent ranking that does not need to be learned in Japanese, is responsible for the preference for realizing accent in stems over accent in suffixes. Thus, on a par with the same set of results in Cupeño and Russian, inherently accented suffixes lose their accent when they attach to accented stems, as in /yóm+tára/ → *yón-dara* 'if he reads', because $\text{PROS-FAITH}_{\text{Root}}$ is ranked above $\text{PROS-FAITH}_{\text{Affix}}$. The same inherent ranking predicts that inherent accent in stems will win out over inherent accent in prefixes, and this prediction is studied in detail in the final subsection of this case study.

The ranking given below summarizes the basic results established thus far in the analysis (the four lowest rankings constraints are in an unordered stratum).

(39) Japanese Word Accent (Interim Ranking)

ACCENT-TO-HEAD(σ)
|
PROS-FAITH$_{Root}$
|
PROS-FAITH$_{Affix}$
|
{ALIGN-R, ALIGN-L, NONFINALITY, HEADEDNESS(PrWd)}

With ACCENT-TO-HEAD(σ) ranked above the Prosodic Faithfulness constraints, lexical prominence will be limited to the first mora of a heavy syllable, the head mora of the syllable. The Prosodic Faithfulness constraints in turn dominate a set of Markedness constraints, which accounts for two kinds of accentual contrasts observed in the system. First, the contrast in the position of accent is derived by ranking PROS-FAITH above three constraints which require accent to appear at the left or right edge of the PrWd or in non-final positions. Second, the ranking of the Prosodic Faithfulness constraint DEP-PROM above HEADEDNESS(PrWd) accounts for the contrast between accented and unaccented words by banning the insertion of non-lexical prominence. An important empirical point is that this ranking pairs unaccented lexical words with unaccented surface forms, which will be crucial in the analysis of morphologically de-accented structures in chapter 5.

3.3.3 Analysis of Noun-Noun Compounds

An examination of noun-noun compounds in Japanese is essential for two reasons. First, it will enable us to establish some ranking relations that have not yet been established in the analysis of the basic facts given above. The analysis of compound accent, therefore, will clarify some important constraint rankings which will be needed in the characterization of default accentual patterns elsewhere in the system (investigated in detail in chapter 5). A second reason for studying compounds, which will become more apparent in the next subsection, is that many prefixes behave like the first member of a compound. Thus, a thorough account of prefix accent will first require an analysis of compound accent.

The accentuation of noun-noun compounds is a classical problem in Japanese phonology which has led to many contributions to the study of Japanese accent, including Martin 1952, Hirayama 1960, Chew 1964, McCawley 1968, Hiraguchi 1983, Poser 1984, 1990a, and Kubozono 1988 [1993], 1995, 1997. It is not possible to review all of this work here, nor is it desirable, as a thorough review would lead us too far afield. It is, however, necessary to be clear on some empirical matters, which involve comparing two recent analyses, namely Poser 1990a and Kubozono 1995.

Excluding *dvandva* compounds from the picture, the description of noun-noun compounds involves determining a 'default' position for accent; this accentual default is sensitive to the prosodic size of the second member. Thus, if the second member is 'long', i.e., trimoraic or greater, then the default position for accent is the first syllable of the second member, as shown by the behavior of compounds in which neither member has an inherent accent, e.g., /me + kusuri/ → *me-gúsuri* 'eye wash'. On the other hand, when the second member is 'short' (two moras or less), then the characterization of the default position depends on certain assumptions about how to treat exceptions. Following Chew 1964, Poser 1990a describes two distinct default patterns in compounds with short second position nouns: (i) word-final accent in the first member (N_1) when the second member (N_2) is unaccented (with some exceptions), as in /kábuto + musi/ → *kabutó-musi* 'beetle', and (ii) unaccented compounds when the second member is accented on the final syllable,

e.g., /garasu + tamá/ → *garasu-dama* 'glass bead'. Kubozono 1995 reduces this two-fold pattern to a single accentual default, namely default final accent in N_1, by assuming that compounds surfacing without an accent are exceptional and are treated on a par with other exceptions. I follow Kubozono's descriptive approach here because, as he shows quite convincingly, this approach enables a unification of certain generalizations about extrametrical elements. Let us first consider Kubozono's generalizations and see how this unification applies to particular examples.[18]

While Kubozono describes the default patterns in foot-based terms, it is possible to achieve the same descriptive insight without this construct, and this is the spirit in which the following generalization is formulated.

(40) Noun-Noun Compounds in Tokyo Japanese (after Kubozono 1995)

> If the second member of a noun-noun compound has an inherent accent on a syllable other than the final syllable, keep it. Otherwise, assign a default accent.

The difference between noun-noun compounds and nouns generally is therefore that compounds introduce a kind of final syllable extrametricality; and in cases where the second noun is unaccented (either lexically or through extrametricality), a special accentual principle applies. Employing the long versus short distinction mentioned above, this principle assigns accent to a default position, which is characterized as follows.

(41) Default Accent with Long and Short Distinction (cf. Poser 1990)

a. Default with long N_2: if $N_2 \geq \mu\mu\mu$, accent the first syllable of N_2.

b. Default with short N_2: if $N_2 \leq \mu\mu$, accent the last syllable of N_1.

Moving now to some examples, this set of generalizations gives the correct results for compounds with a long second member, as illustrated below.

(42) Compounds with Long Second Member

a.	/oo + kámakiri/	→	oo-kámakiri	'big mantis'
	/yámato + nadésiko/	→	yamato-nadésiko	'Japanese lady'
	/nise + karakása/	→	nise-karakása	'paper umbrella'
b.	/ne + syoogatú/	→	ne-syóogatu	'lazy New Years holiday'
	/áisu + koohíi/	→	aisu-kóohii	'ice coffee'
	/minami + amerika/	→	minami-ámerika	'South America'

Starting with the examples in (42a), the accent of N_2 is non-final, and so it is preserved in the surface form. The examples in (42b), on the other hand, show the initial default pattern in words of this type. If N_2 has accent on the final syllable, as in the first two examples, it cannot be preserved because of final syllable extrametricality, and so these forms receive

[18]While I follow Kubozono in admitting a set of exceptions to be accounted for in some other way, I will not go into them in detail here, as that would lead us too far from the focus of this section. But see Kubozono 1995 for some attractive proposals.

default initial accent. Lastly, if the second member is unaccented, it also receives initial accent, as shown with *minami-ámerika*.

Concerning compounds with a short second member, the same basic accentual principles are at work, but we find a different default pattern. Hence, if a non-initial syllable is accented, then this accent is preserved in the output, as shown below in (43a). If, however, N_2 has final syllable accent, or is unaccented, the resulting compound surfaces with final accent on the first member of the compound, a strikingly different pattern from the forms in (42) above.

(43) Compounds with Short Second Member

a.	/maikuro + básu/	→	maikuro-básu	'micro-, mini-bus'
	/faasuto + kísu/	→	faasuto-kísu	'first kiss'
b.	/témuzu + kawá/	→	temuzú-gawa	'Thames River'
	/míito + pái/	→	miitó-pai	'meat-pie'
	/kuwagáta + musi/	→	kuwagatá-musi	'stag bettle'
	/kensetu + syoo/	→	kensetú-syoo	'Ministry of Construction'

The importance of Kubozono's generalization is therefore that it employs the principle of final syllable extrametricality across the board, that is, in all noun-noun compounds (40). This approach differs, therefore, from Poser's 1990a approach in which compounds with long N_2's are assumed to have an extrametrical foot, while short N_2's are not subject to an extrametricality requirement. Kubozono has thus clarified a pattern that applies to compounds with both long and short second members and also broadened the empirical coverage of the analysis to cases like /nise + karakása/ → *nise-karakása* (where Poser's analysis predicts default initial accent). A final point is that the generalization given in (40) is formally different than Kubozono's characterization of default accent, which essentially states that default accent falls on the non-final foot derived with a foot-parsing algorithm. The system used here is descriptively identical to Kubozono's, however, because it gives the same default for compounds with short and long second members. It differs only in the theoretical assumption that the default is derived in terms of feet.

To focus the following discussion, consider the following observations.

(44) Salient Observations in Noun-Noun Compounds

a. Final Syllable Extrametricality: the final syllable of the whole compound is ineligible for accent.

b. De-Accentuation of N_1: all initial members are treated as unaccented.

c. Prosodic Minimum on Accented Noun: a preference is given to positing accent on nouns larger than two moras.

d. Default-to-Opposite Edge: if the accent occurs in N_1, it is rightmost; if it occurs in N_2 (and N_2 is unaccented), it is leftmost.

The first two observations are rather straightforward, and it is clear how to proceed in analyzing them. Thus, following Kubozono 1995 (see also Poser 1990a), I will treat the

extrametricality effects as the result of a NONFINALITY constraint (Prince & Smolensky 1993), though some additional assumptions are necessary to make the analysis consistent with the constraint system given in §3.3.2 (see below). As for the observation in (44b), morphological processes often correlate with the neutralization of an accentual contrast; indeed, there is abundant evidence in Japanese for such a morpho-accentual process. Therefore, in completing the picture here, it seems sensible to approach this pattern as a dominance effect induced by the morphological process of compounding, an idea which is originally due to McCawley 1968 I believe. The remaining observations are somewhat more subtle, but as they too have clear precedents in the literature, the parallels found in other languages will suggest a clear line of analysis.

