1.1 Morphologically Governed Accent in Optimality Theory

This dissertation is about accent systems in which word structure has an important role in the characterization of accentual processes. These processes affect phonological categories like stress and tone, but importantly, they cannot be described with reference to sound structure alone. Morphological factors like the accentual properties of roots and certain diacritically marked affixes must also be recognized. As many accent systems studied here have a strict limitation of one accent per word, one major accentual process examined in this thesis is Accent Resolution, the deletion of accent in words with more than one inherently accented morpheme. This pattern of deletion often shows a preference for retention of accent in the root, which underscores one important function of morphological structure. Other morpho-accentual phenomena examined here include morphologically triggered de-accentuation (or “dominance effects”), accent insertion (often know as pre- and post-accentuation), and certain accentual shifts. The occurrence of these processes is, in many cases, directly tied to affixation, and so they too are inherently morphological. The focus here is almost exclusively on word accent, as the accentual processes under examination are mostly word-level phenomena, but some parallels with other levels of structure are made throughout this thesis.

1.1.1 Goals

This thesis has two basic goals. The first goal is more or less a descriptive one and involves arguing for the existence of two distinct types of morpho-accentual processes (1). The first type is an analogue to a well-known type of vowel harmony system where the features of root vowels have the effect of ‘overriding’ the featural specifications in prefixes and suffixes. In many accent systems, the presence of an accent in the root likewise overrides accent in affixes, hence the term ‘root-controlled accent’. The second type is fundamentally different from the first. Generally linked to affixation, ‘affix-controlled’ accentual processes require a change in the accentuation of the base, which is usually the root or the stem.

(1) a. **Root-Controlled Accent (RCA):** inherent accent in the root precludes the realization of accent elsewhere in the word.

b. **Affix-Controlled Accent (ACA):** the attachment of an affix correlates with a mutation of the accent in the base of affixation.

The second goal, related to the first, is to argue for a specific theoretical model which accounts for these two types of morpho-accentual processes in an explanatory way.

To my knowledge, the first characterization of an accent system in terms of root-control is due to Hill & Hill 1968, who describe stress-accent in the Uto-Aztecan language Cupeño. In this language, both roots and affixes have an accented/unaccented contrast, but when an inherently accented root combines with an accented affix, the root accent ‘wins’, as exemplified below with some characteristic examples (the roots are underlined).
(2) Root-Controlled Accent in Cupeño (Hill & Hill 1968)

\[
\begin{align*}
\text{a.} & \quad /\text{pé} + \text{yax}/ \rightarrow \text{pé-yax} \quad \text{‘He says’} \\
& \quad /\text{pé} + \text{yax} + \text{qál}/ \rightarrow \text{pe-ya-qál} \quad \text{‘He was saying’}
\end{align*}
\]

\[
\begin{align*}
\text{b.} & \quad /\text{pé} + \text{áyu} + \text{qál}/ \rightarrow \text{pe-áyu-qál} \quad \text{‘S/he was wanting’} \\
& \quad /\text{pé} + \text{pulín} + \text{qál}/ \rightarrow \text{pe-pulín-qal} \quad \text{‘She gave birth’}
\end{align*}
\]

Part of the descriptive aim of this thesis is to extend this idea to other, better-known accent systems like Russian and Japanese. In the analyses of these systems, root-controlled accent has a very similar role, causing the deletion of an accent outside of the root. The parallels between these systems run deeper than this, however, which can be seen by examining a second pattern of RCA.

RCA has an equally important role in blocking the application of other accentual processes. For example, Cupeño has a set of suffixes which place an accent on the root-final syllable (3a), but this process is blocked in words with accented roots because such an insertion would preclude the realization of a root accent (3b).

(3) Blocking Effect of RCA in Cupeño

\[
\begin{align*}
\text{a.} & \quad /\text{wena} + \text{´nuk}/ \rightarrow \text{wená-nuk} \quad \text{‘having put in’} \\
& \quad /\text{né} + \text{ma} + \text{´c i}/ \rightarrow \text{ne-má-ć i} \quad \text{‘with my hand(s)’}
\end{align*}
\]

\[
\begin{align*}
\text{b.} & \quad /\text{méme} + \text{´yke}/ \rightarrow \text{méme-yke} \quad \text{‘to the ocean’} \\
& \quad /\text{tívi?e} + \text{´maa} + \text{le}/ \rightarrow \text{tívi?-me-l} \quad \text{‘small round basket’}
\end{align*}
\]

Likewise, in Russian and Tokyo Japanese, certain patterns of pre-accentuation are only found in words with unaccented roots, an observation which extends to other morpho-accentual processes. In sum, RCA has the effect of privileging roots in the realization of inherent accent, both in the concatenation of more than one inherently accented morpheme and in the application of morpho-accentual processes.

In the second type of morpho-accentual process, affix-controlled accent, affixes are in charge accentually. However, this process is not simply the symmetric counterpart to RCA; it shows a different kind of behavior altogether. The main characteristic of ACA which sets it apart from RCA is that ACA demands a change in the accentuation of the base to which the affix is attached. Thus, affix-controlled processes run counter to the underlying force behind RCA because they demand a change in base prosody, which typically contains the root. Three affix-controlled processes examined in detail here are illustrated below with some examples from Tokyo Japanese.

a. **Dominance effects** require a deletion of base prosody

\[
\begin{array}{lll}
/\text{edo} + \text{kko}/ & \rightarrow & \text{edo-kko} \quad \text{‘native of Tokyo’} \\
/k\text{oobe} + \text{kko}/ & \rightarrow & \text{koobe-kko} \quad \text{‘native of Kobe’}
\end{array}
\]

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

\[
\begin{array}{lll}
/\text{yosida} + \text{ke}/ & \rightarrow & \text{yosidá-ke} \quad \text{‘the Yoshida family’} \\
/\text{nisímura} + \text{ke}/ & \rightarrow & \text{nirimurá-ke} \quad \text{‘the Nishimura family’}
\end{array}
\]

c. **Accent shifts** require a shift of base prosody

\[
\begin{array}{lll}
/\text{kúzu} + \text{ya}/ & \rightarrow & \text{kuzú-ya} \quad \text{‘junkman’} \\
/\text{toma} + \text{ya}/ & \rightarrow & \text{toma-ya} \quad \text{‘mat seller’}
\end{array}
\]

A common type of affix-controlled process, exemplified in (4a) with the suffix -kko, is deletion of the prosody of the base to which the affix is attached. It is clear why this type of deletion, sometimes called a ‘dominance effect’, is antagonistic to RCA: RCA strives to preserve the accent of the root, while -kko demands deletion of the root accent. Another type of affix-controlled process is pre-accentuation (or post-accentuation for prefixes), which causes insertion of an accent somewhere in the base, as shown in (4b). Pre-accentuation may also run counter to the imperative to realize root accent in this system because, as is typical, there is one accent per word in Japanese; the insertion of an accent thus entails the deletion of the base accent, as in nisirmurá-ke. A final type of ACA involves accent shift or “flop”, exemplified in (4c) with the suffix -ya. While not in direct conflict with RCA, accent shifts of this kind resemble the other types of ACA in that they mutate the accent of the base. The accentual change demanded by -ya is a shift of the prosody of the base, as observed in words with accented stems like kuzú-ya. To summarize, affix-controlled accent runs counter to RCA in requiring a change of the accentuation in the base of affixation.

The identification of these two morpho-accentual processes raises the following two questions for the theory of morphologically governed accent.

1. How are the differences between RCA and ACA to be described and explained?

2. How is the conflict between RCA and ACA to be resolved?

The observation that RCA and ACA are fundamentally different poses the formal question of how to distinguish them as separate classes of morpho-accentual phenomena. Furthermore, the inherent difference between RCA and ACA leads to situations of conflict where RCA demands preservation of a root accent, while ACA requires a change of the root accent, even the deletion of it. Moreover, the negotiation of this conflict is a subtle matter. In some contexts RCA wins, as found in pre-accentuation in Cupeño. In the case of Japanese, however, ACA wins, as the pre-accenting suffix -ke induces an insertion of accent across the board, even in words with accented roots. How then is the conflict between these morpho-accentual phenomena to be modelled in a way that accounts for the observed cross-linguistic differences?

There is also a larger theoretical issue to be addressed in the analysis of these morpho-accentual processes. Both RCA and ACA have clear parallels in other morpho-
phonological alternations and these parallels require explanation. As alluded to above, RCA is like root-controlled vowel harmony in that the phonological patterns observed in words are determined by the roots contained in these words. Affix-controlled accentual processes also have well-established parallels with non-accentual processes. Pre-accentuation, for example, can be compared to the length alternations induced by certain affixes, like pre-lengthening suffixes found in many languages (e.g., Yidiñ, Dixon 1977): both pre-accenting and pre-lengthening suffixes trigger a change of the phonological make-up of their bases. These considerations lead to a third important question, which has both descriptive and theoretical implications.

3. What accounts for the parallels to RCA and ACA found in other areas of phonology?

If the parallels pointed to above are valid, then it would be a significant liability if the ultimate theory of RCA and ACA did not make these connections. A major goal of this thesis, therefore, is to account for the properties of ACA and RCA with principles that are generally available in linguistic theory. The correct theory, by this desideratum, should account for the range of accentual processes with theoretical constructs which are not specific to a theory of accent, but rather, sufficiently general to extend to other morphologically governed phonological patterns.

1.1.2 Synopsis of Theoretical Arguments

A fundamental goal of linguistic theory is to make sense of language particular facts with universal principles. Optimality Theory (OT) takes a particular approach to achieving this goal (Prince & Smolensky 1991, 1993, McCarthy & Prince 1993b). Universal constraints are posited, often having a basis in theories of language production, perception, and processing. This assumption entails that there is universal set of constraints, dubbed CON, and that these constraints are present in the grammar of every language. To account for cross-linguistic differences, these well-formedness constraints are ranked, or prioritized, on a language particular basis. In this ranking, violation of a constraint is tolerated if it leads to the satisfaction of another, higher-ranking, constraint.

(5) Some Core Assumptions in Optimality Theory

a. Universality of Constraints: linguistic behavior is modelled as the interaction of universal constraints.

b. Constraint Ranking and Violability: constraints are ranked on a language particular basis; violation of a given constraint is tolerated if it leads to the satisfaction of a higher-ranking constraint.

In this context, it is important to account for language particular patterns in tandem with the typological regularities which cross-cut languages. Optimality Theory, because of these inherent assumptions, is responsible for both types of observations. The core tenets of OT bring new insight into both language particular and cross-linguistic patterns found in morphologically governed accent systems, as I show below in a synopsis of the theoretical arguments developed in subsequent chapters.

In most OT work in phonology, two types of constraints are recognized (6). There are the so-called Markedness constraints, which characterize various forms of surface well-

---

1For an introduction to the technical aspects of Optimality Theory, e.g., the generation and evaluation of candidate forms, see the references cited above, in addition to McCarthy & Prince 1994a, 1995, Beckman 1997 [1998], and Benua 1997 [1998].
formedness and are often motivated in terms of ease of articulation or perception. These constraints assess outputs and determine the markedness of a given form as a function of its constraint violations. For the present purposes, however, the more important constraint type is Faithfulness. Generally speaking, Faithfulness constraints require a lexical form to remain unchanged at the surface. Thus, if lexical-to-surface Faithfulness is fully satisfied, then the output duplicates the input in every way.

(6) Constraint Types in Optimality Theory

   a. **Markedness**: applies to output forms and characterizes surface well-formedness.

   b. **Faithfulness**: applies to a pair of related forms and requires them to match for different aspects of linguistic structure.

There is a fundamental tension between Markedness and Faithfulness constraints. On the one hand, Markedness pushes a form towards simplification and loss of marked structure. Faithfulness, on the other hand, pushes back, striving for preservation of lexical distinctions, even at the expense of marked or complex structure at the surface. While Markedness constraints have an important role in accent systems, especially in regulating phonologically predictable accentual patterns, Faithfulness to lexical accent is fundamental as it is at the heart of the explanation for the morphological factors examined in this thesis.

One central role of the Faithfulness constraints is to provide the basis for a theory of phonemic accent. The presence of a phonemic contrast in a language entails a ranking in which Faithfulness for the contrastive feature outranks the relevant Markedness constraints that neutralize this contrast. This reasoning applies with equal force when prosodic features such as stress and tone give rise to surface contrast. If Faithfulness to lexical prosody outranks the set of constraints which bring about a regular pattern for this prosody, the result is a system with contrastive accent. The reverse ranking, on the other hand, produces a grammar without this contrast. In sum, phonemic versus predictable accent is determined through constraint ranking in this theory.

The approach to accentual contrast as satisfaction of Faithfulness to lexical prosody leads to a principled analysis of the first type of morpho-accentual process, root-controlled accent. Converging sources of evidence have surfaced recently which lead to the conclusion that there are distinct Faithfulness constraints for roots and affixes. A direct source of evidence derives from psycho-linguistic studies showing the privileged role of roots in lexical access and storage (see Beckman 1997 [1998] for a review). In addition, the distinction between Root and Affix Faithfulness is motivated on purely linguistic grounds (as argued in McCarthy & Prince 1995, Selkirk 1995a,b, Urbanczyk 1996, and Beckman 1997 [1998]). The privileged status of roots over affixes leads to the following intrinsic ranking among the Faithfulness constraints.

(7) Morphologically-Dispersed Faithfulness (McCarthy & Prince 1995)

   Root Faith >> Affix Faith

This inherent ranking accounts for two characteristic observations. First, roots generally license a wider range of contrasts than affixes. This observation is ensured by the ordering in (7) because any constraint ranked above Root Faith must also outrank Affix Faith. Therefore, any restriction that holds on the distribution of a feature of the root must also hold of affixes, which effectively precludes a contrast in affixes which is not present in roots. In addition to deriving restrictions in inventories, the above ordering predicts that roots will have a privileged status in phonological alternations. In familiar root-controlled
vowel harmony systems, for example, the demands of the system require that there be a single featural specification in a given harmonic domain; in situations where a root and affix have conflicting featural specifications, morphologically-dispersed Faithfulness guarantees faithful treatment of the features of the root, yielding the observed root-control pattern. In sum, the ranking Root Faith >> Affix Faith assigns a privileged Faithfulness status to roots, which is found in both phonological inventories and alternations. Furthermore, these results foreground the importance of constraint ranking because the satisfaction of a high-ranking constraint is decisive.

With these assumptions in hand, root-controlled accent is explained with the same basic tools used in the analysis of other root-controlled phenomena. Typically, words may only have a single accent; thus, in words with more than one inherently accented morpheme, all but one is deleted. If the word contains an accented root and one or more accented affixes, satisfaction of Root Faithfulness has the effect of precluding the realization of affix accent, as shown below.

(8) Root-Controlled Accent in Cupeño as Root Faithfulness

<table>
<thead>
<tr>
<th>/pé + ?áyu + qál/</th>
<th>FAITH(Accent)Root</th>
<th>FAITH(Accent)Affix</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. pé-?áyu-qal</td>
<td>*!</td>
<td>*</td>
</tr>
<tr>
<td>b. → pe-?áyu-qal</td>
<td></td>
<td>**</td>
</tr>
</tbody>
</table>

Preservation of affix accent in (8a) entails a violation of FAITH(Accent)Root, which is fatal for the first candidate given the rank of this constraint in the system. The winning form is thus the one which preserves the root accent at the expense of the loss of affix accent (8b). This analysis therefore explains the pattern of root retention in terms of the same constraint ranking used in the analysis of a non-accentual phenomena like vowel harmony, establishing a parallel between these two systems in a formal way. In addition to this result, there are two important consequences that this approach to RCA has for accent systems in general.