Starting first with (44c), the characterization of the default positions given above show a prosodic requirement on the accented noun: if it is suitably large, accent appears on the second member, but if N_2 does not meet the three mora threshold, accent falls on the first member. Prosodic minima of this kind are very common cross-linguistically, and the standard treatment of this observation is in terms of a binarity requirement on the prosodic structure of the word (McCarthy & Prince 1986 et seq., Hayes 1995, Itô & Mester 1992). Thus, one clear line of analysis is to posit a binarity requirement of some kind on the noun which receives the accent of the larger compound. This approach will require some additional consideration of the internal structure of compounds, essentially positing the binarity requirement on the prosodic head of the compound.

The next question is, once the correct noun has been accented, where does the accent fall? The answer to this question also seems to have clear parallels in other accent systems, as the default patterns for the first and second members show a clear pattern of default-to-opposite edge accent. Thus, if the first member is accented, accent falls on the final syllable. This pattern is in contrast to the accentuation of the second member, which receives initial accent by default (in cases where lexical accent is not preserved). I analyze this pattern in the same way as in other languages, modelling this effect in terms of constraint conflict between different Alignment constraints. To sum up the new ideas, I propose to use a binarity requirement on the head of the prosodic compound to describe the prosodic minimum on the accented element; once this contextually determined head is identified, the constraint rankings for default-to-opposition edge tropism will take effect, explaining the conflicting edge effects.

Starting first with the effect of final syllable extrametricality, there are two important differences between the behavior of accent in noun-noun compounds and nouns generally that need to be addressed. First, bare nouns may have final syllable accent, but compound nouns may not. Furthermore, as shown in the previous subsection, the default accentual pattern for nouns is to be unaccented, but with compounds, the default pattern is either word-initial accent (with long N_2) or word-final accent (with short N_2). These disparities in the inventory of possible accent patterns and the characterization of accentual defaults call for some new theoretical developments which I will now introduce.

The presence of an accentual contrast of the final syllable in non-compound nouns shows that NONFINALITY is dominated by the Prosodic Faithfulness constraints. This ranking, however, cannot be the same ranking which is responsible for the distribution of accent in compound nouns because in this context final accent is not possible. To deal with this restriction, I propose to relativize NONFINALITY to a different prosodic category for compounds than the one already in use for bare nouns, namely PrWd. Thus, I will employ a higher level prosodic category which I will provisionally call P-Comp, for prosodic compound (see Peperkamp 1997 and references therein). The prosodic words which dominate the segments of the nouns are thus grouped together under one P-Comp, as shown below.

(45) Proposed Structures for Compounds

As a prosodic category, P-Comp must have a head. While the best P-Comp is right-headed, meaning the structurally subordinate PrWd head is on the right as in (45a), it may also be left-headed (45b) under duress, i.e., when the second member does not meet the prosodic size requirement for heads. The constraint interaction which derives these results will be returned to below.

Returning to the matters at hand, the proposed structures for noun-noun compounds solves the two problems outlined above in one stroke. Thus, extrametricality effects observed only in compounds may be explained by relativizing NONFINALITY to P-Comp and ranking this constraint as shown below. With the relativized NONFINALITY$_{P\text{-}Comp}$ constraint ranked above the Prosodic Faithfulness constraints (46a), the effect is that accent may not appear in the final syllable of compounds, but may in nouns otherwise. Furthermore, it is natural to posit a head PrWd of P-Comp. Since it is a fundamental characteristic of headed structures is to have an accent, the constraint responsible for this accent-to-head tropism may be ranked above DEP-PROM to give the required accent in compound nouns (46b).

(46) Final Syllable Extrametricality Effects

a. NONFINALITY$_{P\text{-}Comp}$ >> PROSFAITH: preserve the accent of N_2, unless it appears in the final syllable of the compound.

b. ACCENT-TO-HEAD(P-Comp) >> DEP-PROM: the head of the compound must have an accent.

The following two tableaux illustrate the results of these rankings. Starting with (46a), because NONFINALITY$_{P\text{-}Comp}$ dominates the Prosodic Faithfulness constraints, final syllable accent is not allowed in this construction, as illustrated below. Accent in the second member is preserved if the satisfaction of Faithfulness does not lead to a violation of NONFINALITY$_{P\text{-}Comp}$, as in the input-output pairs in (47a) and (47b). On the other hand, if satisfaction of PROS-FAITH leads to violation of NONFINALITY$_{P\text{-}Comp}$, a default pattern is assigned, as in (47c) and (47d).

(47) Final Syllable Extrametricality Effects

Input		Output	NONFINAL$_{P\text{-}Comp}$	PROS-FAITH
a. /yámato + nadésiko/	→	yamato-nadési⟨ko⟩		
		*yamato-nádesi⟨ko⟩		*!
b. /nise + karakása/	→	nise-karaká⟨sa⟩		
		*nise-káraka⟨sa⟩		*!
c. /ne + syoogatú/	→	ne-syóoga⟨tu⟩		*
		*ne-syooga⟨tú⟩	*!	
d. /áisu + koohíi/	→	aisu-kóo⟨hii⟩		*
		*aisu-koo⟨híi⟩	*!	

The second ranking in (46) describes the fact that compounds are, as a rule, always accented. Thus, by ranking ACCENT-TO-HEAD(P-Comp) above DEP-PROM, the PrWd head of the P-Comp must have an accent, as shown below. (The head of the P-Comp is underlined.)

(48) Obligatory Accent Insertion in Compounds

/minami + amerika/	ACCENT-TO-HEAD(P-Comp)	DEP-PROM
→ minami-<u>á</u>merika		*
minami-<u>a</u>merika	*!	

To summarize, the typical pattern for compounds is for them to be accented, which differs from bare nouns, which are preferentially unaccented in some contexts because DEP-PROM dominates ACCENT-TO-HEAD(PrWd). Furthermore, noun-noun compounds differ from nouns in general because they are subject to final syllable extrametricality; this fact requires the domination of the PROS-FAITH constraints by the NONFINALITY constraint specific to compounds.

Moving next to the problem of the distinct default positions for accent, as alluded to above, I propose to treat this fact by assuming that long and short compounds are prosodized differently, and as a result, these different prosodic structures yield two distinct defaults. The structural differences stem from a contextually determined position for the head PrWd, which is derived by the following prosodic well-formedness constraint.

(49) WORD-BIN$_{Head}$ (after Itô & Mester 1992)
The head PrWd of the prosodic compound must be binary; in effect, the PrWd prosodic head must be at least trimoraic.

Like the prosodic foot, the prosodic word subordinate to P-Comp is subject to a binarity requirement, essentially requiring a branching structure at the level directly below the prosodic word. The effect of this constraint, when applied to the head PrWd, is that this prosodic head must either consist of a pair of feet, or a foot plus a syllable, giving the effect that the head can be no less than trimoraic (assuming that feet must be binary as well). The constraint WORD-BINARITY$_{Head}$ can therefore be employed in explaining the distinction between short and long N_2's: the three mora minimum needed to satisfy this constraint is exactly on a par with the requirement for the second member to be 'long'. By ranking the

Word Binarity constraint relative to another constraint, ALIGN-R-HEAD, the contextually determined headedness effect mentioned above can be straightforwardly derived. Thus, the force of ALIGN-R-HEAD is that the PrWd head of the compound would like to be the second member, which gives N_2 as the head when N_2 is big enough, i.e., three moras or more, as in (50a). When N_2 is less than trimoraic, however, it cannot be the head PrWd because of high-ranking WORD-BINARITY$_{Head}$. As a result, a marked non-final head is chosen, as illustrated in (50b).[19]

(50) Headedness in Noun-Noun Compounds

a.	Long Second Member	b.	Short Second Member
	[... [μμμ ...]$_{Hd}$]		[[...]$_{Hd}$ μ(μ)]

This proposal is illustrated with the constraint interaction depicted in the following tableau.

(51) Long/Short Distinction via Word Binarity

Input		Output	WORD-BIN$_{Head}$	ALIGN-R-HEAD
a. /yámato + nadésiko/	→	[yamato-[nadesiko]]		
		[[yamato]-nadesiko]		*!
b. /míito + pái/	→	[[miito]-pai]		*
		[miito-[pai]]	*!	

When both the first and second member of a compound are suitably binary, the grammar chooses in favor of a rightmost PrWd head, as shown by the input-output mappings in (51a). But when the preferred PrWd is not large enough, a marked position for the head is chosen, as in (51b).