The first consequence is that the role of directionality in accent systems is significantly reduced. The inherent ranking Root Faith >> Affix Faith predicts that, in languages with an accentual contrast in both roots and affixes, root accent generally takes precedence over affix accent. This prediction is indeed interesting because it attributes a role for the morphological structure in Accent Resolution (AR) that has been formerly treated in terms of phonological directionality. For example, the retention of stem accent in many Indo-European languages is argued in Kiparsky & Halle 1977 to be due to a principle which assigns a word level accent to the first inherently accented morpheme of a word. Likewise, Poser 1984 employs a principle of directional AR which favors deletion of all but the first lexical accent in Japanese minor phrases. These accounts, however, lack the crucial evidence from prefix + root sequences which shows that AR must be governed by directionality. The absence of a class of prefixes which ‘win out’ over a following stem accent invites a re-analysis of these phonological accounts in terms of root-controlled accent. In the RCA analysis, the absence of a class of prefixes which take precedence over a root accent is a predicted consequence of the privileged Faithfulness status of roots. It appears, therefore, that two additional accent systems, which have been previously analyzed in different way, also fall within the scope of Root Faithfulness constraints.

The theory of RCA developed here does not deny a role for directionality in accent systems altogether. Rather, morphologically-segregated Faithfulness predicts that root-controlled AR is primary, and when Faithfulness is indecisive, other constraints may take
effect. Faithfulness is not decisive when it is crucially dominated. Thus, when a constraint requiring accent to appear at a designated edge dominates Faithfulness to lexical prosody, a directional pattern of AR may emerge. Also, Faithfulness is not decisive in word types where inherently accented morphemes are of equal status. For example, in Cupeño, words with an unaccented root and more than one accented affix show a preference for realizing the rightmost affix accent. In such a scenario, rightmost accent surfaces when the grammar does not require faithful treatment of a root accent. To summarize, overriding root accent is primary, applying to all cases where Root and Affix Faithfulness to accent is decisive.

A second important consequence of the proposed theory is that it clarifies a distinct type of morpho-accentual process, affix-controlled accent. In contrast to root-controlled accent, which assigns enhanced Faithfulness to roots, affix-controlled accent actively mutates the base of affixation, as depicted below for dominant affixes in Japanese.

(9) RCA in Cupeño          ACA in Japanese

\[
\begin{array}{c}
\text{INPUT} \\
\hline
\text{pe-}áyu \text{-qál} \\
\hline
\text{koobe} \text{-kko}
\end{array}
\]

The analysis of RCA follows from the privileged Faithfulness properties of roots. I argue that the analysis of ACA, by contrast, is due to a new type of constraint, Anti-Faithfulness. Roughly speaking, Anti-Faithfulness is the negation of Faithfulness. While Faithfulness resists an alternation, Anti-Faithfulness specifically requires one, as observed with the deletion of accent in words with -kko. The distinction between RCA and ACA can thus be characterized as two different lines of development in the formalization of Faithfulness. RCA is due to Root Faithfulness; ACA is the result of affix-induced Faithfulness reversals which bring about a change in the accentuation of the base of affixation.

While Anti-Faithfulness forms the basis of an explanatory theory of ACA, it is also motivated in non-accentual phonology. In particular, this constraint type is indispensable in the analysis of exchange processes, i.e., morpho-phonological alternations which involve a full rotation of two classes of phonological elements. A well-known example of this type is the voicing exchange found in the Nilotic language Luo, where the [voice] specification for the stem-final obstruent in the singular is reversed in the corresponding plural.

(10) Voicing Exchange in Luo (Gregerson 1972, Okoth-Okombo 1982)

<table>
<thead>
<tr>
<th>Singular</th>
<th>Plural</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. bat</td>
<td>bed-e</td>
</tr>
<tr>
<td>reč</td>
<td>rej-e</td>
</tr>
<tr>
<td>b. č ogo</td>
<td>č ok-e</td>
</tr>
<tr>
<td>luedo</td>
<td>luet-e</td>
</tr>
</tbody>
</table>

Cases such as these pose an interesting challenge to OT because no ranking of Markedness and Faithfulness constraints yields the observed exchange (a point demonstrated in Moreton 1996). Succinctly, any ranking of these two classes of constraints which maps one type of segment onto another is invariably one-way, i.e., /A/ → [B], but /B/ → [B],
not /B/ to [A] as observed in Luo. In order to produce an unfaithful mapping, as in /A/ → [B], Faithfulness for the relevant feature must be ranked below the constraint banning segments of type A; if this ranking holds, then the grammar will not change /B/ to [A] as well because this mapping violates the constraint banning [A]. The up-shot is that exchange processes are formally intractable in OT if grammars are characterized as a ranking of just Markedness and Faithfulness constraints.

The introduction of Anti-Faithfulness constraints solves the problem posed by exchange rules. The Faithfulness constraint for [voice] has, by hypothesis, a corresponding Anti-Faithfulness constraint, ¬FAITH(voice), which requires a change of the [voice] specification of the stem-final obstruent. The ranking of this constraint above its related Faithfulness constraint therefore describes the full rotation of this feature observed in Luo.

(11) Voicing Exchange in Luo as Anti-Faithfulness

<table>
<thead>
<tr>
<th>Input</th>
<th>Output</th>
<th>¬FAITH(voice)</th>
<th>FAITH(voice)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. /bat/</td>
<td>be[d]-e</td>
<td></td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>*be[t]-e</td>
<td></td>
<td>*!</td>
</tr>
<tr>
<td>b. /č ogo/</td>
<td>č o[k]-e</td>
<td>¬FAITH(voice)</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>*č o[g]-e</td>
<td></td>
<td>*!</td>
</tr>
</tbody>
</table>

Both parts of the exchange are predicted by ¬FAITH(voice) because this constraint specifically requires a change of the [voice] specification in the base. This solution therefore motivates Anti-Faithfulness as an important theoretical construct and shows that it is operative in non-accentual morpho-phonological alternations.

A host of properties of affix-controlled accent are identified in this thesis and shown to follow from Anti-Faithfulness when this constraint type is applied to morphologically related words, i.e., when it is ‘transderivational’ in the sense of Benua 1997 [1998]. First, ACA is morphological in the sense that it induces an opposition between a base and a derived form. As a relation between words, Anti-Faithfulness forces an alternation in the paradigm which has the effect of marking and re-enforcing salient morphological distinctions. Second, affix-controlled accent is always base-mutating, meaning that it always affects the base of affixation. This observation also follows from the transderivational implementation: Anti-Faithfulness only affects the subconstituent of the word which occurs throughout a paradigm, namely the base. Third, affix-controlled accentual processes are ‘grammar dependent’, which means that their output is constrained by the independently motivated grammar of accent. Anti-Faithfulness explains grammar dependence because it does not fully specify the ways in which two words must differ accentually; it asserts that they must be different, and the rest of the grammar predicts how this difference is realized (a point returned to below).

In a sense, the approach to ACA as Transderivational Anti-Faithfulness (TAF) is an explicit formal statement of the insights that underlie many traditional analyses of diacritic properties of affixes (see especially Garde 1968 et seq. on Slavic languages, Fudge 1984 on English, and Carlson 1976, 1989 on Interior Salish). These analyses differentiate morpheme classes with various accentual diacritics, e.g., ‘pre-stressing’ or ‘accent-deleting’, etc.; furthermore, language particular prioritizations for these diacritic properties determine the outcome in words which are marked for more than one diacritic (see Carlson 1976 et seq. for a particularly elaborate hierarchical ordering). The formalization proposed
here, however, establishes the basis of a highly restrictive theory of accentual processes because of the nature of Transderivational Anti-Faithfulness and the inherent properties of Optimality Theory. First, TAF theory establishes substantive limitations on the range of affix-controlled processes. Since ACA is derived as Faithfulness reversals, the range of affix-controlled accentual processes must be described in terms of violations of existing Faithfulness constraints. Thus, the theory of Accentual Faithfulness defines a set of constraints which govern the realization and distribution of accent (12a). These Accentual Faithfulness constraints have corresponding Anti-Faithfulness constraints (12b), which effectively predict the range of possible affix-controlled accentual processes.

(12) Faithfulness and Anti-Faithfulness for Accent

a. MAX-ACCENT: no accent deletion b. ¬MAX-ACCENT: obligatory accent deletion

DEP-ACCENT: no accent insertion ¬DEP-ACCENT: obligatory accent insertion

NO-FLOP-ACCENT: no accent shift ¬NO-FLOP-ACCENT: obligatory accent shift

The fundamental notion of Faithfulness in OT thus has a role in the analysis of ACA too, through the negation of the independently needed Accentual Faithfulness constraints. The constraints which are essential to the analysis of phonemic accent have corresponding Anti-Faithfulness constraints, which in turn characterize a restrictive typology of affix-controlled morpho-accentual processes.

The TAF theory of affix-controlled accent is also constrained by the larger grammar in which Anti-Faithfulness is employed. Succinctly, a TAF constraint requires a change in the base of affixation, but the realization of this change is predicted by the independently motivated grammar of accent. Applying this reasoning to dominance effects in Japanese, the suffix -kko requires a deletion of base prosody by activation of the TAF constraint ¬MAX-ACCENT. It is the rest of the grammar, however, which determines the result of this deletion process. Since unaccented words are left unaccented by default in Japanese, as shown by miyako ‘city’, so too are forms which result from de-accentuation.

(13) Grammar Dependent ACA: Dominance Effects in Japanese

/kōobe + kko/ /miyako/ INPUT

↓ ↓

[koobe-kko] [miyako] OUTPUT

As obligatory violations of Faithfulness, TAF makes the prediction that the output of affix-controlled accentual processes is intimately tied to the default accentual structures found elsewhere in the system. The finding that all of these processes exhibit some form of grammar dependence is therefore strong support for the proposed theory.

Returning to the observed conflict between RCA and ACA, OT provides the right tools for modelling this antagonism as well. Recall that certain suffixes in Cupeño trigger the insertion of an accent in the base. This observation is accounted for in (14a) as an effect of the Anti-Faithfulness constraint, ¬DEP-ACCENT, which calls for the observed insertion of an accent. The loser fails to insert an accent, and as a result incurs a fatal violation of ¬DEP-ACCENT. However, accented roots block pre-accentuation, which is derived by ranking the Root Faithfulness constraint demanding the realization of accent, namely MAX-ACCENT\textsubscript{Root}, above the Anti-Faithfulness constraint, as shown in (14b).
The conflict between these two competing forces is described with one of the fundamental assumptions of OT, namely that the constraints are ordered with respect to each other in a constraint hierarchy. Furthermore, this ranking is established on a language particular basis; in one language Root Faithfulness may be ranked above the Anti-Faithfulness constraint ¬DEP-ACCENT, which as illustrated above for Cupeño, accounts for blocking effects. However, another language may have the reverse ranking, yielding pre-accentuation across the board, as exemplified above for -ke in Japanese. In sum, this variation is treated as a language-internal prioritization of universal constraints.

To summarize the main ideas, two lines of development in the characterization of Faithfulness in Optimality Theory define a theory of morphologically governed accent. A set of Accentual Faithfulness constraints are employed in the analysis of phonemic accent. A relatively straightforward modification of these constraints, namely their division into the morphological categories root and affix, leads to a principled explanation of root-controlled accent. With morphologically-dispersed Faithfulness, overriding root accent is a consequence of the privileged Faithfulness properties of roots, as has been shown in other empirical domains such as vowel harmony. Affix-controlled accent, on the other hand, is due to a new constraint type, Anti-Faithfulness, which models this type of morpho-accentual process as a Faithfulness reversal. Applied between a base and derivative, Anti-Faithfulness explains the fact that affix-controlled accentual processes are inherently morphological and base-mutating. Furthermore, the Anti-Faithfulness thesis leads to a restrictive typology of morpho-accentual processes; these processes are limited to operations that can be derived by obligatory violations of Faithfulness constraints and that result in language particular default patterns for accent.

Concerning the larger theoretical implications, the theory of morphologically governed accent proposed in this dissertation employs principles which have very general applications in phonology. The notion of Faithfulness crucial in the characterization of phonemic accent is no less crucial in the analysis of other types of phonemic contrast. Furthermore, the privileged Faithfulness status for roots found in accent systems is also characteristic of non-accentual phonological systems, and thus the ordering of Root and Affix Faithfulness extends to both types of systems. Lastly, the approach to affix-controlled accent as obligatory violations of Faithfulness constraints also has some currency outside of accent systems; it is critical to the analysis of exchange processes and it forms the base of a general theory of morpho-phonological alternations. These descriptive and analytical assumptions therefore lead to the conclusion that root-controlled accent is a special case of a cross-linguistic trend favoring retention of information in the root, and likewise, that affix-controlled accent is just a special type of phonological alternation instantiating a morphological contrast.
1.1.3 Overview of the Dissertation

The next section of this chapter provides an introduction to the properties of the accent systems examined in this thesis and the theoretical background in autosegmental and metrical theory relevant for these systems. A theory of Prosodic Faithfulness is then proposed, and the constraints responsible for phonemic accent are defined and applied to a concrete example. The rest of the thesis is summarized below as an overview of what is to come in later chapters.

§2. Root-Controlled Accent in Cupeño. This chapter is a detailed case study of stress-accent in Cupeño. After a close look at stress in isolated roots, the interaction between root and affix stress is examined and the morphologically-dispersed Faithfulness constraints are employed in the analysis of the basic fact that root accent overrides affix accent. The root-controlled analysis of Cupeño stress-accent is contrasted with some plausible alternatives and a host of predictions of the analysis are summarized.

§3. Restricted Edge Effects in Root-Controlled Accent Systems. This chapter studies the implications of the analysis of root-controlled accent in Cupeño for other languages. The consequences of the universal ordering Root Faith >> Affix Faith are studied and a prediction is outlined which posits a significant restriction on the scope of directionality in accent systems. This prediction is then examined in detail in two languages, Russian and Japanese. In developing close formal analyses of the regular and productive accentual patterns found in these languages, it is shown that these languages do in fact conform to the restrictive theory of edge effects stemming from morphologically-segregated Faithfulness.

§4. Transderivational Faithfulness and Anti-Faithfulness. This chapter provides the necessary background for analyzing affix-controlled accent in a general theory of morpho-phonological alternations. As the theory of Anti-Faithfulness is developed in Transderivational Correspondence Theory (Benua 1997 [1998]), a review of the basic concepts of this theory is given in the context of a discussion of stress-neutral affixation in English. Next, the theory of Anti-Faithfulness is motivated and applied to the case of voicing exchange in Luo. The implications of this theory are also studied and a set of predictions for affix-controlled accentual processes are clarified.

§5. The Role of Transderivational Anti-Faithfulness in Morpho-Accentual Phenomena. This chapter applies the theory of Transderivational Anti-Faithfulness to affix-controlled accent, arguing that this theory establishes the observed parallels between morpho-accentual processes and morpho-phonological alternations in general. It begins by discussing the properties which distinguish affix-controlled accent from root-controlled accent and the underlying functions of these distinct accentual processes in the larger architecture of the grammar. Subsequently, each affix-controlled process is examined in the context of a series of case studies. It is shown that the TAF theory of affix-controlled processes provides an explanatory account of the properties which characterize ACA and distinguish this theory from several previous approaches. The resulting theory is an integrated whole, accounting for a heterogeneous body of accentual patterns as forced violations of existing Faithfulness constraints.
1.2 Lexical Accent and Prosodic Faithfulness

The proposal to study accent systems is in some ways problematic because the term ‘accent’ has been used in so many different ways and applied to a wide range of phonological phenomena. For some, the term accent is often equated with ‘pitch accent’ in systems like Japanese, and as accent is realized tonally in this system, accent would appear to be restricted to just those systems with linguistic uses of f0 (fundamental frequency). In practice, however, lexical stress systems like Russian are dubbed pitch accent systems too, either because the system under analysis developed from a true pitch accent system, as with Russian, or simply to emphasize the phonological similarities between stress-accent in one language and non-stress accent languages like Japanese. The latter case is exemplified by the stress-accent language Cupeño (Uto-Aztecan), where the ancestor language was clearly a stress language (Munro 1977, see Kiparsky & Halle 1977 on a comparison between Cupeño and other Indo-European languages like Russian).2

Accent systems are also sometimes called ‘restricted tone systems’ to clarify the differences between accent and tone. While differentiating accent and tone is not always a straightforward matter, accent systems typically differ from tonal systems in the nature of the accentual contrast and the types of accentual processes. These properties will be examined in detail below, but an important point is that, in some theories, accent simply involves a type of tone system where tonal contrasts are more restricted and processes involving tone can operate over long distances. Any characterization of the notion accent will have to account for these differences, and furthermore, it should formalize the intuition shared by many that there is a notion of accent that is independent of the phonetic realization of accent. That is, an adequate characterization should account for the striking similarities between languages like Russian and Japanese (an observation first made by in Jakobson 1963, 1965 I believe), despite the obvious fact that accent in these two systems have different phonetic correlates.

In the next subsection, I list of properties which characterize the accent systems studied throughout this thesis. I also identify some theoretical approaches to accent, including various autosegmental and metrical theories, and I justify choosing a metrical theory of accent. Then, in §1.2.2, I propose a formal theory of lexical accent in terms of Faithfulness to underlying prosody, discuss its advantages over previous approaches to accent systems, and clarify how it is used in the individual case studies which follow.

1.2.1 Remarks on the Notion ‘Accent’

1.2.1.1 Observations

To start with a relatively theory-neutral characterization, accent is often a cover term for systems with suprasegmental features like stress and tone, which have the following phonological properties.

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2 Distinctive tone in a related Uto-Aztecan language, Northern Tepehuan, is probably an innovation, brought about by the loss of certain laryngeals (see Bascom 1965 for details).
(15) General Properties of Accent Systems

a. **Contrastiveness**: accent is unpredictable and therefore may bring about contrast in otherwise identical words.

b. **Edge Effects**: accent is often assigned or attracted to a designated edge of a word or phrase (cf. ‘delimitative accent’ from Trubetzkoy 1939).

c. **Culminativity and Accent Resolution**: there can be at most one accent per word; in words with more than one inherently accented morpheme, all but one is deleted.

d. **Accentual Processes**: accentual processes are limited to deletion, insertion, and shift of accent; these processes may take place over long distances.

The distribution of suprasegmentals is, in part, unpredictable in accent systems, and they may therefore lead to a surface contrast in otherwise identical words. For example, stress-accent in Russian is unpredictable and brings about a contrast in words such as *bägrít* ‘to spear fish’ and *bagrít* ‘to paint crimson’. Accent in Japanese, though realized as a tonal event, is likewise contrastive and also yields a surface contrast, e.g., *häsi* ‘chopsticks’, *hasí* ‘bridge’, and *hasi* ‘edge’. Accentual contrasts such as these differ from those found in so-called ‘free tone’ systems, such as Yoruba, in that the contrast is not paradigmatic; that is, it is not due to an opposition among an inventory of accentual or tonal units, e.g., a high versus low tone contrast in a single tone-bearing unit. Rather, the contrast is only in the location of accent in the surface form or the presence or absence of accent, as in the case of Tokyo Japanese. Concretely, the total number of contrasts possible in an accent system is $n + 1$, where $n$ stands for the number of sponsors for accent in a given word and an additional contrast (the ‘+1’ part) allows for the absence of accent in a form. On the other hand, a system with a paradigmatic contrast may admit as many contrasts per sponsor multiplied by the number of accentual or tonal types in the language, which is clearly less restricted. In sum, languages such as Russian and Japanese have in common that accent is unpredictable and therefore has a contrastive function, but this accentual contrast is more restricted than the range of contrasts observed in tonal systems.

Another unifying property of accent is that accent is often attracted to the edge of a prosodic or morphological unit. Thus, various contexts may require accent to appear at a designated edge, or alternatively, may privilege realization of an accent which is closer to a given edge constituent. These two types of edge effects may be distinguished as **EDGE TROPISM** versus **EDGE ORIENTATION**, respectively. The former accounts for the Trubezkovian notion of delimitative accent, where accent is co-extensive with an edge. Edge tropism is observed in Cupeño in words which are composed exclusively of unaccented morphemes. In such forms, accent is tropic to the first syllable of the word, as in /yax + em/ → *yax-em* ‘say! (second person plural)’. Cupeño also exemplifies the other type of edge effect, edge orientation. In words with more than one inherently accented morpheme, the rightmost accent is realized in the surface form, e.g., /pé + yax + qál/ →

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4Beckman 1986 observes that accent typically does not carry the same distinctive load as other segmental features, a point supported by psycholinguistic research leading to the conclusion that lexical stress is not directly used in lexical access strategies (see Culter & Clifton 1984 and Culter 1986). Whatever the reason for this observation concerning the function of accent, the distribution of accent is nonetheless phonologically unpredictable, and this requires a linguistic analysis on a par with segmental features which are also unpredictable.
"pe-ya-qāl ‘he was saying’, cf. /pē + yax/ → pē-yax ‘he says’, which shows a bias towards realizing inherent accent as close as possible to the right edge of the word, though non-final accent is still found in the system. Edge effects such as these are not unique to accent systems: as autosegmental tone may also show the same patterns of edge tropism and orientation. But this property of accent systems distinguishes accent from other phonological features which are not mobile in the same sense as accent and will be important in the characterization of Faithfulness to underlying accent in §1.2.2.

A third important property observed in accent systems is that there may be an overarching constraint in the system which has the effect of requiring a single accent in a given domain, often the lexical word. When an accent system is subject to this constraint, accent is said to be CULMINATIVE.5 In Russian, for example, there is a single rise and fall in intensity per word. Likewise in Japanese, minor phrases may only have a single fall in pitch over the accented syllable. Culminativity in these systems leads to a characteristic type of morpho-accentual process, Accent Resolution. When a word is composed of more than one inherently accented morpheme, only one may realize its accent because accent is culminative. Therefore, in multiply accented lexical forms, the mapping from input to output may be viewed as a type of competition for a unique surface accent. In this way, accent systems may be contrasted from other types of tonal systems and stress systems where there is no ‘uniqueness requirement’ on accent. Thus, tone languages like Yoruba do not limit the number of tones in a form to exactly one, and consequently, there is no loss of all but one lexical tone.

Finally, accent systems may be characterized by the types of processes operating on accent. Accent systems often have only three types of processes: deletion, insertion, and shift of accent. Deletion of accent has already been mentioned as a culminativity effect: in words with more than one accented morpheme, only one accent can be realized, which in turn results in the deletion of all other lexical accents. Insertion of accent may also be modelled as an effect of culminativity: if the underlying representation of a form does not have a lexically specified accent, an accent is inserted to satisfy an existence requirement for accent embodied in culminativity. While deletion and insertion of accent may be due to other factors, both phonological and morphological, culminativity plays a major role in deriving these two processes in the cases studies presented here. Finally, an accent may also shift from its lexical sponsor in the mapping from lexical to surface forms. For example, if the vowel which is associated with an accent is deleted, the lexical accent may shift to another position in the surface form, as with syncopated vowels in the Jivaroan language Aguaruna (§5.4.4). One common way of contrasting these accentual processes with those found in tone systems is that processes of tone assimilation and dissimilation are typically subject to stricter locality conditions, essentially requiring that the target and trigger be in adjacent syllables or moras (see Odden 1995 and references therein). The accentual processes outlined above, however, may take place over long distances and are typically not subject to the same locality conditions. For example, Accent Resolution in Russian and Japanese does not require accent on two adjacent syllables in order to trigger the deletion of accent; this accentual process simply deletes all lexical accents but one, whether they are local or not. To summarize, accent systems may have three types of

5The term ‘culminative’ has been used differently in different contexts: Trubetzkoy 1939 defines culminative features as features which make an appearance exactly one time in a given domain, while Liberman & Prince 1977 and Hyman 1977 use the term differently for stress systems to mean essentially that there is always a stress peak which is more prominent than all others in the word. For the purposes of the case studies presented here, both uses of the term are appropriate, though in the next subsection, some remarks are made as far as how to distinguish these different observations in terms of the bracketed grid structures commonly assumed in metrical stress theory.
processes, accent deletion, accent insertion, and accent shift, and these processes may operate over long distances.

While accent systems share a host of phonological properties, it is important to note that the phonetic correlates to accent may be significantly different. That is, accent systems have similar phonological properties, but the phonetic attributes of accent may differ from language to language. Thus, stressed syllables in Russian have an intensity peak and are perceived as louder than unstressed syllables (Jones & Ward 1969). In Japanese, on the other hand, the primary cue for accent is the fall in f0 directly following the accented syllable (see Beckman 1986 and references therein). While some early work on stress and accent has suggested that f0 is a major factor in cueing stress as well as tone (Hyman 1977, 1978, based on Fry 1955, 1958), it seems clear that there is no universal phonetic correlate to accent as I have characterized it. Beckman 1986 provides experimental evidence supporting a distinction between stress-accent and non-stress accent, the latter being represented in Tokyo Japanese where f0 is the primary correlate to accent. In stress-accent systems, as exemplified by English in Beckman’s study, phonetic cues other than pitch are used, including intensity, length, and possibly other phonetic properties, such as phonation type and vowel quality. Jones & Ward’s 1969 characterization of stress in Russian shows a clear role for amplitude and duration of stressed syllables, even in post-focus environments, which effectively classifies Russian as a stress-accent language. Thus, while accent in Russian and Japanese behaves similarly in the phonology, the phonetics of accent is quite different in these languages.

1.2.1.2 The Representation Question

These observations concerning the phonetics and phonology of accent lead to some interesting questions regarding the representation of accent. The phonology of accent in Russian and Japanese supports a direct comparison, suggesting that they should be represented with the same phonological structures. On the other hand, the phonetic correlates of accent are vastly different; if the phonological representation of accent requires a connection with the phonetic implementation of accent, entails different phonological representations for accent. It would appear therefore that there are two basic approaches to the ‘representation question’.

(16) Two Basic Approaches to Representation of Accent

a. Different Phonologies Approach: phonological representations for accent are determined on a language-particular basis and have universal phonetic interpretations.

b. Different Phonetics Approach: accent is given a consistent phonological representation which has a language-particular phonetic interpretation.

Fleshing out the first approach, accent systems like Russian and Japanese require a lexical representation for accent. After all, accent is contrastive in these languages, and the domain of idiosyncratic distinctions such as these is the lexicon. On the assumption that Russian and Japanese have different phonologies, one clear avenue of analysis is that accent in Russian is encoded with the features in the representation of metrical stress, e.g., grid marks or diacritics marking the heads of stress feet. As accent in Japanese is realized with an f0 contour, the obvious choice here is to posit an autosegmental feature, presumably a tonal melody, or simply a linked high tone, over the lexically accented syllable. In the Different Phonologies theory, therefore, lexical accent is encoded with the phonological features which best describe the phonetic properties associated with accent in
these languages. An approach of this kind is taken in the autosegmental literature where languages with non-stress accent are represented with linked tones, see for example Pulleyblank 1986, Poser 1984, Archangeli & Pulleyblank 1984, Blevins 1993. The Different Phonologies approach leaves stress-accent languages like Russian and Cupeño with a different analysis, presumably lexical markings for stress feet or a set of minor rules which characterize the lexically idiosyncratic stress patterns.

The alternative approach presented in (16b) is that there is a single phonological feature for lexical accent in Russian and Japanese and the phonetic consequences of this feature is dealt with on a language-particular basis. The Different Phonetics approach is often taken in the metrical literature, with the underlying assumption that lexical accent is lexically specified stress and that stressed syllables may be assigned other phonological features by rule, or that stress is realized differently from one language to the next. See for example Zubizarreta 1982, Hayes 1980, Bennett 1981, Abe 1981, Prince 1983, HV, Sietsema 1989, Melvold 1990, Prince 1990, Zec 1994, Hayes 1995, McCarthy 1995, Pater 1995, van der Hulst 1995, Féry 1996, Revithiadou 1997; Idsardi 1992, Kubozono 1995, Katayama 1995, 1998. The Different Phonetics approach is of course not wedded to a metrical representation of accent, and other researchers have posited non-metrical accentual features. For example, Clements & Goldsmith 1984 and Goldsmith 1984 employ an accentual diacritic which guides the association of a pitch accent (=tonal melody) to the lexical sponsor. Also, employing the feature system of Vanderslice & Ladefoged 1972, Beckman & Edwards 1994 encode lexical stress in English with a diacritic feature for accent, which is again not directly tied to metrical structures. These specific implementations of the Different Phonetics theory of accent have in common that the phonological representation of accent does not have a unitary phonetic realization, which, as we will see, makes possible certain generalizations in the phonology of a wider range of accent systems.

While the matter of the lexical representation of accent is not directly relevant to the core issues of this thesis, I assume a metrical theory of accent, following the leading ideas in Prince 1983, HV, and Idsardi 1992. Before stating my formal assumptions, I will briefly summarize my reasons for choosing this specific theory. One important reason for formalizing accent as a prominence on the metrical grid is that it explains the phonological similarities among accent systems. Thus, the basic observation that accent systems have at most one accent receives a natural account if, by hypothesis, accent is encoded as a prominence which embodies a strong position in a bracketed grid structure, i.e., either a grid mark or an ‘*’.

Metrical representations are inherently culminative because of their hierarchical structure (see Hayes 1995), and so culminative accent, in a sense, comes for free. If, on the other hand, accent is represented as stress-accent in one system, and for example, as a linked tone in another, then culminativity effects do not follow in both systems, and therefore a direct parallel cannot be made. Furthermore, the non-local character of accentual processes is explained in the metrical interpretation of the Different Phonetics approach, but it does not necessarily follow in other theories. Concretely, the loss of non-adjacent lexical prominences is expected in the metrical theory because a lexical accent is deleted if it does not form the head of a stress foot. On the other hand, the deletion of tone due to certain cooccurrence constraints on tone is subject to more stringent locality requirements (Goldsmith 1976, Odden 1995, Myers 1987a). These points will be made more explicit below after a formal theory of lexical accent is proposed.

A second argument in favor of the metrical theory just described is that it leads to a more restricted theory of morpho-accentual processes, an argument originally due to Bennett 1981, cf. Poser 1984, but in a different form. As outlined above, accent systems may be characterized by a set of accentual processes, deletion, insertion and shift. These processes may be phonological or morphological, i.e., triggered by special affixes or only
in certain word classes. In other words, there is a restricted set of accentual processes which have counterparts in the morphology, a fact that is clearly relevant for the representation of accent. While all of the pieces are not in place to make this argument succinctly, the theory of morphological accent developed in this dissertation assumes that accentual processes with a morphological basis are derived as reversals of Faithfulness constraints governing the relation between lexical and surface accent. If the Faithfulness constraints operate on the prominence structures employed in metrical theories, then certain phonological operations can be systematically ruled out. For example, the fact that a prominence on the grid is never associated with more than one subordinate element supports the conclusion that grids never ‘spread’; thus, it follows that there is no Faithfulness constraint against this phonological operation. Because there is no Faithfulness constraint against spreading of accent, there will never be a morphological process calling for the reversal of an anti-spreading constraint, i.e., a morphological process expressing an imperative to spread. Thus, an advantage of the metrical theory of accent is that it restricts the range of possible morpho-accentual processes.