With these assumptions in place, we are in a position to explain the two default positions for accent in compounds in terms of a phenomenon which has clear parallels in other languages, namely default-to-opposite edge tropism. The analysis unfolds as follows. Accent must be a property of the PrWd head by ACCENT-TO-HEAD(P-Comp), and so when N_2 is long, N_2 must be accented in order to satisfy this constraint. When N_2 is short, on the other hand, N_1 is the head, and so it must be accented. Thus, as illustrated below, by assuming that the default position for accent is at the right edge of the PrWd, in compounds with a short N_2, the accent will be rightmost in the head PrWd by default (52a). In compounds with long N_2's, however, N_2 is the head, and so accent is assigned to the second member. But in just this context, accent cannot fall on the final syllable because the final syllable is extrametical. Accent cannot be rightmost, so it defaults to the left edge (52b).

[19]Concerning the prosodic analysis of compounds with sub-minimal nouns, there are at least two options: (i) they can be directly associated with the P-Comp, or (ii) they can be grouped into a separate PrWd which is in turn dominated by P-Comp. As I do not know of any empirical evidence which can decide between these two analyses, I leave both options open.

(52) Divergent Accentual Defaults as Default-to-Opposite

a. Rightmost Accent with Short N_2 b. Leftmost Accent with Long N_2

[[σ ... σ] + μ(μ)] [... + [σ . . . ⟨σ⟩]]

Let us formalize these ideas with some constraint rankings. Following Baković 1998, I assume that default-to-opposite edge accent follows as a consequence of the domination of one Alignment constraint, which in turn activates a lower-ranking Alignment constraint (see also Samek-Lodovici 1998 and Nelson 1998 for related results and Kenstowicz 1995b and Zoll 1997 on the role of conflicting Alignment constraints in default-to-opposite stress). In particular, the rankings required for 'default rightmost accent, otherwise, leftmost accent', are given below.

(53) Default-to-Edge Orientation in Japanese Compound Accent

NONFINALITY$_{P\text{-}Comp}$ >> ALIGN-R(PROM, PrWd) >> ALIGN-L(PROM, PrWd)

Before demonstrating this result, however, it is necessary to account for the absence of an accentual contrast in the first member. That is, in contrast to N_2, compounding generally suppresses the lexical accents of N_1, in effect making all first members unaccented. Following McCawley 1968 and Kurata 1984, I analyze this as a dominance effect, i.e., a deletion of accent that is triggered by the application of the morphological process itself. As this kind of morpho-accentual process is the topic of a discussion in chapter 5, I will not go into the details of the analysis here, except to say that there is a rankable constraint, DE-ACCENT-N_1, which causes de-accentuation of the first member of a compound because it is ranked above the Prosodic Faithfulness constraints.

(54) Dominance Effect in First Member

DE-ACCENT-N_1 >> PROS-FAITH

Now that all of the ranking arguments have been established, I will demonstrate the results of this system with a series of tableaux. Starting first with compounds that have short N_2's, as shown in the tableau below, when the first member is unaccented, the expected pattern is the observed one, namely rightmost accent in the word (55b). Putting accent on the final syllable of the whole compound, a different rightmost accent, results in a violation of both ACCENT-TO-HEAD(P-Comp) and NONFINALITY$_{P\text{-}Comp}$, and so this option is ruled out (55a). Furthermore, initial accent in N_1 is also marked because it results in a violation of ALIGN-R, which is ranked above ALIGN-L, and so this candidate is eliminated as well (55c).

(55) Rightmost Default with Short Second Member (N_1 is Unaccented.)

/kensetu + syoo/	ACCENT-TO-HEAD	NONFINAL	ALIGN-R	ALIGN-L
a. [[kensetu]-syóo]	*!	*		
b. → [[kensetú]-syoo]				*
c. [[kénsetu]-syoo]			*!	

Rightmost accent in N_1 is also predicted if this noun is accented on a non-final syllable because it will be de-accented by the constraint ranking given in (54), but to compare the

compound structures above with some related compounds with accented N_2's, I return to this result below.

Moving next to compounds with long second members, when such an N_2 has final syllable accent, rather than being faithful to this lexical accent, which would violate high-ranking NONFINALITY$_{P\text{-}Comp}$ (56a), an initial accent is posited, because this candidate fares better on the low-ranking constraint ALIGN-L (56c). Importantly, I assume that violations of the Alignment constraints here are interpreted categorically (see Zoll 1996a for motivation and discussion), and thus, a close-to-rightmost accent, as in candidate (56b), is not good enough. Finally, ALIGN-R cannot be satisfied here by positing an accent in the first member, as in (56d), because this option puts accent on a non-head, which violates ACCENT-TO-HEAD(P-Comp).

(56) Leftmost Default with Long Second Member (N_2 is Accented.)

/ne + syoogatú/	ACCENT-TO-HEAD	NONFINAL	ALIGN-R	ALIGN-L
a. ne-syooga⟨tú⟩		*!		*
b. ne-syoogá⟨tu⟩			*	*!
c. → ne-syóoga⟨tu⟩			*	
d. né-syooga⟨tu⟩	*!			

Thus, while the language on a whole prefers rightmost accent, in compounds with a final head, the extrametricality requirement triggers a default-to-opposite edge effect. Significantly, this result holds regardless of whether the final syllable is inherently accented or not: compounds with unaccented second members also receive default initial accent, as the following tableau shows.

(57) Leftmost Default with Long Second Member (N_2 is Unaccented.)

/minami + amerika/	ACCENT-TO-HEAD	NONFINAL	ALIGN-R	ALIGN-L
a. minami-ameriká		*!		*
b. minami-ameríka			*	**!
c. → minami-ámerika			*	
d. minamí-amerika	*!			

Consistent with the above results, accent is assigned to the head PrWd, hence ruling out (57d). And since ALIGN-R cannot be satisfied because of final syllable extrametricality, the winner is the form with initial accent on the head prosodic word because this candidate does best on ALIGN-L.

The same principles of default edge effects are predicted in structures which are de-accented, as with compounds that have accented N_1's (and short N_1's, which trigger the non-standard left-headed structure). Thus, when the non-final accent of N_1 is deleted, ruling out fully faithful accentuation (58a), the resulting pattern is default right-aligned accent (58b), as observed above with lexically unaccented N_1's.

(58) Dominance Effect in First Member

/kuwagáta + musi/	DE-ACCENT-N_1	PROS-FAITH	ALIGN-R	ALIGN-L
a. kuwagáta-musi	*!			
b. kúwagata-musi		*	*!	
c. → kuwagatá-musi		*		*

This result is in fact consistent with a general prediction made in chapter 5, namely that morphologically triggered de-accentuation of this kind always brings about a default pattern of accent. De-accentuation in compounds is thus consistent with this prediction because it causes default right-aligned accent.

A final puzzle to be dealt with is the Faithfulness effect in compounds like the following: /maikuro + básu/ → *maikuro-bá⟨su⟩*. Such cases have a short second member, and so the first noun is the head of the prosodic compound. Given the ranking of ACCENT-TO-HEAD(P-Comp) over Prosodic Faithfulness, the system currently predicts that accent should fall somewhere in the first member, since it is the head PrWd. This case can be straightforwardly accounted for, however, if we employ the distinction used throughout this thesis, namely the one between the anti-deletion constraint, MAX-PROM, and the anti-insertion constraint, DEP-PROM. Specifically, the desired result can be achieved by ranking these two constraints as shown below.

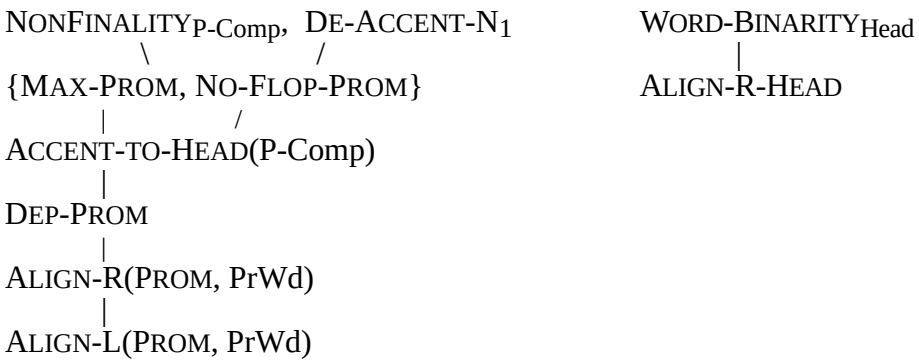
(59) Evidence for the Distinction between MAX-PROM and DEP-PROM

/maikuro + básu/	MAX-PROM	ACCENT-TO-HEAD	DEP-PROM
a. → maikuro-bá⟨su⟩		*	
b. maikuró-ba⟨su⟩	*!		*

Walking through the above candidate set, the loser is out because it fails to realize the inherent accent in *básu* and the constraint governing the realization of inherent accent, MAX-PROM, is ranked above ACCENT-TO-HEAD(P-Comp). The winner therefore is the form that has an accent outside of the head PrWd as a means of satisfying this high-ranking Faithfulness constraint. Crucially, this Faithfulness effect only holds with inherent accent in the second member of a compound, as lexical accents in the first member are wiped out by DE-ACCENT-N_1. Because of this last ranking, inherent accent in the first member is not realized when N_2 is long, which accords with the observed facts.