To summarize this background discussion, following many previous approaches, I employ an accentual feature that does not have a direct phonetic interpretation. The assumption that this accentual feature is a prominence on the grid establishes a clear parallel in the phonology between stress-accent systems like Russian and Cupeño and non-stress accent languages like Japanese. Though these assumptions are motivated in their own right, if it turns out that the lexical representation of accent in these languages must be different, then this finding will not directly affect the basic arguments to be made here. Thus, if Russian has lexical stress but Japanese has linked tone structure, then the explanations for root-controlled and affix-controlled accent does not substantively change; these explanations lie in principles applying to Faithfulness constraints generally, and not just to a specific type of Faithfulness. Indeed, all that matters in the construction of the theory of accent here is that these languages have an object in the underlying representation to be faithful to. If this is true, then the exact nature of the Faithfulness constraints is quite irrelevant to the analysis of RCA and ACA, as the analysis is one that is defined in terms of Faithfulness generally.

1.2.2 A Theory of Prosodic Faithfulness

1.2.2.1 The Constraints

We require a set of constraints to govern the relation between lexical and surface accent, which I will refer to collectively as ‘Prosodic Faithfulness’. Prosodic Faithfulness must therefore make reference to the assumed prominence structure, which requires the notion of Correspondence developed in McCarthy & Prince 1995.

(17) Correspondence

Given two strings \(S_1\) and \(S_2\), correspondence is a relation \(R\) from the elements of \(S_1\) to those of \(S_2\). Elements \(\alpha \in S_1\) and \(\beta \in S_2\) are referred to as correspondents of one another if \(\alpha R \beta\).

As McCarthy & Prince make clear, the set of correspondent elements that can be referred to by the Faithfulness constraints is not limited to segments; these elements may include autosegmental features like moras, tone, and importantly, prominence structure. As discussed above, accent is encoded as a lexical prominence, i.e., a grid mark over an accented vowel in the underlying representation. The Prosodic Faithfulness constraints given below make reference to lexical and surface prominence and require related strings to ‘match’ in this prominence structure.
(18) Prosodic Faithfulness (PROS-FAITH)

MAX-PROM: For a prominence, \( \forall x \exists x' [ x \in S_1 \rightarrow x' \in S_2 \land xRx' ] \)
‘Every prominence in \( S_1 \) must have a correspondent in \( S_2 \).’

DEP-PROM: For a prominence, \( \forall x \exists x' [ x \in S_2 \rightarrow x' \in S_1 \land xRx' ] \)
‘Every prominence in \( S_2 \) must have a correspondent in \( S_1 \).’

NO-FLOP-PROM
For a prominence, a sponsor, and an autosegmental link,
\( \forall x \forall y \forall z [ x \text{ and } y \text{ are associated via } z \text{ in } S_1 \rightarrow \exists x' \exists y' \exists z' \text{ such that } (x, y, z)R(x', y', z') \text{ and } x' \text{ and } y' \text{ are associated via } z' \text{ in } S_2. \)
‘Corresponding prominences must have corresponding sponsors and links.’

The above constraints distinguish between two forms of Faithfulness to underlying prosody, which in turn, are responsible for the range of accentual contrasts commonly found in accent systems. The first two constraints, MAX-PROM and DEP-PROM, govern Faithfulness to the presence or absence of prominence in related forms. When properly ranked, these constraints yield a contrast between accented and unaccented morphemes. This type of contrast can take two forms. In a system in which every word has an accent, like Russian and Cupeño, words with accented morphemes are faithful to their lexical prominence, which contrasts with words that have no underlying accent and, as a result, receive a default accentual pattern. Alternatively, the accented/unaccented contrast may directly manifest in surface words, as in Japanese where words with no underlying prominence are distinguished from accented forms by the absence of accent in the output. In both systems, MAX-PROM plays a crucial role in enforcing Faithfulness to a lexical prominence. The difference between these two results from the ranking of DEP-PROM: in languages like Russian, DEP-PROM is relatively low-ranking, as unaccented forms receive an inserted accent; in languages like Japanese, by contrast, DEP-PROM is relatively high-ranking, ensuring that unaccented forms in the input will not receive a non-lexical accent in the output.

A different form of Faithfulness concerns the position of prominence in related forms. Unless otherwise motivated, the position of prominence does not change in the mapping from one structure to another, and Faithfulness to the position of accent is governed by NO-FLOP-PROM. Thus, if NO-FLOP-PROM is high-ranking in the grammar, specifically ranked above constraints which assert a fixed position for prominence structures, then a word with \( n \)-numbered syllables or moras will have \( n \) number of accentual contrasts because the lexical position for accent must be maintained. Importantly, this contrast in the position of accent is only observed if MAX-PROM is also suitably high-ranked; NO-FLOP-PROM is only relevant for a prominence which has a counterpart in the input, which is of course governed by MAX-PROM. Since MAX-PROM (and DEP-PROM) bring about an additional contrast, i.e., the presence or absence of an accent, these constraints together yield the set of contrasts characteristic of accent systems discussed above, namely \( n + 1 \), where \( n \) is equal to the number of sponsors for accent in a given form.

In the characterization of Prosodic Faithfulness above, accent is understood as an autosegmental unit, namely a grid mark, instead of a property of a segment itself or the result of underlying foot structure, as sometimes assumed (Inkelas 1994, Kenstowicz 1995a, McCarthy 1995, 1997, Benua 1997 [1998], Itô, Kitagawa, & Mester 1996). That is, the constraints which mitigate against the deletion (MAX), insertion (DEP), and migration (NO-FLOP) of accent, are more like the Faithfulness constraints employed in the
treatment of other autosegmental objects like moras (McCarthy 1997) or tone (Bickmore 1996, Zoll 1996b, Yip 1996, Myers 1997a). The reason for this assumption is not part of a plan to rule out metrical constituency in accent systems altogether — there are many good reasons for wanting bracketed grids or stress feet in surface representation of accent. The rationale here that the principal reasons for positing foot structure in underlying representations, e.g., affix-controlled processes like pre- and post-accentuation, will receive a different treatment in the latter half of the thesis. Since the theory of these processes no longer requires foot structure in the underlying representation, Faithfulness to the hierarchical relations embodied in foot structure is not necessary in the input. Furthermore, as will be illustrated in detail in chapter 5, the Prosodic Faithfulness constraints given here have ‘echoes’ in the morphology: the attachment of an affix triggers a violation of one of these constraints. In morphologically triggered accentual processes, then, it is imperative to separate the different types of Faithfulness to underlying prosody precisely as it is done here in order to account for the differences among affixes which lead to deletion, insertion, or shift of an accent.

1.2.2.2 Application of the Constraints

Let us apply these constraints to a concrete example as a means of illustrating the basic assumptions of the theory of Prosodic Faithfulness. Two closely related Cupan languages (Uto-Aztecan), Cupeño and Cahuilla, differ in the behavior of stress in roots. Cupeño has a contrast between initial and pen-initial stress, while Cahuilla has uniform initial stress (Munro 1977, 1990).

(19) Cupeño Cahuilla
a. ?amúl ?ámul ‘agave’
   qas álý qásílý ‘sagebrush’
   qewál kíyul ‘fish’
   kaxál qáxal ‘quail’

b. tévet tévat ‘conifer’
   wáxeč ilý wáxač ilý ‘frog’
   wí?et wí?at ‘oak’
   sú?iš sú?iš ‘jackrabbit’

Stress is therefore phonemic in Cupeño, but predictable in Cahuilla. In OT, the presence of a phonemic contrast is an indication of high-ranking Faithfulness, as Faithfulness requires a contrast present in the lexical form to surface in the output. This assumption applies with equal force when stress, or other suprasegmental features, introduce a contrast, which is illustrated by the following schematic rankings.

(20) Phonemic versus Predictable Accent through Constraint Ranking

a. **Phonemic Accent**: PROS-FAITH >> PHONO

b. **Predictable Accent**: PHONO >> PROS-FAITH

In this theory, the distinction between phonemic and predictable accent is determined by the ranking of the Prosodic Faithfulness constraints relative to other
phonological constraints on the distribution of accent. In Cupeño, the observed contrast in
the position of accent is described by ranking two PROS-FAITH constraints above the
constraint responsible for deriving regular initial stress, INITIAL-PROM. In a grammar
characterized by this ranking, an input with a lexical prominence on the second syllable will
be paired with an output which also has a prominence over the second syllable, as
illustrated below. Where needed, indices are marked on prominence structure to indicate
the direction of corresponding prominences; in the forms below, two grid marks bearing the same index
indicates that they stand in correspondence according to the definition given in (17) above.

(21) Phonemic Accent in Cupeño

<table>
<thead>
<tr>
<th>Input:</th>
<th>?amül</th>
<th>MAX-PROM</th>
<th>NO-FLOP-PROM</th>
<th>INITIAL-PROM</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. (x₁  ,)</td>
<td>?amül</td>
<td></td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>b. (x₁  ,)</td>
<td>?ámul</td>
<td></td>
<td>*!</td>
<td></td>
</tr>
<tr>
<td>c. (x₂  ,)</td>
<td>?ámul</td>
<td>*!</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Given the OT principles of constraint ranking and violability, the predicted output may
violate a given constraint if such a violation will lead to the satisfaction of high-ranking
constraints. Thus, when comparing the first and last candidates above, candidate (21c) is
ruled out because it violates MAX-PROM as a means of satisfying lower-ranking INITIAL-
PROM. Concretely, the failed candidate has deleted the lexical accent because the lexical
prominence x₁ does not have a correspondent, or a ‘counterpart’, in the surface form. The
failed candidate in (21b) is also unfaithful to the input, but in a different way: the lexical
prominence has not been deleted but shifted from its lexical position in the input, leading to
a crucial violation of NO-FLOP-PROM. The winning candidate is therefore the one which is
fully faithful to both the presence of an accent and its position in the input (21a), despite its
poor edge-alignment by INITIAL-PROM.

The result achieved by this grammar is the desired opposition between forms like
?amül and forms which are not marked for second syllable stress, e.g., tévet. If such
forms are either marked lexically for initial stress, or completely unmarked, they will
receive initial stress by the ranking of constraints given above.⁶ This result is ensured by
the ranking of two important PROS-FAITH constraints, namely MAX-PROM and NO-FLOP-
PROM, above INITIAL-PROM, which favors the realization of the prosodic properties of the
input over perfect edge-alignment.

In contrast to this ranking of constraints, the reverse ranking in Cahuilla accounts
for regular initial stress in roots, as illustrated below. Regardless of the accentual
properties of lexical roots in Cahuilla, inputs are mapped onto outputs which have uniform
initial stress, even when such a mapping leads to a violation of PROS-FAITH, as in the
input-output pairs shown in (22b).

---

⁶The empirical issues of restricting the stress contrast to initial and pen-initial syllables, and the ranking of
INITIAL-PROM relative to the anti-insertion constraint, is taken up in §2.3, where a more thorough analysis
of Cupeño root stress is given.
(22) Predictable Accent in Cahuilla

<table>
<thead>
<tr>
<th>Inputs</th>
<th>Outputs</th>
<th>INITIAL-PROM</th>
<th>PROS-FAITH</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. /tévet/</td>
<td>tévet</td>
<td>* tevet</td>
<td>*</td>
</tr>
<tr>
<td>b. /cvcý/</td>
<td>cv cv</td>
<td>* cvcý</td>
<td>*</td>
</tr>
</tbody>
</table>

In this way, the presence or absence of a phonemic contrast in accent is derived through constraint ranking. To summarize the above results, phonemic accent in Cupeño involves the ranking of a set of PROS-FAITH constraints above a phonological constraint which requires a systematic pattern (23a). If the reverse ranking holds, on the other hand, the result is a predictable pattern of accent, as observed in the case of Cahuilla (23b). Furthermore, the effects of these two schematic rankings can be combined to account for what might be dubbed ‘hybrid accent’ systems, i.e., systems where accent is contrastive in some contexts, but certain over-arching constraints limit the distribution of the accentual contrast. For example, Spanish nouns have a contrast in the position of stress in that stress may fall on any of the last three syllables of the word; but antepenultimate stress is systematically avoided if the penultimate syllable is bimoraic (Harris 1983). By interleaving the PROS-FAITH constraints between two purely phonological constraints, this type of limited contrast can be achieved in a direct way (see Pater 1995, Alderete 1996, Revithiadou 1998, and Baerman 1998 for analyses of such systems along these lines).

(23) Summary of Results

<table>
<thead>
<tr>
<th>Classification</th>
<th>Schematic Ranking</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Phonemic Accent</td>
<td>PROS-FAITH &gt;&gt; PHONO</td>
<td>Cupeño</td>
</tr>
<tr>
<td>b. Predictable Accent</td>
<td>PHONO &gt;&gt; PROS-FAITH</td>
<td>Cahuilla</td>
</tr>
<tr>
<td>c. ‘Hybrid’ Accent</td>
<td>PHONO1 &gt;&gt; PROS-FAITH &gt;&gt; PHONO2</td>
<td>Spanish Nouns</td>
</tr>
</tbody>
</table>

Of course restricted phonemic contrasts can be approached differently in terms of constraints on underlying representations themselves; these are the Morpheme Structure Constraints (MSC) which are commonly used in rule-based accounts of such restrictions, however they are conceived (see Hammond 1989b and Franks 1991; Inkelas 1994, Pater 1994, Katayama 1995 for different formal approaches to restricted accentual contrasts). One important argument for the treatment of such systems as constraint domination is that it solves a classic problem in Generative Phonology concerning the treatment of constraints on the inventory, namely the Duplication Problem (see Kenstowicz & Kisseberth 1977 and references therein). In many accent systems, the constraints on the distribution of contrast also play a role in governing the output of certain accentual processes. For example, unaccented words in Russian receive a stress on the first vowel of the inflectional ending, e.g., /stol + u/ → stol-ú ‘table (dative plural)’; furthermore, special accent-deleting suffixes in Russian, e.g., -acˇ , trigger a deletion of the stem accent which results in ending stress as well: /púz + acˇ + u/ → puz-acˇ -ú ‘man with paunch’. Clearly, the constraint requiring ending stress is operative in both cases, showing that a single constraint has a role in the analysis of restricted suffix stress and the stress pattern resulting from de-accentuation.
In the theory proposed here, this constraint is the same constraint, whose application is restricted exclusively to output forms (see §3.2 and §5.2.3 for the details of the analysis). Consistent with the OT principle of the RICHNESS OF THE BASE, there are no languages particular restrictions on the input. Therefore, the restriction governing the range of possible stress patterns in unaccented words may not be stipulated of lexical forms because it is a restriction specific to Russian. This reasoning entails that the constraint yielding ending stress is a surface-oriented constraint, which may of course extend to the analysis of ending stress in de-accented structures. In a rule-based theory with MSCs, on the other hand, a constraint on possible inputs applies to the lexical inventory, yielding ending stress in unaccented words. This constraint is in additional to a constraint yielding ending stress in forms like \textit{puž-ač -ú}. The argument is thus that the approach to restricted phonemic contrast with surface-oriented constraints is superior to the theory with MSCs because the latter requires constraints operative in different components of the grammar which achieve essentially the same result.\footnote{See Prince & Smolensky 1993, Pater 1995, 1996, Myers 1997a, Tesar & Smolensky 1997, and Beckman 1997 for further discussion of the solution to the Duplication Problem and conspiracies in general in Optimality Theory.}

1.2.2.3 Consequences for Culminative Accent

Recall that accent systems always have a single most prominent accent, entailing the resolution of accent in words with more than one lexical accent. In addition, in words with no lexical accent, an accent is often supplied to the surface representation. These two observations characterize two different meanings for the notion ‘culminativity’, both the classical sense of Trubetzkoy 1939 and the sense it which it is commonly used in studies of metrical stress (see Liberman & Prince 1977, Hyman 1977, Hayes 1995).

(24) Culminativity of Accent (relative to a domain \( D \))

\begin{itemize}
\item \textbf{Existence requirement}: every \( D \) has an accent.
\item \textbf{Uniqueness requirement}: every \( D \) has exactly one accent that is greater than all others.
\end{itemize}

To say that some constituent \( D \) has culminative accent entails that every instance of \( D \) has an accent. Furthermore, culminativity of accent entails that there be a single accent that stands out among all others in \( D \), which can be satisfied simply by the existence of a single accent per \( D \).

The role of prosody is largely undisputed in the analysis of culminativity: the assumption that lexical prominences are mapped directly onto bracketed grid structure derives culminative accent in a simple and direct way. A fundamental assumption in metrical stress theory is that prosodic structures are hierarchically structured (Liberman & Prince 1977, Halle & Vergnaud 1978, Selkirk 1980, among many others), as in the hierarchy of prosodic categories arranged below.
Within the present OT framework, the hypothesis that prosodic categories are hierarchically organized breaks down into a set of well-formedness constraints, given in (26). Thus, each of these constraints may be ranked on a language particular basis, accounting for the common finding that, while these principles of prosodic organization dictate a target for optimal prosodic structure, they may, in fact, be violated in specific contexts. For example, Itô & Mester 1992 argue convincingly that certain unpaired syllables in Japanese word clippings are directly associated with the prosodic word, rather than being footed by a non-binary foot.


- **Layeredness**: No \( C^i \) dominates a \( C^j \), \( j > i \), e.g., ‘No \( \sigma \) dominates \( F \).’
- **Headedness**: Any \( C^i \) must dominate a \( C^{i-1} \) (except if \( C^i = \sigma \) [or consistent with (4), except if \( C^i = \mu \)], e.g., ‘A PrWd must dominate a F.’
- **Exhaustivity**: No \( C^i \) immediately dominates a constituent \( C^j \), \( j < i-1 \), e.g., ‘No PrWd immediately dominates a \( \sigma \).’
- **Nonrecursivity**: No \( C^i \) dominates \( C^j \), \( j = i \), e.g., ‘No F dominates a F.’

The culminativity requirements follow from these assumptions inherent to the organization of prosodic structure, plus a basic assumption about the nature of headed constituents discussed below. First, the existential requirement follows from the principle of **Headedness**, and the standard assumption that accent is a property of the head of a prosodic foot. The principles of prosodic organization require that every PrWd must have a foot, and since accent is a property of the head of a prosodic foot, the existence requirement follows from these basic assumptions. The same type of result can be modelled for phonological phrases because phrases contain PrWds, and are thus subject to the restrictions on PrWds, including the requirement that they have an accent. Furthermore, the head of a given PCat is more than just an obligatory element at the immediately subordinate level in the hierarchy; the head specifies a structural relationship between itself and other members at the same level (see e.g., Liberman & Prince 1977, Hayes 1980, Selkirk 1980). Thus, in purely arboreal theories of prosodic structure characteristic of early metrical theories, as well as the bracketed grid theories of Hammond 1984, HV, and Hayes 1995, the head specifies a relation between a strong element, i.e., the head, and a weak element, i.e., the non-head. Since every PrWd has a single head foot, and every foot has a single head syllable, it follows that if accent is assigned to a head syllable in the head foot, there can only be a single ‘main accent’, or a single accent greater in prominence than all others.

To illustrate these results in Cupeño, if an input has more than one lexical prominence, only one of them can be faithfully retained in the related output because there is only a single head foot in the output (27a). Furthermore, given a form with no
underlying accent, as in (27b), the related surface form will be supplied with a prominence as a consequence of the assumption that all words must have a prosodic foot, and hence must have a prominence in the head syllable of that foot.

(27) Culminative Accent in Cupeño

<table>
<thead>
<tr>
<th>Underlying Representation</th>
<th>Surface Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. /pé + ?áyu + qál/</td>
<td>pe-?áyu-qál</td>
</tr>
<tr>
<td></td>
<td>‘S/he was wanting’</td>
</tr>
<tr>
<td>b. /yax + em/</td>
<td>yáx-em</td>
</tr>
<tr>
<td></td>
<td>‘Say’ (plural imperative)</td>
</tr>
</tbody>
</table>

Importantly, ‘culminativity effects’ such as these may be derived over long distances, which, as mentioned above, is characteristic of accent systems in general. It makes no difference in the analysis of culminativity above whether the lexical prominences are on adjacent or non-adjacent syllables; what matters is that only one can be realized as the head of the main stress foot.

One question that arises in this theory is whether or not a lexical prominence can give rise to contrastive accent that is not the primary accent in a surface form. After all, accent is equated with prominence on the grid in this theory, and this prominence structure is also the stuff that makes up the heads of non-primary feet. So, in languages which allow non-head feet, can Faithfulness to a lexical prominence likewise give rise to a contrastive secondary prominence? Without further stipulation, clearly the theory of Prosodic Faithfulness proposed here does allow for this possibility, which leads to an interesting empirical question: do languages have contrastive secondary stresses (potentially realized as tone or other suprasegmentals)? While it is sometimes asserted that only primary stress is contrastive in lexical accent systems (van der Hulst 1994), the number of reported cases with unpredictable secondary prominence casts some doubt on this claim. In Modern Hebrew, for example, the assignment of secondary stress to the first or second syllable of the word is unpredictable and must therefore be specified for individual words (Bolozyky 1980: 277). Secondary (=non-final) stress in Tábatulbal is likewise assigned on a word-by-word basis and is not predictable from the phonological make-up of the form (Voegelin 1935, see also Kager 1989, Crowhurst 1991). A third case concerns the directionality of secondary stress in the Peruvian language Huariapano: secondary stress is assigned on alternating syllables, but whether the stress trains run from left-to-right or right-to-left is again a lexical property of individual words (Parker 1998, 1994). All of these cases have in common the fact that a pattern of non-primary prominence is not phonologically predictable, which is exactly the type of lexical idiosyncrasy predicted by the theory of Prosodic Faithfulness assumed here.9

---

8 This result for Cupeño relies on the assumption that lexical prominences cannot be ‘realized’, i.e., faithfully retained in a bracketed grid, in a non-head foot. There are two possible means of ensuring this result: either there are no non-head feet in outputs, consistent with the absence of secondary stresses, or the lexical prominences are on a grid which marks the most prominent foot, and so realization of a foot-level prominence is not sufficient. The latter state of affairs seems to be the correct account of Cupeño, as is made clear in chapter 2.

9 The difficulty in hearing secondary stress may perhaps explain why impressionistic studies do not always report irregularities in secondary stress. Pressing further, if secondary stress is hard to hear, its apparent markedness may be due to a failure to hear such deviations in stress in language learning. Concretely, deviations from a regular pattern of stress is more audible, and hence more reliably retained, for primary stresses than secondary ones, which would appear to explain the preference for lexical primary stress over non-primary stress implicit in van der Hulst’s claim.
The theory of phonemic accent through constraint interaction also has an important implication for an often noted property of accent in underlying representations. In many accent systems, the general trend of ‘one accent per word’ is also carried over into the lexical inventory, with the effect that individual morphemes also have at most one accentual prominence. Clearly, the same constraints at work in restricting the surface forms extend into the lexicon somehow, raising the question of how underlying forms themselves are subject to said culminativity requirements. In the literature on lexical stress systems, this fact is taken as highly significant and leads to the conclusion that the same universal principles at work in assigning predictable and systematic stress are also at work in assigning lexical stress. Thus, Tsay 1991 approaches lexical stress as different instantiations of a universal set of parameter settings for stress. Building on this idea, Idsardi 1992 proposes a theory of Lexical Edge Marking (LEM), which draws on a restricted set of rule types and posits a metrical bracketing in lexical entries as the representation of lexical stress. In other words, stress in the lexicon is assigned ‘by rule’, and as a consequence of this assumption, the properties of these stress rules are carried over to lexical stress. As pointed out explicitly by Idsardi, since the rules of regular and systematic stress only assign a single stress, it follows that this feature of stress rules is inherited by the principles of lexical stress markings, thereby explaining the fact that there is only a single lexical stress per morpheme.

This basic result also follows from the theory of lexical accent proposed here, once the principles of learning inputs is properly understood, except the current theory does not have the descriptive short-comings of LEM theory. Intuitively, the parallel between these two theories works as follows. Given that there may only be a single prominence in the output, it is of absolutely no use to posit underlying forms with more than one prominence. If the learner goes to the trouble to do such a thing, the lexical form will invariably lead to unfaithful mappings, i.e., ones in which one of the prominences is deleted, and so morphemes with more than one prominence are never learned as a part of the lexical inventory. The principle implicit in this informal statement is not one of grammar construction, but rather, a principle of learning the inputs of a language. As shown in Prince & Smolensky 1993, Tesar & Smolensky 1993, 1998, the principles of harmonic evaluation may be employed in both the learning of a grammar and the lexical forms of a particular language. The learning of inputs is governed by Lexicon Optimization (LO), which is given below.

Suppose given an overt structure ρ and a grammar. Consider all structural descriptions (of all inputs) with overt part equal to ρ; let the one with maximal Harmony be p, a parse of some input I. Then I is assigned as the underlying form of ρ.

Given a grammar in which a set of constraints ensuring culminative accent (see discussion above) outranks the PROS-FAITH constraints, culminative accent is guaranteed in lexical forms by LO. As illustrated below, a lexical form with more than one lexical prominence will never realize all of them, because of the role of CULMINATIVITY in the system, and so such a mapping will always have a breach of Faithfulness (29a). When compared with a different input-output mapping with a single lexical prominence which produces same overt structure, the latter will always be chosen by LO; the IO-map in (29b) is more harmonic than the one in (29a), and therefore it is chosen as the lexical form.10

10This result is also obtained if the learner has not yet arrived at the correct ranking of constraints; see Tesar 1998 and Tesar & Smolensky 1998 for discussion of the application of these principles in the acquisition of both inputs and constraint rankings in tandem.
26

(29) Culminativity in Lexical Inventory through Lexicon Optimization

<table>
<thead>
<tr>
<th>Input</th>
<th>Output</th>
<th>CULMINATIVITY</th>
<th>MAX-PROM</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>/s/</td>
<td>s s s</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>s s s</td>
<td>!</td>
</tr>
<tr>
<td>b.</td>
<td>/s/</td>
<td>s s s</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>s s s</td>
<td>!</td>
</tr>
</tbody>
</table>

In this way, the grammatical constraints requiring culminative accent in outputs is ‘cycled back’ into inputs in the learning of lexical forms. An important property of this account which distinguishes it from various alternatives is that culminativity of inputs is derived by a language particular ranking of universal constraints. That is, there is an intimate relationship between the grammar of outputs and the principles of learning lexical forms: in both cases, it is harmony relative to the language particular constraint hierarchy that matters. Thus, if a language allowed for multiple prominence in outputs, it will likewise allow for multiple prominence in inputs. The theory of accent proposed here will have no trouble with cases reported to have lexical accent in more than one position in the word (see Idsardi 1992 for discussion of the relevant cases). The presence of more than one prominence entails that the culminativity requirements are subjugated to MAX-PROM, which in turn allows for more than one lexical prominence in a given form. In contrast, if lexical accent is assigned by rule, as in LEM theory, then an additional provision needs to be stipulated in order to accommodate non-culminative lexical accent.

A final difference between the current theory and theories of lexical accent assignment by rule is that the latter approach makes substantive restrictions on the set of possible lexically accented positions. In essence, lexical accent must fall on a position which is attested as a position of primary stress in some language, e.g., final, initial, or penultimate position, etc. In languages which have a wider range of lexically accented positions, like Russian and Japanese, forms with accent in marked positions must be treated as exceptions on a par with loan words or structures with a complex morphological analysis (see for example Idsardi 1992: 52 for such lexical edge markings in Russian). In the theory of lexical accent as Prosodic Faithfulness, the lexical positions for accent are also restricted, but only by the constraints operative in the language under analysis. Thus, Russian allows stress on any syllable in the stem, so there is nothing precluding the acquisition of an input with, for example, accent on the third syllable from the beginning of a word that has six syllables. Again, the constraints on the distribution of surface accent play an important role in dictating accent in lexical forms, as has just be illustrated for culminativity requirements. Thus, in languages with looser restrictions on surface accent, like Russian, the theory provides a descriptively adequate treatment of lexical accent, which, in other theories, leads to additional stipulation in to accommodate marked positions for accent.

To summarize, I have proposed a theory of Prosodic Faithfulness in which accent is encoded lexically as prominence on the grid, and Faithfulness to this prominence entails realization of the lexical prominence in the head of a prosodic foot, represented as a bracketed grid. Culminative accent in this theory is explained in terms of requirements on this bracketed structure, i.e., the requirement that every grouping must have a head, and that there is only one head foot in a given accentual domain. Furthermore, restrictions on the surface distribution of accent were stated in the grammar as well-formedness constraints which may dominate the Prosodic Faithfulness constraints. These surface-oriented
constraints also have an indirect effect on lexical forms because the principle of Lexicon Optimization systematically excludes lexical forms which would otherwise lead to gratuitous constraint violation. The proposed theory therefore has the descriptive power to extend to the reported cases of contrastive secondary prominence, systems with emergent lexical accent in more than one position per word, and languages like Russian and Japanese where accent is in principle possible in any position in the word. In general, the restrictions on both lexical and surface accent come from the language particular rankings of universal constraints.
Chapter 2. Root-Controlled Accent in Cupeño

2.1 Introduction

A fundamental observation in the accent system of Cupeño11 (Uto-Aztecan) is that inherent stress in roots overrides inherent stress in affixes (Hill & Hill 1968). That is, the system recognizes a distinction between accented and unaccented roots, and inherently accented roots cause the deletion of stress in inherently accented prefixes and suffixes. This is illustrated with the following forms.

(1) Accented Roots with Accented Affixes
   a. pe-mí?aw-lu /pé + mí?aw + lu/  
      ‘He came’ 3sg+COME+MOTION
   b. ?áyu-qa /?áyu + qá/   
      ‘He wants’ WANT+PRES.SING

(2) Unaccented Root ÿyax with Accented Affixes
   a. né-yax /né + yax/   
      ‘I said’ 1sg+SAY
   b. ne?en ya-qá? /ne?en yax + qá/   
      ‘I say’ 1sg+SAY+PRES.SING

The accented roots in (1) win out over the person marker, pé-, and the singular present suffix, -qá, because affix stress is overridden by root stress. Inherent stress in affixes only emerges in words containing unaccented roots, as shown in (2). In sum, there is a rank order in the system, with an imperative to realize inherent stress in roots over inherent stress in affixes.