To summarize the above constraint rankings, I have argued for the following partial ordering of constraints.

(60) Summary Rankings for Noun-Noun Compounds



The second column, with the Word Binarity constraint top-ranked, accounts for the position of the head in the prosodic compound, which was shown to be sensitive to the size of the second member. This context-sensitive headedness effect in turn leads to the analysis of the divergent default patterns in terms of default-to-opposite edge orientation. Because ALIGN-R dominates ALIGN-L, as shown in the first column, the accentual default in compounds with initial heads is rightmost in the word. But when the head is final in the word, ALIGN-R cannot be fully satisfied, and so the lower-ranking Alignment constraint, ALIGN-L, takes effect, giving leftmost accent in the word. The remaining rankings dealt with some further peculiarities of the compound accent rule. For example, the high-ranking constraint DE-ACCENT-N_1, accounts for the neutralization of accentual contrast in the first member, which appears to be a necessary stipulation. Finally, the ranking of ACCENT-TO-HEAD(P-Comp) between the two Faithfulness constraints is needed to account for the fact that accent insertion is a possible means of satisfying the imperative to put accent in the head PrWd, while deletion of inherent accent (in the second noun) is not.

Before moving on to examine prefixing structures, it is worth mentioning some of the advantages of the analysis proposed here. First, this analysis handles a complex set of phenomena with arguably universal constraints. Thus, many of the basic ideas used here, e.g., word binarity, default-to-opposite, and dominance effects, have clear parallels in other systems, and I relate the components of Japanese compound accent to these other phenomena by using the same, or formally related, well-formedness constraints. The analysis therefore differs from the one offered in Kubozono 1995 which treats the two default patterns in terms of a non-standard interpretation of Alignment constraints.

The second important advantage of the analysis proposed here is that it clarifies the constraint rankings which characterize the accentual defaults elsewhere in the language. Thus, in addition to the accentual default observed above in underived words, i.e., unaccented structures, there are two additional defaults which crop up in different corners of Japanese morpho-phonology.

(61) Accentual Defaults Elsewhere in Japanese (cf. Poser 1984)

a. Default Structure 1: unaccented words, pattern resulting from dominant unaccented affixes, main pattern of exceptions in compounds

b. Default Structure 2: rightmost accent, as in first member of noun-noun compounds, the position to which accent is shifted in word with accent-shifting suffixes, many deverbal nouns, (ante-) penultimate accent in loans, verbs, adjectives

c. Default Structure 3: leftmost accent, as in second member of compounds, some deverbal nouns, and some loans

As we will see in chapter 5, the default rightmost/leftmost accent is also important in the outcome of certain accent shifts triggered by suffixation, which falls out from the constraint rankings given here because the suffixed structures are compound-like. Thus, when the accent falls on the first member, the accent is rightmost in the PrWd, but when it occurs on the second member, it is leftmost, exactly as we have seen above in noun-noun compounds. Deverbal nouns also support the right edge default pattern here, as this is the main pattern when an accented verb is changed to a noun, e.g., *hirakí* 'opening, closet', cf. *hiráku* 'open'. Deverbal nouns formed from accented verbs may also have initial accent, perhaps showing variation in the application of NONFINALITY(σ) in these cases. Thus, if ALIGN-R dominates ALIGN-L, and the accentuation of the verb must change (a typical affix-controlled process) then the prediction is that the accent of the verb base will gravitate to the right edge of the word in forming a noun. Or, if this is not possible because of NONFINALITY(σ), then accent defaults to the left edge of the word. Clearly these sketches do not cover all the morpho-accentual processes in Japanese, but the characterizations of the different defaults deriving from the analysis of compounds given here do seem helpful in accounting for other morpho-accentual processes, and are therefore worth pursuing further.[20]

3.3.4 Influences of Prefixation on Word Accent[21]

Now that an analysis of compound accent has been proposed, some further implications of the Root-Controlled Accent hypothesis can be examined in more detail. In particular, the accentual behavior of prefixes will be studied, as the interaction between prefixes and the bases to which they attach is directly relevant for the RCA hypothesis. The basic empirical finding here is that prefixes in Japanese may be sorted into three well-defined classes with respect to their accentual behavior: (i) prefixes which behave like the first member of a compound, (ii) dominant post-accenting prefixes which delete the accent of the base and bring about stem-initial accent, and (iii) so-called 'Aoyagi prefixes' which induce a prosodic organization of the word such that it has two minor phrases. I will show in this subsection that the behavior of these prefix classes is consistent with the RCA hypothesis, and thus, that this restrictive hypothesis may be maintained.

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[20]One interesting problem which is not straightforwardly predicted here is the pattern of pre-antepenultimate accent in loans ending in either LLH or HLH (L = light, H = heavy), a pattern which is uncovered and analyzed in Katayama 1995, 1998. The problem here is how to account for the variation between pre-antepenultimate, as in *herikóputaa* 'helicopter' and antepenultimate, as in *bitámiN* 'vitamin'. Katayama argues that this variation requires a gradient Alignment constraint for the ante-penultimate pattern, which is in different from the analysis of noun-noun compounds here, which relies on a categorical interpretation of Alignment violations.

[21]The examples presented in this section come from various Japanese dictionaries, namely Masuda 1974, NHK 1985, and Akinage 1981, and have been checked with at least two native speakers of Tokyo Japanese.

At first blush, there seem to be a few examples that provide direct evidence against the RCA hypothesis. Thus, there are some examples that show that prefixation leads to the deletion of the accent of the stem, e.g., *sín-getsu* 'new moon' and *kó-bari* 'little needle', cf. *-gétsu* 'moon' and *hári* 'needle'. This deletion of the stem accent could be accounted for by assuming *ko-* is inherently accented: if this prefix is accented, the loss of accent on the stem can be explained by the same pattern of edge orientation observed in minor phrases, namely the 'leftmost inherent accent wins'. If this analysis is the correct one, then it constitutes a clear counter-example to the Root-Controlled Accent hypothesis, which states that edge effects such as these are restricted to contexts where Faithfulness is not relevant. Faithfulness is surely relevant here because this prefix-stem sequence provides a situation of constraint conflict between Root and Affix Faithfulness, on a par with the analysis of these same sequences in Cupeño.

The analysis which uses a principle of leftward edge orientation, however, is almost certainly incorrect for these examples, and many others like them. As I will argue directly below, an analysis based on the theory of compound accent presented above is superior in several ways. Thus, the words which have the prefixes *sin-* and *ko-* behave exactly like compounds, according to an independently testable set of criteria. Therefore, the analysis in terms of compound accent is more explanatory than the alternative sketched above because it unifies this cluster of properties in a cogent analysis.

Before we can study the accentuation of prefixes, however, we require a set of criteria for diagnosing compounds. The following list is based on the criteria given in Otsu 1980 and Poser 1984, 1990a, modified to account for the new empirical generalizations clarified in Kubozono 1995.

(62) Properties of Noun-Noun Compounds

a. Semantic modification or complementation (MOD)

b. Rendaku Voicing (REND)

c. Distinction between short and long second members (S≠L)

d. Final syllable extrametricality (⟨σ⟩#)

e. Medial accent in N_2 (...σ σ́ σ...)

Noun-Noun compounds, ignoring *dvandva* compounds, involve the semantic modification or complementation of one member, distinguishing compounding from other types of morphological rules. This test is of course not a two-sided test, as non-compounds may also involve semantic modification, but I mention it here because this diagnostic correlates reasonably well with other test results. A second, more reliable test, is the existence of Rendaku voicing, i.e., the voicing of the first obstruent of the second member of the compound. I know of no other morphological rules which induce this pattern of obstruent voicing, so Rendaku is a very good test of the status of a derived form as a compound. Third, as exemplified in the above discussion, compounds are sensitive to the short/long distinction in the second position noun, and so differences in the accentual patterns dependent on this size distinction also provide a nice diagnostic for compound hood. Compounds are also distinguished from (some) non-compounds by final syllable extrametricality effects, and so this feature constitutes a fourth test for the status of a form as a compound. To clarify the diagnostic pattern of this test, if the second member of a compound has final syllable accent which defaults to initial accent, then the compound shows extrametricality effects of the right type. A final criterion for compounds, which will be shown to distinguish compounding from simply the attachment of a dominant suffix, is the existence of an accentual prominence on a medial syllable in the second

member. Thus, if N_2 has accent on a non-final, non-initial syllable, we cannot say that a prefix attached to this N_2 is accent-deleting, as is observed in dominant, post-accenting prefixes like *ma-* 'true' (examples given below), because this inherent accent would be lost in a word-medial position. With these tests in hand, I will now show how many productive prefixes in Japanese clearly behave like compounds.

Starting with the prefix *sin-* 'new', consider the following data with the set of tests presented above in mind. The examples presented below, and throughout this discussion, are sorted by the accentual properties and the prosodic size of the second member, as this organization is most revealing for our concerns. Specifically, compounds formed with an unaccented N_2 are opposed to compounds with accented N_2's, i.e., (a) and (c), versus the (b) and (d) examples. Also, compounds formed with short N_2's, the (a) and (b) examples, are contrasted with forms that have long second members, i.e., the (c) and (d) forms.

(63) Examples with *sin-* as the First Member of a Compound

a.	kao	sin-gao	'face'	(-acc, short N_2)
	kyoku	sin-kyoku	'song, music'	
	gara	sin-gara	'pattern'	
	iri	sin-iri	'enter, come'	
	-syo	sin-syo	'book'	
	kabu	sín-kabu	'stock'	
b.	án	sin-an	'idea'	(+acc, short N_2)
	géki	sin-geki	'play'	
	mé	sin-me	'bud'	
	katá	sin-gata	'style'	
	-gétu	sín-getu	'moon'	
	-nén	sín-nen	'year'	
	-réki	sin-reki	'year'	
c	kabuki	sin-kábuki	'*kabuki*'	(-acc, long N_2)
	kansen	sin-kánsen	'*kansen*'	
	keikoo	sin-kéikoo	'tendency'	
	kenzai	sin-kénzai	'material'	
	gakki	sin-gákki	'semester'	
	kiroku	sin-kíroku	'record'	
	zidai	sin-zídai	'time, period'	
	seikatu	sin-séikatu	'life'	
	tairiku	sin-táiriku	'continent'	
	hakken	sin-hákken	'discovery'	
	hatumei	sin-hátumei	'invention'	
	hossoku	sin-hóssoku	'start'	
	kufuu	sin-kúfuu	'device, gadget'	

d.	kénpoo	sin-kénpoo	‘constitution’	(+acc, long N_2)
	zítai	sin-zítai	‘situation’	
	syotái	sin-zyótai	‘household’	
	séido	sin-séido	‘regulation’	
	séifu	sin-séifu	‘government’	
	kanazúkai	sin-kanazúkai	‘kana usage’	
	yasúne, yasune	sin-yasúne	‘low (finance)’	
	tísiki	sin-tísiki	‘knowledge’	
	hikúne	sin-hikúne	‘low (finance)’	
	takáne	sin-takáne	‘high (finance)’	
	kígen	sin-kígen	‘epoch’	
	kotengákuha	sin-kotengákuha	‘(Neo-)Classical School’	

The finding here is that these forms pass all the tests for compounds. Thus, *sin-* clearly modifies the second member in a way that is consistent with other compounds. For example, the attachment of *sin-* to *kao* only changes the meaning of *kao* in that the resulting word *sin-gao* refers to those faces which are new. Furthermore, there are some examples showing Rendaku voicing, as in *sin-gao, sín-basi* in(63a), and an example from (63d), *sin-zyótai*. It is important to note here the existence of forms where Rendaku is not observed, but predicted on a purely phonological basis, e.g., *sin-kéikoo* in (63c), does not confound this result because Rendaku is actually not predicted here. As noted in Itô & Mester 1986, Rendaku is only observed in compounds formed with components from the Yamato stock, and so cases like these do not tell us anything, as *-keikoo* is a Sino-Japanese stem. The existence of native stems which undergo Rendaku, however, is revealing because they are only consistent with an analysis as the second member of a compound.

Moving now to the tests which assess accentual features, *sin-* passes all of these tests too. Hence, by comparing the forms in (63a) and (63b) with those in (63c) and (63d), one observes a clear contrast in the accentual patterns which is dependent on the short/long distinction: the compounds with short N_2’s are either unaccented or have accent on the prefix, whereas the forms with long second members always have a non-final accent on N_2. Furthermore, these patterns are clearly consistent with a treatment in terms of the accentual defaults observed above in compounds. The forms with short N_2’s have a default word-final accent in N_1, or no accent at all, which is also an independently observed pattern with compounds of this type. In the forms with long second members, on the other hand, the default position is clearly the initial syllable of N_2, as shown by the examples in (63c) with unaccented bases, and one form in (63d) which has final accent on the base, but initial accent in the compound, namely *sin-zyótai* from *syotái*. This last fact is evidence for final syllable extrametricality, the fourth test for compounds. Finally, it is clear that *sin-* is not simply a dominant prefix, which would destroy the inherent accent of the second word, as there are several examples in (63d) with a non-initial accent in both the base and the derived form, e.g., *sin-takáne* from *takáne*. If *sin-* was a dominant prefix, we would expect either accent on the prefix if the prefix itself was accented, or accent on the initial syllable if it were dominant, post-accenting. However, neither of these patterns are observed, and so it is clear that *sin-* behaves like the first member of a compound.

Many of the features of compounds, like those found in words with *sin-*, overlap with words formed with dominant, post-accenting prefixes, and so it is worthwhile contrasting what appears to be a case of the latter with the *sin-* words from above, in an effort to tease these two patterns apart. Consider the data below for the prefix *ma-* ‘true’, which is argued in Poser 1984 to be a dominant (i.e., accent-deleting), post-accenting prefix.

(64) Dominant Post-accenting *ma-* (examples from Poser 1984: 57, with some additions)

a.	kura	'darkness'	ma-kkúra	'total darkness'	(-acc, short)
	ura	'back'	ma-ura	'right in back'	
	saki	'front'	ma-ssáki, ma-ssakí	'foremost'	
	siro	'white'	ma-ssíro	'snow white'	
	maru	'circle'	ma-mmaru, má-mmaru	'a perfect circle'	
	ue	'top'	ma-ué	'right on top'	
	yoko	'side, flank'	ma-yoko	'just beside, abeam'	
b.	áka	'red'	ma-kká	'deep red'	(+acc, short)
	kúro	'black'	ma-kkúro	'pitch black'	
	fuyú	'winter'	ma-fuyu	'dead of winter'	
	náka	'center, box'	ma-nnaka	'dead center, box'	
	kita, kitá	'north'	ma-kitá	'due north'	
	áo	'red'	ma-ssáo	'deep red'	
	máe	'front'	ma-mmáe	'right in front'	
	súgu	'at once'	ma-ssúgu	'straight ahead'	
	hirú	'noon'	ma-hiru	'high noon'	
c.	futatu	'two'	ma-ppútatu, -futátu	'exactly half'	(-acc, long)
	hadaka, hadáka	'naked'	ma-ppádaka	'stark naked'	
	hiruma	'noon'	ma-ppíruma	'high noon'	
	minami	'south'	ma-mínami	'due south'	
	mukai	'opposite'	ma-múkai	'directly opposite'	
	mukoo	'opposite'	ma-múkoo	'directly opposite'	
	sakari	'zenith'	ma-ssákari	'in full bloom'	
	sakasama	'head over heels'	ma-ssákasama	'topsy-turvy'	
d.	sikakú	'rectangle'	ma-ssikáku, -ssíkaku, -sikáku, -síkaku	'a perfect square'	(+acc, long)
	syoozíki, syoozikí	'honesty'	ma-ssyóoziki	'downright honesty'	
	syooméN	'front'	ma-ssyóomeN, ma-syooméN	'straight ahead'	
	yonaká	'midnight'	ma-yónaka	'dead of night'	
	kokóro	'heart'	ma-gókoro	'sincerity'	
	tadánaka, tadanaka	'in the middle'	ma-ttádanaka	'right in the middle'	
	atarasíi	'new'	ma-atarasíi	'truly new'	
	itimónzi	'straight line'	ma-itimónzi	'in a straight/direct line'	

First off, the absence of any examples showing Rendaku voicing is suggestive that these words are not compounds. Furthermore, several examples have accent on the final syllable, e.g., *ma-kitá* in (64b) and *ma-atarasíi* in (64d), which is another clue that these cannot be compounds because compounds are subject to final syllable extrametricality. This last fact is also not consistent with *ma-* as a dominant post-accenting morpheme, as the analysis predicts stem-initial accent across the board, but as noted by Poser, there are some exceptions which show that this prefix vacillates between being recessive or dominant. Finally, there is one form in (64d), namely *ma-gókoro* from *kokóro*, that shows deletion of a medial accent, which is only consistent with an analysis in terms of a dominant prefix, a conclusive piece of evidence. Together with the other body of facts, this fact shows that words with *ma-* are not compounds, but rather the result of dominant post-accentuation.

Much of the discussion that follows provides further evidence for the type of prefixes exemplified above with *sin-*; the reader more directly interested in the argument for

the RCA hypothesis may press on to the chart below in (69) which summarizes this evidence.

Two additional prefixes which exhibit precisely the accentual behavior observed in compounds are the diminutive prefix *ko-* and the augmentative prefix *oo-*. Both cases involve simple modification of the base to which they attach, and as can be seen from the examples in (65) and (66) below, both cases of prefixation correlate with instances of Rendaku voicing. Moreover, both *ko-* and *oo-* correlate with the accentual alternations predicted by the principles of compound accent. Starting first with *ko-*, there is a clear contrast between the forms with a short second member (65a-b) and those with a long second member (65c-d). The former cases have the defaults characteristic of this type of compound, namely final accent in the first component or they are unaccented.[22] In contrast, the (65c-d) forms show the accentual patterns characteristic of their type, i.e., faithfulness to the lexical accent, unless the form is unaccented or accented on the final syllable, in which case you get initial accent in the second member.