Cross-linguistically, roots are special in another way, which can be seen by examining languages with phonemic stress. In Sanskrit, for example, the position of accent is contrastive in roots, but accent in suffixes is limited to the first vowel of the suffix (Kiparsky 1973). Likewise, in the Athapaskan language Tahltan, stress is contrastive in roots but not in affixes, as the position of affix stress is predictable from the root stress (Cook 1972, Nater 1989). The basic observation in both cases is therefore that roots are privileged in the phonemic inventory, sponsoring a richer set of accentual contrasts than other morphological domains.

11 Cupeño, now extinct, was a Takic language spoken in Southern California. The data examined in this chapter are drawn from Hill 1967 (H), Hill & Hill 1968 (H&H), Hill & Nolasquez 1973 (given with page.sentence number), Crowhurst 1994 (C), and a set of unpublished fieldnotes provided for me by Jane Hill (JH). A note on transcription: /e/ is the symbol used here for schwa, /ʔ/ for glottal stop, and /ŋ/ for velar nasal.
In this chapter, the connection between overriding root stress and the privileged status of roots in inventories is explained as the interaction of Faithfulness constraints in Optimality Theory (Prince & Smolensky 1991, 1993). In particular, the cross-linguistic observation that roots have a wider range of accentual contrasts than affixes motivates the introduction of distinct Root and Affix Faithfulness constraints, with Root Faith ranked above Affix Faith (McCarthy & Prince 1995). With this inherent ranking, overriding root stress in Cupeño is explained as a straightforward case of constraint conflict: root stress overrides affix stress because the constraint responsible for realizing stress in roots is top-ranked. In sum, the observation that root stress overrides affix stress in Cupeño is treated as a special case of the cross-linguistic tendency for roots to license a wider range of contrasts than affixes.

One important goal of this chapter, therefore, is to provide further evidence for the segregation of Faithfulness constraints into the morphological domains Root and Affix, thereby supporting the findings of McCarthy & Prince 1995, Selkirk 1995a, Urbanczyk 1996, and Beckman 1997 [1998], among others. Morphologically-dispersed Faithfulness is shown to be essential in the explanation of the diverse aspects of Cupeño accent, extending to the analysis of complicated morpho-accentual phenomena. A second goal is to motivate the Faithfulness-based analysis by contrasting it with plausible alternatives. Both of the alternatives examined here employ phonological levels, or strata, in some crucial way, and the assumptions inherent to these approaches are shown to have descriptive and theoretical problems. Finally, I present a complete analysis of accent in Cupeño, bringing a wide range of observations in this complex accentual system to bear on contemporary issues in theoretical phonology.

The rest of the chapter is structured as follows. The next section (§2.2) lays out the theoretical background necessary for the analysis of Cupeño accent. §2.3 then examines stress in isolated roots and gives the constraint ranking necessary for the root stress inventory. In §2.4, these rankings are incorporated in the larger analysis of stress in fully formed words. Two alternatives to the Faithfulness-based account are subsequently considered in §2.5, namely the level-ordered account given in Crowhurst 1994 and a multi-stratal account along the lines of Halle & Vergnaud 1987a. The last section (§2.6) summarizes the main results of the chapter and discusses some of the implications of the core ideas.
2.2 Theoretical Background: Root and Affix Faithfulness

Recent work in Optimality Theory has argued for a set of Faithfulness constraints for roots which is distinct from the Faithfulness constraints for affixes. The evidence for this distinction comes in various forms, which are summarized below.

(3) Evidence for Privileged Status of Roots


b. **Evidence from phonological alternations** (McCarthy & Prince 1995, Selkirk 1995a,b, Pater 1996, Blake 1998): Phonological alternations may be ‘root-controlled’; that is, there is a premium set for realization of phonological features of the root over features in an affix.

c. **Psycholinguistic evidence** (see Beckman 1997 [1998] for a survey): Word recognition studies provide support that lexical storage and access is root-based and not affix-based.

The first form of evidence comes from phonological inventories. In many inventories, roots license a wider range of contrasts than affixes, but the reverse state of affairs never obtains. With distinct Root and Affix Faithfulness, this asymmetry in the distribution of contrast may be accounted for in terms of familiar types of constraint interaction (discussed directly below).

A second form of evidence is that roots tend to have privileged Faithfulness properties in alternations, favoring retention of information in roots over information in affixes. For example, consider a well-known case of root-controlled vowel harmony in Akan. In this language, \(\pm\text{ATR}\) is contrastive in root vowels, but it is predictable in affixes. As illustrated below, \(\pm\text{ATR}\) specifications in prefixes and suffixes are determined by the root to which they attach.

(4) Root-Controlled Vowel Harmony in Akan (Clements 1981)

```
a. e-bu-o ‘nest’        b. o-be-tu-i ‘he came and dug (it)’
  e-bu-O ‘stone’        O-be-tu-I ‘he came and threw (it)’
```

Another example illustrating a root-controlled alternation is [labial] dissimilation in Tashlhiyt Berber. In this case, certain derivational prefixes lose their [labial] specification when they combine with a root bearing a primary [labial] specification, as illustrated by the contrast between (5a) and (5b) below.

(5) Root-Controlled Labial Dissimilation in Tashlhiyt Berber (Selkirk 1993, 1995b)

```
a. m-xazar \(\sqrt{xzr}\) ‘scowl’        b. n-fara \(\sqrt{fra}\) ‘disentangle’
  m-saggal \(\sqrt{siggl}\) ‘look for’     n-h ašš am \(\sqrt{hšš}\) m ‘be shy’
```

Again, retention of information in the root, in this case Place features, is more important than retention of affix information.
These two patterns of root privilege are interpreted by McCarthy & Prince 1995 as evidence for a universal ordering among the morphologically dispersed Faithfulness constraints (see also the references listed in (3) above for developments and further discussion).

(6) Meta-Constraint on Constraint Rankings (McCarthy & Prince 1995)\(^{12}\)

Root Faith \(>>\) Affix Faith

This inherent ranking explains root-controlled phenomena in terms of the same constraint interaction required in the analysis of root-affix asymmetries in inventories. Given the ordering of Faithfulness constraints above, any restriction that holds on the distribution of a property of a root must also hold of affixes, effectively precluding a contrast in affixes which is not sponsored in roots.

This same ranking also extends to root-controlled alternations, since it asserts that retention of a property in a root is always better than retention of the same property in an affix. To illustrate this result for Akan, consider the following ranking of constraints for \([\pm ATR]\) Faithfulness for roots and affixes.

(7) Morphologically-Dispersed Faithfulness in Akan (after McCarthy & Prince 1995)

\[
\text{IDENT(ADR)Root, PHONO} >> \text{IDENT(ADR)Affix}
\]

A grammar with this ranking will allow a \([\pm ATR]\) contrast in roots because \(\text{IDENT(ADR)Root}\) is not dominated by any crucial phonological constraints. Predictable \([\pm ATR]\) specification in affixes, on the other hand, derives from the domination of \(\text{IDENT(ADR)Affix}\). Thus, if one or more affixes have a \([\pm ATR]\) specification which conflicts with that of the root, it will be overridden by the root’s \([\pm ATR]\) specification, as depicted below.

(8) Root-Controlled ATR Spread in Akan

<table>
<thead>
<tr>
<th>Input: (\varepsilon + bu + O)</th>
<th>IDENT(ADR)Root</th>
<th>HARMONY</th>
<th>IDENT(ADR)Affix</th>
</tr>
</thead>
<tbody>
<tr>
<td>(-A +A -A)</td>
<td></td>
<td>(!)</td>
<td></td>
</tr>
<tr>
<td>a. (\varepsilon - bu - O)</td>
<td></td>
<td>(!)</td>
<td></td>
</tr>
<tr>
<td>(-A +A -A)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. (\varepsilon - bu - O)</td>
<td>(!)</td>
<td>(!)</td>
<td>(!)</td>
</tr>
<tr>
<td>(-A)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. (\varepsilon - bu - o)</td>
<td></td>
<td></td>
<td>(**)</td>
</tr>
<tr>
<td>(+A)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(^{12}\) Root privilege is interpreted here as an ordering between distinct Root and Affix Faithfulness constraints; but an equally coherent analysis would be to posit Root Faithfulness distinct from context-free Faithfulness, i.e., a theory in which there is no Affix Faithfulness. Since both approaches establish a parallel between root-controlled accent and other phonological phenomena, I do not distinguish them here. These distinct theories do, however, make testable predictions for different types of edge effects in root-controlled accent systems, which are discussed in detail in chapter 3.
An over-arching constraint, HARMONY, requires a single \([\pm \text{ATR}]\) specification per harmony domain. With Root Faithfulness top-ranked in the constraint hierarchy, the \([\pm \text{ATR}]\) specification of the root will always override the affix’s \([\pm \text{ATR}]\) specification. Importantly, the Faithfulness constraints make direct reference to the input specification of distinct morphological categories; such morphological and lexical information is crucial in distinguishing (8b) and (8c).

The ordering of Root and Affix Faithfulness, motivated here on purely linguistic grounds, also appears to have a functional basis in some word recognition studies. In a number of recognition experiments, a priming effect is found in words that share the same root; further, no such effect is found in words that share the same affix, leading to the conclusion that lexical access and storage are root-based (see Beckman 1997 [1998] for a review). In light of these findings, a grammar that assigns special Faithfulness properties to roots will aid considerably in the on-line processing of words. Root Faithfulness in effect precludes the destruction of information in the root, leaving intact properties of the input which are critical in lexical look-up strategies.

In many cases, the morphological root is co-extensive with an underived stem, and so there is no means of distinguishing these two domains in terms of their retention of lexical information. In some contexts, however, stem-forming affixes show privileged Faithfulness properties which are uncharacteristic of affixes generally and therefore call for a notion of Stem Faithfulness which is distinct from Root Faithfulness (see Revithiadou 1997 for an alternative). While not directly attested in Cupeño, certain derivational suffixes in Russian exhibit these Faithfulness properties; in §5.2.3 the intermediate rank of these morphemes is treated as an effect of ranking Stem Faithfulness between Root and Affix Faithfulness. For the moment, however, I will ignore this formal distinction and treat simplex stems as roots, which will therefore be governed by the Root Faithfulness constraints.

The ordering of Faithfulness constraints given in (5) above is not specific to \([\pm \text{ATR}]\) or segmental features more generally. It is a proposal which extends to all aspects of Faithfulness, including the Prosodic Faithfulness constraints given in §1.2.2.1. Thus, applying the inherent ordering in (6) to the PROS-FAITH constraints yields the following ranking of constraints.

\[(9) \text{Root-Controlled Accent Systems}\]

\[\text{PROS-FAITH}_{\text{Root}} >> \text{PROS-FAITH}_{\text{Affix}}\]

Before delving into the facts of Cupeño, let us briefly consider the role of this ranking in accentual inventories cross-linguistically. As mentioned above, it is often the case that roots sponsor a wider range of contrasts than affixes; this trend is also observed when accent is responsible for the surface contrast. For example, in Sanskrit, the location of accent is unpredictable in roots, giving rise to surface contrasts in the presence or absence of accent and its surface position in the root. Polysyllabic affixes, on the other hand, when they receive an accent, always have initial accent (Kiparsky 1973). Likewise, in Tahlitan (Northern Athapaskan), the presence or absence of accent is contrastive within roots. However, accent is predictable in affixes, basically falling on every other syllable counting from the root stress (Cook 1972, Nater 1989). In both cases, therefore, accent is more restricted in affixes than in roots.
With the distinction between Root and Affix Faithfulness, restricted affix stress becomes a simple matter of ranking the relevant prosodic well-formedness constraint, as shown in (10). The limitations on affix prosody derive from the ordering of various constraints relative to Root and Affix Faithfulness.

(10) Restricted Affix Inventories

a. **Sanskrit**: \text{PROS-FAITH}^{\text{Root}} \gg \text{ALIGN}(PK, L, STEM, R) \gg \text{PROS-FAITH}^{\text{Affix}}

b. **Tahltan**: \text{PROS-FAITH}^{\text{Root}} \gg \text{RHYTHM} \gg \text{PROS-FAITH}^{\text{Affix}}

The ranking for Sanskrit yields the observed accentual contrasts in roots because of the high-ranked status of \text{PROS-FAITH}^{\text{Root}}. But accent in affixes is predictable because the Alignment constraint ensures that if accent is on the affix it will always fall on the first syllable, or equivalently, the syllable directly following the stem, which is derived here through a subcategorization-type Alignment constraint (see McCarthy & Prince 1993a). The intrinsic ordering of Root and Affix Faithfulness also extends to the skewed accentual inventory in Tahltan: roots support a contrast in accent, but accent in affixes must be on alternating syllables because of the force of RHYTHM (Hung 1994), which dominates \text{PROS-FAITH}^{\text{Affix}}. In sum, the distinction between Root and Affix Faithfulness applied to the \text{PROS-FAITH} constraints provides the correct tools for describing restricted accentual inventories in affixes.

The ordering of the \text{PROS-FAITH} constraints in (9) above also has a role in the resolution of accent in words with more than one inherently accented morpheme. Substituting \text{MAX-PROM} in this ranking will set a premium on preserving inherent root accent over inherent affix accent. As this pattern of root privilege will support a major theme in the case studies that follow, I state the effects of this inherent ordering in prose.

(11) Root-Controlled Accent Hypothesis (derived from (9))

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

As with root-controlled vowel harmony, root-controlled accent follows from the same principles responsible for restricted affix inventories. Concretely, the ordering of Root and Affix Faithfulness employed in the analysis of restricted affix accent in Sanskrit and Tahltan extends to accentual alternations, explaining root-controlled accent as a special case of the cross-linguistic trend for root privilege. In the next two sections the Root-Controlled Accent Hypothesis will guide the study of the interaction between root and affix stress in Cupeño, and subsequently in chapter 3, it will be applied to accent in Russian and Japanese.

2.3 Root Stress Inventory

In this section, the observations characterizing the root stress inventory of Cupeño are presented (§2.3.1) and are then analyzed in OT terms (§2.3.2). The goal of the analysis is to demonstrate how emergent lexical prosody and restrictions on surface stress are characterized in terms of a language particular ranking of the Prosodic Faithfulness constraints.
2.3.1 The Data

While earlier work on Cupeño assumed that stress in roots was unpredictable, more recent research has shown that the observed root stress patterns are not completely irregular (Munro 1990, Crowhurst 1994). Stress is contrastive in certain contexts to be described below, but if a root has a long vowel, that vowel is stressed. The examples below are typical, showing long vowel stress in bare roots (12) and conjugated verbs (13). Most of the roots in these examples are no longer than two syllables, which apparently reflects the canonical pattern.13

(12) a. máasive-t 'grass’ C 185
    xéene 'blow (wind)’ C 185
    péexwen ‘nothing but’ 10.57
    náacˇ i ‘soon, quick’ 38.4
    híima?ay ‘donate goods to burning ceremony’ C 185

    b. tevxáa-qa ‘... is working’ C 185
    ?iyúune ‘fast’ C 185
    muháan ‘shoot with bow’ C 185

(13) a. pem-téec ˇ i
    cˇ em-náaxc ˇ in ‘They ordered’ 41.7
    ‘We passed on’ 21.9

    b. pe?-ic ˇ áay-wen ‘They did ...’ 24.51
    taváan-pe-qal ‘He put him ...’ 58.13

Long vowel stress also has the effect of precluding stress on a short vowel in the same word. That is, there are no roots with long vowels where stress falls on a syllable with a short vowel. The historical developments leading up to Cupeño stress, as described in Munro 1990, supports this observation. Pre-Cupeño stressed the root-initial vowel, or the second vowel if it was long; otherwise default stress fell on the initial syllable. Subsequently, contrastive vowel length was lost in unstressed syllables. Thus, the fact that vowel length was only preserved in stressed syllables effectively rules out the possibility of short-vowel stress in forms with long vowels. Summarizing the above discussion in synchronic terms, one key observation governing the distribution of accent in roots is that long vowels attract stress.14

In contrast to this predictable part of the stress system, stress is contrastive in roots which do not contain long vowels: stress may fall on either the first or second syllable, as shown by the nouns in (14) and the conjugated verbs in (15).

13 It is rare to find roots composed of three or four syllables with post-peninitial stress; this observation has prompted Crowhurst 1994 to invoke an initial two syllable window for stress in roots. The observations on canonical morpheme shape in Hill 1967: 184 ff., however, suggest that such a constraint may in fact be unnecessary because of the rarity of simplex roots greater than two syllables. Also, a cursory inspection of the lexical resources uncovers some exceptions to the two syllable window: isˇ mivíy ‘things’, tukumáy ‘tomorrow’, and pis ˇ ?emáy ‘just then’.

14 Stress in Spanish loans, e.g., váaka-?am ‘cattle’ and kaváayu-?um ‘horses’, also conforms to this pattern of long vowel stress. But stressed vowels in both Spanish and English loans tend to be long in Cupeño, suggesting that vowel length in these forms is phonological. Considering the role of duration in signaling stress in these languages, however, the most sensible approach to this problem seems to be that stressed vowels in the source languages are perceived as long, and hence represented as such lexically.
(14) a. súʔi-š ‘jackrabbits’ 10.63  b. temá-l ‘ground’ 29.4
   púki-yka ‘by (to) the door’ 9.25  atáxʔ-am ‘the people’ 29.1
   máxiʔ-c’am ‘greens’ 9.4  savá-l ‘grass’ 29.4
   kúpá-hax ‘from Cupa’ 29.1  kawf-š ‘rock’ 29.4
   kʷí-mi-l’ ‘acorns’ 29.1  sevé-l ‘wind’ 9.16
   siʔáyi-š ‘cracked acorns’ 29.7

   a. pe-míʔawlu ‘He came’ 9.1  b. pe-pulín-qal ‘... gives birth’ 43.5
   č em-yáyax ‘We try to ...’ 9.7  č em-tewáš ‘We lost’ 125
   pem-híwen ‘They stopped’ 21.9
   pem-náyxi ‘They fought’ 1.15

While there may be a historical account of these patterns, the initial-peninitial stress contrast is synchronically unpredictable. This fact has led Hill & Hill 1968 and Munro 1977 to classify Cupeño as a ‘lexical stress’ language, i.e., a language in which stress alone may introduce contrast among roots.

To summarize, the inventory of stress patterns observed in roots (excluding monosyllables) is given in (16).

(16) Root Stress Inventory
   
   a. Predictable Long Vowel Stress
      
      CV VCV
      
      CVC CVC

   b. Contrastive Stress Elsewhere
      
      C
      xéene
      tevxáa
      súʔiš
      temá

Any analysis of the root stress inventory must account for the fact that long vowels are always stressed, and at the same time, it must allow for lexically determined initial or peninitial stress in forms with no long vowels.

2.3.2 The Analysis

I assume essentially the same foot structures proposed in Crowhurst 1994 to account for certain correspondences between the accent system and the prosodic morphology of the habilitative construction (see also Hill 1970, McCarthy 1979a, 1997, McCarthy & Prince 1986, 1990). In particular, roots are consistently parsed into right-headed feet in the output, even if this results in a monomoraic foot.  This is illustrated below.

---

15The evidence for iambic feet in the analysis of stress is indirect, but strong. There is a relationship between the overall shape of the habilitative and the surface stress of its base form: the stressed vowel is always followed by two syllables in the habilitative, e.g., č ál—č áʔaʔal ‘husk’ and páč ik—páč iʔik ‘leach acorns’. Assuming that feet are uniformly right-headed, it is possible to describe the prosodic morphology of the habilitative as a bipodal unit. Thus, finally-accented stems receive two epenthetic syllables, i.e., [(č á)(ʔaʔal)], while disyllabic stems with initial stress only get one inserted syllable, as in [(pá)(č iʔik)], because one of the stem syllables can be recruited in the final foot.

---

35
(17) Uniform Right-Headed Feet

\[
\begin{array}{cccc}
(x) & (. x) & (x) & (. x) \\
\text{xèene} & \text{tevxåå} & \text{sǔʔiš} & \text{temål}
\end{array}
\]

In constraint-based terms, uniform iambics entail a constraint ranking in which \( \text{RH TYPE} = \text{IAMB} \) dominates \( \text{RH TYPE} = \text{TROCHEE} \) (Prince & Smolensky 1993). In addition, Foot Binarity must be ranked below the Prosodic Faithfulness constraints (PROS-FAITH) because the iambic requirement may have the effect of creating non-binary feet in cases like [(sǔʔ)iš], as depicted in the following tableau.

(18) Emergence of Lexical Initial Stress

<table>
<thead>
<tr>
<th>x</th>
<th>/sǔʔiš /</th>
<th>PROS-FAITH</th>
<th>FTBIN</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>(. x)</td>
<td>*!</td>
<td></td>
</tr>
<tr>
<td>b.</td>
<td>(x)</td>
<td></td>
<td>*</td>
</tr>
</tbody>
</table>

The losing candidate is the unfaithful one, because the first vowel in the input has a prominence, but the related vowel in the output has no corresponding prominence, hence violating PROS-FAITH. The constraint violations in the first candidate can be due either to deletion of an accent, i.e., a MAX-PROM violation, or, if the grid mark in the input stands in correspondence with the surface prominence, then a violation of NO-FLOP-PROM is incurred. Either scenario is sufficient to motivate the domination of FTBIN. The winner, therefore, is the candidate which matches the input prosody exactly, at the expense of a FTBIN violation.

In this way, the constraint system accounts for the lexically determined stress contrast: variation in the position of stress is licensed by high-ranking Faithfulness. By the same reasoning, the surface restrictions on the stress inventory are achieved through the domination of Prosodic Faithfulness. In particular, predictable long vowel stress is derived by ranking the Weight-to-Stress Principle (Prince 1990) above PROS-FAITH. Assuming that only CVV syllables (and not CVC) are heavy (Crowhurst 1994), this correctly yields the observed pattern of long vowel stress.

It is useful, given the Richness of the Base (see discussion in §1.2), to show this result with a form that has an underlying prominence on a short vowel.\(^{16}\) For example, if a root such as \( /\text{tevxåå}/ \) has an inherent accent on the first vowel, an unfaithful mapping results because the WSP dominates PROS-FAITH.

\(^{16}\)To clarify, there is no overt evidence for a prominence on a short vowel in this form, but it is necessary to derive the restrictions on the inventory from any possible input, as the Richness of the Base entails that there are no language particular restrictions on the input. Therefore, prominence is freely distributed in the input, and the assumed ranking of constraints ensures the winning output forms will have stress on a heavy syllable.
(19) Predictable Long Vowel Stress

<table>
<thead>
<tr>
<th></th>
<th>WSP</th>
<th>PROS-FAITH</th>
</tr>
</thead>
<tbody>
<tr>
<td>x  /tevxaa/</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. (x x ) tévxaa</td>
<td>*!</td>
<td></td>
</tr>
<tr>
<td>b. tevzáa</td>
<td></td>
<td>*</td>
</tr>
</tbody>
</table>

The loser above has stress on a closed syllable, leaving the subsequent heavy syllable unstressed. Since CVC syllables are not heavy, this candidate incurs a fatal violation of the WSP, leaving the candidate which has undergone an accent shift as the optimal form.

Next recall that Cupeño lost contrastive vowel length in unstressed syllables. While not attested in synchronic alternations, this fact is an integral part of the root stress inventory and must therefore come within the scope of the analysis. It turns out that this systematic gap receives a direct explanation by considering further the role of the WSP in the system. Any unstressed long vowel constitutes a violation of the WSP; hence, vowel shortening can be induced by ranking the WSP above the Faithfulness constraint governing the realization of vowel length, WT-IDENT (McCarthy 1995, Urbanczyk 1996).

(20) Vowel Shortening by the WSP

<table>
<thead>
<tr>
<th>/CVVCÝ V/</th>
<th>WSP</th>
<th>WT-IDENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. CVVCÝ V</td>
<td>*!</td>
<td></td>
</tr>
<tr>
<td>b. → CVVCÝ V</td>
<td></td>
<td>*</td>
</tr>
</tbody>
</table>

The losing candidate suffers from a fatal WSP violation because it has an unstressed long vowel, so the form with shortening is the optimal output. In general, the WSP, in its top-ranked position, results in shortening of any unstressed long vowel.17

---

17 Though they are shortened on the surface, long vowels actually fail to delete in contexts where short vowels would drop by regular rules of syncop. Thus, shortening and syncop may be understood here as a kind of ‘chain-shifting’ phenomenon, as found, for example, in Woleaian (Micronesian), where final vowels are deleted but long final vowels are merely shortened. While formal treatment of this fact would lead us too far afield, the greater degree of Faithfulness for long vowels can be handled straightforwardly in terms of locally-conjoined Faithfulness constraints (see Kirchner 1996 for an approach to chain-shifting rules in these terms).
To summarize, the constraint rankings argued for thus far are given below.

\[(21) \text{Summary Ranking} \]

\[
\begin{align*}
\text{WSP} \\
\text{PROS-FAITH} \\
\text{WT-IDENT} \\
\text{FTBIN}
\end{align*}
\]

The ranking in which PROS-FAITH dominates FTBIN accounts for distinctive stress in the inventory of accentual patterns observed in roots. With the assumed iambic requirement undominated, this ranking means that initially-accented roots will surface with a non-binary foot. The domination of PROS-FAITH by the WSP, on the other hand, accounts for the predictable part of the stress system, namely the observation that long vowels are always stressed. Finally, the ranking of the WSP above WT-IDENT accounts for the absence of unstressed long vowels.

### 2.4 Overriding Root Stress

In this section, the influence of inherent root stress is examined and analyzed in larger words. The section begins with a detailed study of the interaction between root and affix stress (§2.4.1), followed by the proposed analysis (§2.4.2). The analysis is then extended in §2.4.3 to account for pre-accenting suffixes and the special phonology of the nominalizer.

#### 2.4.1 Data and Observations

Inherent accent in roots overrides accent in affixes (Hill & Hill 1968). This is shown by the behavior of accented affixes when they combine with different classes of roots. When an accented prefix or suffix is attached to an unaccented root, inherent accent in the affix surfaces. However, when these same affixes attach to an accented root, the root accent prevails. The behavior of the two classes of roots is illustrated below, starting with unaccented roots.

The accented affixes of which I am able to find good examples are listed below. The accented prefixes are the person prefixes listed in (22), which are used to mark the person and number of subjects and possessors. The accented suffixes are listed in (23) (not including pre-accenting suffixes, which are treated in §2.4.3).

\[(22) \text{Accented Prefixes} \]

\[
\begin{align*}
1 & \text{né-} & \text{č ém-} \\
2 & ?é- & ?ém- \\
3 & pé- & pém- \\
\text{Singular} & & \text{Plural}
\end{align*}
\]
(23) Accented Suffixes

-¿ál ‘past durative marker’ (PAST.DUR)
-¿á ‘present singular marker’ (PRES.SING)
-í ‘object marker’ (OBJECT)
-í ‘nominalizer’ (NOM)

When one of these accented prefixes or suffixes combines with an unaccented root, inherent accent in the affix surfaces, as shown below for three roots classified by Hill & Hill 1968 as unaccented.

(24) a. Accented Prefix Wins
/né + yax/ → né-yax ‘I say’ JH
/pé + yax/ → pé-yax ‘He says’ 1.15
/cé + yax/ → cé-yax ‘We say’ 21.6
/pém + yax + wen/ → pém-yax-wen ‘They said’ 42.28

b. Accented Suffix Wins
/ne?ep né + yax + ¿ál/ → né?ep ne-yá-¿ál ‘I was saying’ JH
/pé + yax + ¿ál/ → pe-ya-¿ál ‘He was saying’ 1.9
/mi + yax + ¿á/ → mi-ya-yá? ‘He tells them’ 38.49

(25) a. /né + max + ¿e/
/cé em + max + ¿e/ → cé-em-max-¿e ‘(We) to give ...’ JH
/?i + pém + max/ → ?i-pém-max ‘They gave you ...’ JH

b. /max + ¿á/
/?i + né + max + ¿ál/ → ?i-ne-max-¿ál ‘I was giving you’ JH
/cé im + pé + max + ¿ál/ → cé-im-pe-max-¿ál ‘He was giving us’ JH

(26) a. /né + wen/
/cé em + wen/ → cé-em-wen ‘We put’ JH
/né + wen + pi/ → né-wene-pi ‘(I) to put it in’ JH
/cé em + wen + pi/ → cé-em-wene-pi ‘(We) to put it in’ JH

b. /né + wen + ¿ál/
/wen + ¿á/ → wen-¿á ‘... put (it) ...’ JH

As is evident from the examples above, when a word has more than one accented affix, it is the rightmost one in the word which surfaces with stress, e.g., /né + wen + ¿ál/ → [né-wen-¿ál]. This pattern also holds when the competition is between two accented suffixes, as shown by the following examples which both contain the past durative and objective case marker.

(27) Rightmost Accented Suffix Wins
/yax + ¿ál + í/ → yex-qel-í ‘While ... was saying’ H&H 236
/?é + yax + ¿ál + í/ → ?e-ya-qal-í ‘... what you said’ JH

When an unaccented root combines with an unaccented affix, however, the word is assigned default initial stress, as exemplified below.
(28) Default Initial Stress

a. /yax + em/ → yáx-em ‘(You Pl) say!’ JH
   /č em + č eme yax + we/ → č em-č eme yáx-we ‘We say’ JH
   /ne?qwen ya + ?a/ → ne?qwen yá-?a ‘I can say’ JH

b. /max + em/ → máx-em ‘Give! (Pl)’ C 186
   /max + an/ → máx-an ‘Give it to me’ JH
   /max + aʔesʔ / → máx-aʔes ‘Give it to us’ JH

c. /wen + em/ → wén-em ‘Put it in (Pl subj)’ JH
   /wen + a/ → wén-a ‘Put it in (Sg)’ JH

While many of the examples above with emergent prefix stress also have initial stress, as noted in Hill & Hill 1968: 235, stressed prefixes may surface with non-initial stress. In the examples below, an object marker prefix separates the stressed prefix from the beginning of the word, yielding prefix stress on the second syllable of the word.18

(29) Non-Initial Prefix Stress

a. mi-né-tew ‘I saw them’
   mi-pé-tew ‘He saw them’
   mi-čém-tew ‘We saw them’

b. pi-pú-kus ‘He ... took it’
   /pi + pé + kus/ 3sg+3sg+TOOK

b. pi-pé-wen ‘He put it’
   /pi + pé + wen/ 3sg+3sg+PUT

c. ?i-pé?-max ‘They gave you ...’
   /?i+ pém+ max/ 2sg+3pl+GIVE
   mi-né-maxe-n-pi ‘(I) to give them ...’
   /mi + né + max+ n + pi/ 3pl+1sg+GIVE+X+FUT

mi-pé?-max-wen ‘They were giving ...’
   /mi + pém + max + wen/ 3pl+3pl+GIVE+PRES.IMPER

In contrast to the forms above containing unaccented roots, when an inherently accented affix combines with an accented root, root accent always prevails. This is shown below for each affix type individually (30), and with accented roots which combine with both accented prefixes and suffixes (31).