[22]This is the main exceptional pattern in words with short second members. Though not treated in the previous section, this outcome is not unexpected given the role of DEP-PROM in yielding unaccented words.

(65) Examples with *ko-* as First Member of Compound

a.	hati	kó-bati	‘bowl’	(-acc, short N_2)
	kabu	kó-kabu, ko-kabu	‘radish’	
	hako	kó-bako	‘box’	
	age	ko-age	‘unloading /dockhand’	
	eda	ko-eda	‘twig’	
	sika	ko-zika	‘deer/fawn’	
	sima	ko-zima	‘island’	
	nami	ko-nami	‘wave’	
b.	áyu	ko-ayu	‘sweetfish’	(+acc, short N_2)
	áza	ko-aza	‘(sub)section of village’	
	té	ko-te, kó-te	‘hand’	
	isí	ko-isi	‘rock’	
	imó	ko-imo	‘potato’	
	kikú	ko-giku	‘mum’	
	báka	ko-baka	‘look down on’	
	hán	kó-ban	‘stamp/small oval gold coin’	
	hári	kó-bari	‘needle’	
	táti	kó-dati	‘sword’	
	áme	ko-same	‘rain’	
c.	atari	ko-átari	‘hit/beat around the bush’	(-acc, long N_2)
	hanasi	ko-bánasi	‘story’	
	hasira	ko-básira	‘pillar’	
	saiku	ko-záiku	‘workmanship’	
	temari	ko-démari	‘hand ball/spirea’	
	doogu	ko-dóogu	‘stage props’	
	eguri	ko-éguri	‘scooping/cavetto’	
	kasira	ko-gásira	‘(sub-)foreman’	
	katana	ko-gátana	‘knife’	
	kawase	ko-gáwase	‘postal note’	
	kitte	ko-gítte	‘postal stamp/check’	
	kizami	ko-kízami	‘chopping’	
	mawari	ko-máwari	‘turn’	
	midasi	ko-mídasi	‘(sub-)title’	
	modosi	ko-módosi	‘recovery’	
	musubi	ko-músubi	‘closing/3rd ranking *sumo*’	
	musume	ko-músume	‘girl’	
	segare	ko-ségare	‘son’	
d.	akínai	ko-ákinai, -akínai	‘retail business’	(+acc, long N_2)
	bóozu	ko-bóozu	‘bonze’	
	hyaku-shóo	ko-byáku-shoo	‘farmer’	
	takái	ko-dakái	‘high’	
	kárei	ko-gárei	‘dap, plaice’	
	génso	ko-génso	‘(daughter) element’	
	hítuji, hitúzi	ko-hitúzi	‘lamb, hogling’	
	zyóoki	ko-zyóoki	‘steam (launch)’	
	nímotu	ko-nímotu	‘parcel’	
	nínzuu	ko-nínzuu	‘people’	
	tutumí	ko-zútumi	‘package’	
	tuzumí	ko-túzumi	‘type of drum’	

Likewise, words formed with *oo-* show the accentual patterns found in compounds, though there are a few exceptions. Thus, while words with long N_2's clearly have the predicted accentual default, as shown in (66c) and forms like *oo-átama* in (66d), the pattern is less transparent in forms with short second members. For example, a few forms in (65a) have initial accent on N_2, despite the fact that they are unaccented, and should therefore either be unaccented or have accent on *oo-*. In sum, while the distinction is not perfect, there is a clear contrast between short and long second position nouns here, and this conclusion is consistent with the other facts, pointing in the direction that *oo-* is the first member of a compound in these forms.

(66) Examples with *oo-* as First Member of Compound

a.	kaze	oo-káze	'wind'	(-acc, short N_2)
	azi	oo-azi	'insipid (taste)'	
	atu-atu	oo-átu-atu	'in love/deeply in love'	
	mozi	oo-mozi	'letter/capital letter'	
b.	áme	oo-áme	'rain'	(+acc, short N_2)
	áse	oo-áse	'sweat'	
	aná	oo-ana	'hole'	
	asi	óo-asi, oo-asi	'foot'	
	húne	oo-bune	'ship'	
	kóe	oo-góe	'voice/loud voice'	
	hári	oo-hari	'needle'	
	hasí	óo-hasi	'bridge/large bridge'	
	íki	oo-iki	'breath/deep sigh'	
	matá	oo-mata	'long stride'	
	kído	oo-kído	'gate (of town)'	
	mesí	óo-mesi	'meal/hearty meal'	
	monó	oo-mono	'man/great man'	
	túbu	oo-tubu	'drop'	
	uké	oo-uke	'success'	
c.	akubi	oo-ákubi	'yawn'	
	atari	oo-átari	'hit'	
	hurosiki	oo-búrosiki	'*furoshiki*'	(-acc, long N_2)
	tigai	oo-tígai	'difference'	
	harai	oo-hárai	'purification'	
	hazure	oo-házure	'failure'	
	sikake	oo-jíkake	'device'	
	matsuri	oo-mátsuri	'festival'	
	mawari	oo-máwari	'detour'	
	midasi	oo-mídasi	'headline'	
	mikurai	oo-mikurai	'(Imperial) throne'	
	sooji	oo-sóoji	'house cleaning'	
	tatimawari	oo-tátimawari	'tumble/rough tumble'	
	tokage	oo-tókage	'lizard'	
	yasuuri	oo-yásuuri	'bargain'	

d.	arasi	oo-árasi	‘storm’	(+acc, long N_2)
	atamá	oo-átama	‘head’	
	toorí	oo-dóori	‘street/main street’	
	hánabi	oo-hánagi	‘fireworks’	
	híroma	oo-híroma	‘hall’	
	ibiki	oo-íbiki	‘snore’	
	medamá	oo-médama	‘eye’	
	mooké	oo-móoke	‘profit’	

Another case exemplifying the same pattern is *su-*, which applied to a stem gives the meaning ‘bare X’. As the following data show, there is a clear contrast between forms with short and long second members, (67a-b), cf. (67c-d), which accords generally with the predicted patterns. The abundant instances of Rendaku voicing and final syllable extrametricality effects in (67d) further point in the direction of the analysis of words with *su-* as compounds.

(67) Examples with *su-* as First Member of Compound

a.	asi	sú-asi	‘foot’	(-acc, short N_2)
	kao	sú-gao	‘face’	
	kaki	su-gaki	‘to draw/animation’	
	yaki	su-yaki	‘to fire/unglazed pottery’	
b.	té	su-dé, sú-de	‘hand’	(+acc, short N_2)
	hosí	su-bosi, su-bosí	‘dry’	
	utá	su-uta	‘soup’	
	háda	sú-hada	‘skin’	
c.	hadaka	su-ppádaka	‘naked’	(-acc, long N_2)
	toori	su-dóori	‘go through’	
	tomari	su-dómari	‘stay’	
	odori	su-ódori	‘dance’	
	roonin	su-róonin	‘roonin’	
	utai	su-útai	‘singing’	
	zyooruri	su-zyóoruri	‘*zyooruri*’	
	toonin	su-tóonin	‘townsman’	
	katari	su-gátari	‘to talk/recital of *zyoruri* music’	
d.	awasé	su-áwase	‘a kind of clothes?’	(+acc, long N_2)
	hanasí	su-bánasi	‘speech’	
	modorí	su-módori	‘to return/return empty handed’	
	mogurí	su-móguri	‘diving’	
	hayái	subayái[23]	‘quick’	

Another prefix which may form compounds is *han-*, which attaches to nouns and results in a derived noun meaning ‘anti-X’. *Han-* may be used either as an Aoyagi prefix or a non-Aoyagi prefix, and we focus here on non-Aoyagi usage (which means the morphological word forms a single minor phrase). In support of *han-* as a component of a compound, there appears to be a contrast between words formed with short and long second members; contrast *han-kaku, káku* ‘(anti-)nuclear power’ with the derived word *han-táisei* ‘anti-regime’, from the long base *taisei* ‘regime’. My sample, however, is

[23]The lack of default initial accent here may be related to the fact that this derived form does not look like a straightforward case of modification.

inconclusive, as there are no examples showing Rendaku voicing[24], nor are there cases showing extrametricality effects or medial accent. Thus, prefixation of *han-* is consistent with either treatment of it as a compound, or as a dominant, post-accenting prefix. Focusing more squarely on the issues at hand, while there are cases in which *han-* itself is accented, e.g., *hán-so* 'Anti-Soviet' and *háN-i* 'against one's will', these facts are consistent with an analysis in terms of compound accent, and since this analysis is still viable, it may be entertained as an alternative to the obvious analysis in terms of edge orientation.

Several other prefixes, typically Sino-Japanese in origin, may also be compound-like, but again, the results are inconclusive given the lack of data.[25] For example, *hi-* 'non-' consistently induces accent on the following stem when the stem is long, e.g., /hi + toosei/ → *hi-tóosei* 'uncontrolled' and /hi + nínzyoo/ → *hi-nínzyoo* 'inhuman(ity)'. Further, there is one example in which the stem accent is lost in favor of accenting *hi-*, /hi + ún/ → *hí-un* 'unluckiness', which is again consistent with an analysis in terms of default accent on the first member in words with short second members. Thus, while these facts are consistent with an analysis in terms of compound accent, there are no instances of Rendaku voicing or final syllable extrametricality effects in my sample, and so the results are inconclusive. Likewise, the prefixes *hu-* 'non-', *mu-* 'lacking, un-', and *mi-* 'not yet ...' all present the same pattern: they are consistent with an analysis in terms of the first member of a compound, but we lack the facts which would show this conclusively. The results of my findings for all of these prefixes are summarized in the chart in (69) below.

Another prefix of interest is *zi-*, which is used in making reflexives, because it shows that prefixes which are not simple modifiers of the base to which they attach can behave like an element of a compound. Thus, a clear contrast is observed between derivatives formed with short bases (68a-b) and those formed with long ones (68c-d): the former are mostly unaccented, while the latter all have accent on the first syllable of the stem.[26] Also, the form *zi-hénsuu* in (68d) shows that final syllable extrametricality is in force, as this form is derived from a base with final accent.

[24]The lack of forms showing Rendaku may be due to a morphological restriction which blocks attachment of *han-* to native stems, a restriction that is observed in many Sino-Japanese affixes.

[25]See Martin 1975: 389 ff. for a long list of examples of these prefixes, and the details of their semantic and morphological features.

[26]An interesting fact here is that almost all of the forms in (68a-b) with short bases are unaccented, which is supposed to be the marked accentual default in compounds of this type. However, this fact may simply be an effect of sampling, as most of the examples here are derived from bound stems, which may account for this apparent aberration.

(68) Examples with *zi-* as First Member of Compound

a.	kyoo	zi-kyoo	'confession'	(-acc, short N_2)
	-ri	zí-ri	'self-interest'	
	saku	zi-saku	'work/one's own work'	
	syo	zi-syo	writing/one's own writing'	
	-taku	zi-taku	'one's own home'	
	-ei	zi-ei	'defense; run (e.g. a shop)'	
b.	kóku	zi-koku	'country/one's own country'	(+acc, short N_2)
	máe	zi-mae	'front/geisha living on her own'	
	-mán	zi-man	'pride, boasting'	
	-méi	zi-mei	'self-evidence'	
	-métu	zi-metu	'natural decay, self-destruction'	
	-món	zi-mon	'one's own family'	
	-nén	zi-nen	'spontaneous conbustion'	
	-nín	zi-nin	'self-acknowledge, admission'	
	-réi	zi-rei	'self-excitation'	
	-ríki	zi-riki	'one's own strength'	
	-rítu	zi-ritu	'self-reliance'	
	séi	zi-sei	'self-control; self-examination'	
	-séki	zi-seki	'self-reproach'	
	-sén	zi-sen	'self-election'	
c.	doosi	zi-dóosi	'verb/intransitive verb'	(-acc, long N_2)
	daraku	zi-dáraku	'slovenliness, untidiness'	
	syookai	zi-syóokai	'introduction'	
	isiki	zi-ísiki	'consciousness'	
	senden	ziko-sénden	'advertisement'	
	saimin	ziko-sáimin	'hypnosis'	
	toosui	ziko-tóosui	'absorption'	
d.	hensúu	zi-hénsuu	'(independent) variable'	(+acc, long N_2)
	kén'o	ziko-kén'o	'hatred'	
	mánzoko	zi-mánzoko	'contentment'	

A second example of a non-modifying prefix, but one which clearly behaves like the first member of a compound, is *hi-*, which is used in forming 'passive' nouns. The accentuation of *hi-* depends on the size of the base to which it attaches. If the base is short, the result is loss of accent, as in /hi + koku/ → *hi-koku* 'defendant', or accent on *hi-*, e.g., /hi + gi/ → *hí-gi* 'suspect'. But if the base is long, the result is medial accent in bases with non-final accent, as in /hi + senkyóken/ → *hi-senkyóken* 'right to be elected', cf. *senkyóken* 'right to vote', or default initial accent, as for example in /hi + zyoosúu/ → *hi-zyóosuu* 'dividend'. Indeed, as shown by the following paradigm, one finds the two different accentual default patterns when affixation to the base alters its size, *hí-gai* 'damage', but *hi-gáisa* 'victim' and *hi-gáiti* 'place damaged'. Since these facts are only consistent in terms of compound accent, I conclude that *hi-* is the first member of a compound in these examples, on a par with many others.

The following chart summarizes the basic findings for the prefixes discussed above.

(69) Summary of Results[27]

Prefix	Result	MOD	REND	S ≠ L	⟨σ⟩#	...σ́σ σ...	*n* =
sin- 'new'	comp	Y	Y	Y	Y(1/12)	Y(5/12)	41
ma- 'true'	dom	Y	N	—	Y/N	Y/N	32
ko- 'little'	comp	Y	Y	Y	Y	Y(3/12)	49
oo- 'big'	comp	Y	Y	Y	Y	—	42
han- 'anti-'	comp	N	N	Y	—	—	22
su- 'bare'	comp	Y	Y	Y	Y	—	22
hi- 'non-'	comp	N	N	Y(?)	—	—	12
hu- 'non-'	comp	N	Y(?)	Y(?)	Y(3/11)	—	12
mu- 'un-'	comp	N	N	Y(?)	Y	—	8
mi- 'no yet'	comp	N	N	Y(?)	Y(?)	—	10
zi- Reflexive	comp	N	N	Y	Y(?)	—	30
hi- Passive	comp	N	N	Y	Y(?)	—	15

Working with a substantial corpus of facts, the finding is that most of the nominal prefixes examined here exhibit patterns that are characteristic of the first member of a compound. This finding is significant because it strongly suggests that these prefixes should be treated in terms of the analysis presented above for noun-noun compounds. An analysis which treats these prefixes as the first member of a compound goes a long way towards explaining the complex and varied set of patterns here. When compared with the alternative analysis in terms of edge orientation sketched at the onset of this subsection, it is clear that the compound analysis is superior because it gives a unified analysis of these patterns.

Moreover, the compound analysis is fully consistent with the Root-Controlled Accent hypothesis. If these prefixes are treated as the first member of a compound, then their accentuation is predictable by the principles governing accentual defaults and not their underlying prominence specifications. The inherent accent of the prefix is irrelevant to the accentuation of the larger compound because, as argued above, the first member of a compound is consistently de-accented in this word-formation process. Thus, the prefix-stem sequences do not bring about a situation of constraint conflict between Root and Affix Faithfulness. The various edge effects observed in compounds, therefore, are compatible with the RCA hypothesis because Faithfulness is irrelevant here.

As for dominant, post-accenting prefixes such as *ma-*, this prefix type is also consistent with an analysis of Japanese accent in terms of root-control. As shown in detail

[27]In this chart, if a test result is only supported by one or two examples, a 'Y(?)' appears in the appropriate cell. Also, the number of examples for each prefix is given in the last column, and where possible, the percentages of prefixes testing positively for a given diagnostic is shown. For example, 'Y(1/12)' for *sin-* under ⟨σ⟩# means that one out of twelve relevant words with this prefix show final syllable extrametricality effects.

in §4.1, dominant, i.e., accent-deleting affixes, do not counter the RCA hypothesis because they do not compete for prominence with a root accent. Dominant affixes may be accented or unaccented, as is the case with *ma-*, and therefore the deletion of a stem accent cannot always be attributed to a competition between a root accent and an affix accent: dominant unaccented affixes do not have an accent to participate in such a competition. Dominance effects therefore require some additional principles to account for the observed deletion of base prosody, and chapter 5 is dedicated to the development of these principles. The important point for the matters at hand, however, is that dominant affixes do not contradict the RCA hypothesis because they do not compete for prominence with a stem accent.

The last type of prefix which has an influence of word accentuation are the so-called 'Aoyagi prefixes' (after Aoyagi 1969; see Poser 1990b and Martin 1975: 751 for a list of these prefixes). In a detailed study of these prefixes, Poser 1990b points out two peculiar properties of these prefixes. These properties are exhibited in the data below, which appear to represent exceptions to the basic principles of accent in Japanese words. (The horizontal lines above and below the segments below represent approximations of the f0 profiles.)

(70) Words with Aoyagi Prefixes

a.	moto-	'former'	m óto- d áiziN	'former minister'
	han-	'anti-'	h án- sh ákai	'anti-social'
b.	zeN-	'former'	z éN-syusyo o	'former Prime Minister'
	ki-	'your (honorific)'	k í-syoke N	'your letter'

First, words with Aoyagi prefixes may have two pitch accents, as exemplified in (70a) above in the words with the HLHL pitch excursions, apparently contradicting the general pattern of one accent per word. The second important property is that these words may have a fall in pitch, followed by a rise after the stem-initial mora, as shown the forms with the HLH profiles in (70b). This last pattern is of course aberrant as well because Japanese words typically have a level low tonal pattern after a fall in pitch (see §3.3.1 for background discussion).

Clearly, unless some special provision is made for these prefixes, the basic descriptive assumptions underlying the analysis of Japanese accent must be called into question. The approach to these two problems taken in Poser 1990b is that Aoyagi prefixes, through a pair of subcategorization requirements, bring about a parse of the larger word which has two minor phrases, as illustrated below.

(71) Word-Internal Phrase Boundaries (Poser 1990b)

	{ }{ }$_{\text{MinP}}$	{ }{ }$_{\text{MinP}}$
a.	m óto- d áiziN	b. z éN-syusyo o

To give a brief sketch, Aoyagi prefixes have subcategorization requirements which refer to both morphological and prosodic structure (an idea inspired by the dual structures proposed in Inkelas 1989). Thus, they must attach to stems in the morphology, but, in their prosodic analysis, these prefixes select a minor phrase, in effect inducing the word-internal phrase boundaries shown above. This analysis therefore explains the apparently aberrant properties of words with Aoyagi prefixes in terms of the special phrasing required by said prefixes. Words with accented stems may have a second accentual prominence because it

is parsed by a minor phrase which excludes the prefix (71a); words with unaccented stems have a rise after the first mora because this profile is typical of minor phrases which do not have an inherent accent (71b).

The importance of this analysis is that it demonstrates that the accentuation of words with Aoyagi prefixes is fully consistent with the Root-Controlled Accent hypothesis. The logic of the argument runs as follows. The RCA hypothesis favors retention of a root accent when it competes with an affix accent for the unique word prominence. In Poser's analysis, words with Aoyagi prefixes have two separate minor phrases — this assumption is absolutely crucial to account for the HLHL and HLH tonal contours found in these words. From this it follows that an accent in the prefix does not compete for prominence with the stem accent because the prefix and the stem are in different minor phrases. The up-shot then is that the unusual accentual patterns brought about by Aoyagi prefixes are consistent with the analysis that accent in Japanese words is root-controlled, on a par with root-controlled accent in Cupeño.

To summarize the above discussion, three sets of prefixes were examined and all of them were shown to be consistent with the thesis that accent in Japanese is root-controlled. First, prefixes which act as the first member of a compound are consistent with the RCA hypothesis because their accentuation is predicted by the principles of compound accent, and not their inherent prominence specifications. Second, dominant post-accenting prefixes do not contradict RCA because dominant affixes do not compete for prominence with a root accent (chapter 4 and 5 continues the development of this argument). Finally, Aoyagi prefixes are fully compatible with a RCA analysis of Japanese accent because their special behavior requires the introduction of word-internal phrase boundaries which separate the prefix and the stem. This phrasing of the word has the effect of parsing the prefix and stem into separate prosodic domains and hence they too do not compete for the unique word prominence.

In conclusion, an apparent challenge for the restricted theory of edge effects developed in §3.1 turns out to lend some support to the analysis of Japanese accent in terms of root-control. The prefixes which are known to have an effect on word accent were classified into three distinct types, and it was shown that all of these types are in fact compatible with the RCA-driven analysis. Considering the number of prefixes in the study, approximately 50 when the Aoyagi prefixes from Poser 1990b and Martin 1975 are included, the absence of a class of prefixes which uniformly override root accent supports the Root-Controlled Accent hypothesis, and casts serious doubt on an analysis in terms of edge orientation. In addition to this empirical argument, there are at least two theoretical arguments in support of approaching Japanese accent in terms of root-control. First, the system can be treated on a par with Cupeño, and hence overriding root accent can be explained as a general pattern of root privilege. Second, this analysis is consistent with a restrictive theory of edge effects which significantly reduces the patterns of edge orientation in accent systems. In chapter 5, additional motivation for the RCA analysis is given which involves showing the role of root accentedness in blocking the application of accentual processes like pre- and post-accentuation and accentual shifts.

3.4 Summary and Conclusion

Accent Resolution (AR), the deletion of all but one lexical accent, is root-controlled if it shows a preference for retention of a root accent over an affix accent. This pattern of accent retention is distinct from directional AR, where it is the accent which appears closest to a designated edge that is retained. The intrinsic ordering of Root and Affix Faithfulness

that underlies the analysis of root-controlled AR, namely MAX-PROM$_{Root}$ >> MAX-PROM$_{Affix}$, makes a prediction concerning the scope of directionality in AR. In systems with an accentual contrast in both roots and affixes, directional AR only emerges in contexts where the Prosodic Faithfulness constraints are not decisive.

Two systems previously described in terms of directional AR, Russian and Japanese, were studied with this prediction in mind. A close examination of these systems showed that there is no crucial evidence which necessitate an analysis described solely in terms of directionality. In both Russian and Japanese, a stem accent generally takes precedence over accent in a following suffix, which is consistent with both root-controlled and directional AR (where the latter type set for leftward edge orientation). Furthermore, it was found that accent is predictable in the affixed structures which can distinguish these two analyses, namely prefix + root sequences. Thus, in both of these systems, there is an absence of a class of prefixes which consistently override accent in the following stem. This finding casts doubt on the analysis of AR in Russian and Japanese with phonological directionality. This gap is fully consistent, however, with an analysis of these systems with root-controlled AR because, if roots take precedence over affixes in AR, this is exactly the predicted pattern. At the very least then, the notion of root-controlled accent has some currency outside the analysis of overriding root accent in Cupeño; it is crucial in explaining this distributional gap.

In addition to this empirical issue, there are further reasons to extend the scope of root-controlled accent. First, the analysis of root-controlled accent obtained via the intrinsic ordering of Root and Affix Faithfulness makes a substantive restriction on the range of edge effects in accent systems. If this theory is correct, certain logically possible patterns of edge orientation are systematically ruled out. Second, as suggested in §3.1, the analysis of AR with morphologically-dispersed Faithfulness may make sense of an apparent directional asymmetry in AR. The pervasiveness of systems described with a principle of 'the leftmost accent wins' may be explained as a general preference for suffixing morphology; the apparent pattern of leftward edge orientation is really due to the privileged faithfulness status for roots, which tend to be word-initial. Third, the analysis of AR with root-control explains the observed pattern of root retention in terms of a general pattern of root privilege. Thus, the analysis of RCA in Cupeño, and by extension, Russian and Japanese, makes a connection to segmental phenomena like root-controlled vowel harmony in Akan. Fourth, as demonstrated in Cupeño (see §2.4.3), this approach to AR clarifies a role for root accentedness in the analysis of morpho-accentual processes like pre- and post-accentuation. The imperative to preserve a root accent may have the effect of blocking morphological processes which change the prosody of the base, a very common pattern which is discussed in detail throughout chapter 5. From these considerations, there is reason to entertain the hypothesis that root-controlled accent is indeed a universal property; it explains a host of properties which appear to hold of all languages.

As for restricted edge effects, further typological work is still needed to determine the scope of directionality in accent systems. While it has been shown that two cases, formerly analyzed with directional AR, are in fact consistent with the restricted edge effects, a cross-linguistic study of AR has yet to be done. However, if it turns out that further investigation turns up a system with an unrestricted type of directional AR, which completely ignores word structure, it is important to emphasize that this finding would not necessitate a re-analysis of root and affix accent in Cupeño, Russian, and Japanese. Root-controlled accent in these systems can be analyzed in a way that has all of the advantages of this analysis listed above, but without restricted directionality. In particular, such a finding would support a more recent instantiation of Root Faithfulness in Prince 1997, Beckman 1997 [1998]. In this approac, the privileged status of roots is characterized by a set of

Root Faithfulness constraints, but there are no corresponding Affix Faithfulness constraints. Thus, Root Faithfulness is not inherently ordered, and it may be ranked on a language particular basis in relation to context-free Faithfulness, or Faithfulness which is sensitive to whole words. Directional AR, then, is the result of Prince's 'Anti-Paninian' ranking, where the general or context-free Faithfulness constraint outranks the specific Root Faithfulness constraint, and the edge orientation constraint LEFTMOST is ranked between these two Faithfulness constraints, as shown below.

(72) Directional Accent Resolution with Anti-Paninian Ranking

Input		Output	MAX-PROM	LEFTMOST	MAX-PROM$_{Root}$
a. /áf + róot/	→	áf-root	*		*****
		*af-róot	*	*!	
b. /af + róot/	→	af-róot		*****	
		*áf-root	*!		*****

In such a constraint system, the general constraint is only active in contexts where a lexical accent is not in competition with another accent that would be faithfully parsed word-initially (72b). In words with more than one inherently accented morpheme, the leftmost one wins, regardless of whether it is in a root or an affix (72a).

It is clear, therefore, that it is possible to describe directional AR in a theory which assigns privileged Faithfulness to roots. The findings of this chapter, however, question whether AR is ever governed by directionality alone. The ultimate answer to this question will bear directly on the formulation of the special Faithfulness status of roots, as restricted directionality effects are only accounted for in a theory with distinct Faithfulness constraints for roots and affixes.