18The object markers preceding the stressed prefixes here cannot be clitics because they do not meet the requirements for stand-alone pronouns stated in Hill & Nolasquez 1973: 122 ff.
(30) Root Accent Overrides Affix Accent

a. Root-Controlled De-Accenting in Prefixes

\[
\begin{align*}
/\text{pé} + \eta\acute{y} + \text{pi}/ & \rightarrow \text{pe-}\eta\acute{y}-\text{pi} \quad \text{‘He would go away’ 1.15} \\
/\text{pé} + \eta\acute{y}e + \text{yax}/ & \rightarrow \text{pe-}\eta\acute{y}e\text{-yax} \quad \text{‘It shakes’ 1.17} \\
/\text{pé} + \text{mi}?\acute{a}w + \text{lu}/ & \rightarrow \text{pe-mi}?\acute{a}w\text{-lu} \quad \text{‘He came’ 9.1} \\
/\tilde{c} \text{ ém} + \text{náać in}/ & \rightarrow \tilde{c} \text{ em-náać in} \quad \text{‘We passed on’ 21.9} \\
/\text{pém} + \eta\acute{y} + \text{wen}/ & \rightarrow \text{pem-}\eta\acute{y}-\text{wen} \quad \text{‘They went out’ 29.2} \\
/\text{pém} + \tilde{c} \text{ âŋnu}/ & \rightarrow \text{pem-}\tilde{c} \text{ âŋnu} \quad \text{‘They got angry’ 1.15} \\
/\text{pém} + \tilde{c} \text{ ñ?i} + \tilde{l}'u + \text{wen}/ & \rightarrow \text{pem-}\tilde{c} \text{ ñ?i}-\tilde{l}'u\text{-wen} \quad \text{‘They went gathering’ 29.1}
\end{align*}
\]

b. Root-Controlled De-Accenting in Suffixes

\[
\begin{align*}
/\text{píq} + \text{pe} + \text{qál}/ & \rightarrow \text{píq-pe-qál} \quad \text{‘... touched him’ 43.31} \\
/\text{mi} + \text{kʷáw} + \text{pe} + \text{qál}/ & \rightarrow \text{mi-kʷáw-pe-qál} \quad \text{‘He was calling them’ 44.1} \\
/\text{nánva} + \text{ya} + \text{qá}/ & \rightarrow \text{nánva-ya-qa} \quad \text{‘... is done’ 44.9} \\
/ ?\acute{áyu} + \text{qá}/ & \rightarrow ?\acute{áyu}-\text{qa} \quad \text{‘... (He) wants’ 23.31}
\end{align*}
\]

(31) Root-Controlled De-Accenting

\[
\begin{align*}
/\text{pé} + ?\acute{áyu} + \text{qál}/ & \rightarrow \text{pe-}\acute{áyu}\text{-qál} \quad \text{‘He was wanting’ 1.14} \\
/\text{pé} + \text{túl} + \text{qá}/ & \rightarrow \text{pe-túl-qa} \quad \text{‘He finished’ 42.22} \\
/\text{pé} + \text{háw} + \text{pe} + \text{qál}/ & \rightarrow \text{pe-háw-pe-qál} \quad \text{‘He sang’ 42.22} \\
/\text{pé} + \text{pulín} + \text{qál}/ & \rightarrow \text{pe-pulín-qa} \quad \text{‘She gave birth’ 43.5} \\
/\text{né} + \eta\acute{y} + \text{qál} + \text{i} + \text{pe}/ & \rightarrow \text{ne-}\eta\acute{y}\text{-qál-i-pe} \quad \text{‘When I go away’ 1.16}
\end{align*}
\]

To summarize, the interaction between root and affix accent may be described as follows (roots are underlined).

(32) Summary of Cupeño Accent

- If the root contains an inherently accented vowel, that vowel receives the unique word stress:
  \[
  /...rōot.../ \rightarrow [... rōot ...]
  \]
  \[
  /\text{pé} + \text{túl} + \text{qá}/ \rightarrow [... \text{pe-túl-qa}]
  \]

- In words without an accented root, the rightmost accented vowel in an affix bears word stress:
  \[
  /...\tilde{a}f + ... + \tilde{a}f/ \rightarrow [... \tilde{a}f + ... + \tilde{a}f]
  \]
  \[
  /\text{pé} + \text{yax} + \text{qál}/ \rightarrow [... \text{pe-yax-qál}]
  \]
  \[
  /\text{yax} + \text{qál} + \text{i}/ \rightarrow [... \text{yax-qel-i}]
  \]

- If the word does not contain an inherently accented morpheme, the first vowel receives the word stress:
  \[
  /\sigma\sigma.../ \rightarrow [... \sigma\sigma...]
  \]
  \[
  /\text{yax} + \text{em}/ \rightarrow [... \text{yax-em}]
  \]
2.4.2 The Analysis

There is always a single phonetic stress per word in Cupeño,\(^\text{19}\) and so when more than one accent is present in the underlying representation, only one can be realized as stress. That is, stress is culminative in Cupeño, and so only one inherently accented morpheme can faithfully project its lexical prominence. Therefore, when two or more morphemes combine, each endowed with a lexical word-level prominence, all but one of the prominences must be deleted (see §1.2.2.3 for discussion of the prosodic analysis of culminativity). The analysis proposed below is that this competition for a unique word accent is negotiated through the interaction of a set of ranked well-formedness constraints, i.e., the interaction of Faithfulness constraints, segregated by morphological domains, and Alignment constraints, which favor accent that is closest to a designated edge.

As mentioned in §2.2, I follow McCarthy & Prince 1995 in assuming that Faithfulness constraints are segregated into the morphological domains Root and Affix, and that Root Faith always outranks Affix Faith. This ordering applies to the set of Prosodic Faithfulness constraints, yielding MAX-PROM\(_{\text{Root}}\) >> MAX-PROM\(_{\text{Affix}}\). This natural division in the PROS-FAITH constraints is necessary cross-linguistically to describe the restrictions observed in the accentual inventories of affixes. What is more, this ordering explains the interaction between root and affix stress in Cupeño.

The following tableaux illustrate the basic result. As shown in (33), when the competition for the unique word accent is between an accented prefix and an accented root, the accented root wins. Likewise, when the competition is between an accented root and an accented suffix, the root will again prevail with the word stress, as shown in (34).

(33) Root-Controlled De-Accenting in Prefixes: / áf + róot ... / \(\rightarrow\) [ af-róot ... ]

<table>
<thead>
<tr>
<th>(x_1)</th>
<th>(x_2)</th>
<th>MAX-PROM(_{\text{Root}})</th>
<th>MAX-PROM(_{\text{Affix}})</th>
</tr>
</thead>
<tbody>
<tr>
<td>/pé + miʔaw + lu/</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a.</td>
<td>( (x_1) )</td>
<td></td>
<td>*!</td>
</tr>
<tr>
<td>b.</td>
<td>(\rightarrow)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>pe-(m)iʔaw-lu</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(^{19}\)Bright & Hill 1967: 355-56 mention in passing a pattern of alternating stress counting from the primary stress, but unfortunately do not give any examples. This statement appears to run counter to most work on Cupeño which explicitly deny the existence of secondary stresses (e.g. Hill & Hill 1968: 236), which is consistent with my own listening of a tape of Cupeño speech provided for me by Jane Hill. If it turns out that Cupeño does in fact have secondary stresses, this finding does not affect the result derived here. The distinction between primary and secondary stress implicit here is consistent with culminative stress, which can be analyzed in terms of the prosodic analysis of culminative accent generally given in §1.2.2.3.
(34) Root-Controlled De-Accenting in Suffixes: / ... róot + áf / \[ ... róot-af \]

<table>
<thead>
<tr>
<th>x₁ x₂</th>
<th>x₁ x₂  \ /?áyu + qá/</th>
<th>MAX-PROMₚᵣ₀ot</th>
<th>MAX-PROMₚᵣₐффixe</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. (. x₂)</td>
<td>?áyu-qá</td>
<td>*!</td>
<td></td>
</tr>
<tr>
<td>b. (x₁)</td>
<td>?áyu-qa</td>
<td></td>
<td>*</td>
</tr>
</tbody>
</table>

The same result obtains when an accented root combines with both an accented prefix and an accented suffix, as depicted in (35). Here again, the outcome is overriding root stress because of the universal ordering between Root and Affix Faithfulness.

(35) Root-Controlled De-Accenting: / áf + róot + áf / \[ af-róot-af \]

<table>
<thead>
<tr>
<th>x₁ x₂ x₃</th>
<th>x₁ x₂ x₃  \ /pé + túl + qá/</th>
<th>MAX-PROMₚᵣ₀ot</th>
<th>MAX-PROMₚᵣₐффixe</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. (. x₃)</td>
<td>pe-tul-qá</td>
<td>*!</td>
<td>*</td>
</tr>
<tr>
<td>b. (x₁)</td>
<td>pé-tul-qa</td>
<td>*!</td>
<td>*</td>
</tr>
<tr>
<td>c. (x₂)</td>
<td>pe-túl-qa</td>
<td>**</td>
<td></td>
</tr>
</tbody>
</table>

When the competition is instead between two accented affixes, the Faithfulness constraints cannot be decisive, as the MAX-PROM violations are equal in such a case. The decision therefore falls to some other constraint, which in this case, is the lower ranked Alignment constraint, ALIGN-R(PK, PrWd), which favors right-aligned stress peaks. This constraint thus picks the candidate with the rightmost affix stress, as shown below for a word with an accented prefix and suffix.

(36) Rightmost Affix Stress: / áf + root + áf ... / \[ af-root-áf ... \]

<table>
<thead>
<tr>
<th>x₁ x₂</th>
<th>x₁ x₂  \ /pé-yax-qál/</th>
<th>MAX-PROMₚᵣₐффixe</th>
<th>ALIGN-R(PK, PrWd)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. (x₁)</td>
<td>pé-yax-qal</td>
<td>*</td>
<td>yax-qal !</td>
</tr>
<tr>
<td>b. (. x₂)</td>
<td>pe-yax-qál</td>
<td>*</td>
<td></td>
</tr>
</tbody>
</table>

This result obtains in words with two stressed suffixes, e.g. /yax + qál + í/ \[ yex-qel-i \]. The correct outcome here is more harmonic than a form which stresses the penultimate suffix, e.g. \[ yex-qál-i \], because the former better satisfies ALIGN-R(PK, PrWd).
The fact that inherent accent can be realized non-finally in Cupeño shows that MAX-PROMAffix dominates ALIGN-R(PK, PrWd). If the opposite ranking held, then inherent accent could only surface word-finally, which is not true for Cupeño. In the tableau below, lexical accent emerges in a non-final vowel, despite the resulting violation of ALIGN-R(PK, PrWd).

(37) Non-Final Prefix Stress: /áf ... /

<table>
<thead>
<tr>
<th>x₁</th>
<th>/pé + yax/</th>
<th>MAX-PROMAffix</th>
<th>ALIGN-R(PK, PrWd)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>( x₂ ) pé-yáx</td>
<td>*!</td>
<td></td>
</tr>
<tr>
<td>b.</td>
<td>( x₁ ) → pé-yax</td>
<td>yax</td>
<td></td>
</tr>
</tbody>
</table>

To give an interim summary of the results, the inherent ordering between Root and Affix Faithfulness explains the each pattern of root retention depicted above. That is, regardless of affix type, if an inherently accented root combines with an inherently accented affix, the accent of the root prevails because of the inherent ranking of MAX-PROMRoot above MAX-PROMAffix. Affixal accent only emerges in words with unaccented roots because in such cases there is no root accent to realize. Finally, in words with more than one accented affix, the rightmost affix accent wins because of the role of ALIGN-R(PK, PrWd) in the system.

Recall from §2.4.1 that words which do not have a lexical accent have initial stress. Alongside the rightward orientation of affix accent, this is a pattern of conflicting directionality which Crowhurst 1994 compares to default-to-opposite edge orientation in unbounded stress systems. Naturally, it is desirable to account for this pattern of ‘rightmost lexical accent/otherwise default initial stress’ with the same basic toolbox employed in the analysis of default-to-opposite stress, and this is the spirit in which the following analysis is proposed.

At the heart of most recent approaches to default-to-opposite stress is a ranking of conflicting Alignment constraints. Thus, Zoll 1997 and Walker 1996 employ opposing Alignment constraints formulated to contrast different syllable types, i.e., heavy versus light; Baković 1998 approaches the problem in terms of constraint conflict between Alignment constraints defined at different levels of metrical structure (cf. Prince 1983); and similar constraint rankings are used in Kenstowicz 1995b, Hewitt & Crowhurst 1996, and Crowhurst & Hewitt 1997. For concreteness, I follow Baković 1998 in distinguishing among levels of metrical structure, which I refer to here as stress prominence and stress peaks, and model the conflicting edge effects as a similar type of constraint interaction. My proposal is thus that lexical accents are encoded as stress peaks, i.e., a level 3 grid mark shown below, and stress peaks are oriented to the right edge of the word. Stress prominences (level 2 grids) on the other hand are left-edge oriented, and so the leftmost syllable receives a superordinate grid mark in words with no inherent accent, as shown below.
(38) Default-to-Opposite Stress in Cupeño

a. Rightmost Accented Syllable  
   x   x   x   3  
   x   x   x   2  
   x   x   x   x   x   x   x   1  
   /pé + yax + qál/  →  pe-yax-qál

b. Leftmost Prominent Syllable  
   x   x   x   x   x   x   x   1  
   /yax + em/  →  yáx-em

While it has no phonetic consequences for stress, the distinction between different grid levels is crucial in the analysis: the rightmost level 3 grid mark (=lexical accent) wins in a multiply accented structure (38a), but when the underlying representation has no inherent accent, the level two grid mark (=prominent syllable) is leftmost (38b). This result is very much on par with the treatment of default-to-opposite edge stress in the aforementioned analyses, except the default pattern of initial stress does not have a level 3 prominence. The generalization governing this non-uniform set of structures above is thus that a level 3 grid is not inserted if it is not needed to distinguish a most prominent syllable from all others. The constraint interaction giving this result therefore involves ranking DEP-PROM above the constraint requiring a level 3 grid prominence, namely HEADEDNESS(PrWd) (see §1.2.2.3 for the definition of this constraint and its interaction with the PROS-FAITH constraints). With this ranking, stress peaks will only be present in the output if they are also present in the input, correctly predicting the input-output mappings given above in (38).

The Alignment constraints which are responsible for the conflicting directionality effects are given below.

(39)  

INIT-PROM = ALIGN((x)-2, L, PrWd, L): the left edge of every level 2 x must coincide with the left edge of some PrWd.

ALIGN-R(PK, PrWd) = ALIGN((x)-3, R, PrWd, R): the right edge of every level 3 x must coincide with the right edge of some PrWd.

INIT-PROM refers to stress prominences and characterizes the imperative for prominence on the initial syllable, as illustrated in the tableau below.

(40) Default Initial Stress:  /σσσ.../  →  [ Ǿσσ... ]

<table>
<thead>
<tr>
<th>/yax + em/</th>
<th>ALIGN-R(PK, PrWd)</th>
<th>INIT-PROM</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>( .  x )-2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>yax-ém</td>
<td></td>
</tr>
<tr>
<td>b.</td>
<td>( x )-2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>yáx-em</td>
<td></td>
</tr>
</tbody>
</table>

A stress peak cannot be inserted in this system, so words with no inherent accent receive default initial stress because the left edge is the preferred edge for level 2 grid marks. On the other hand, level 3 prominence is oriented to the right edge of the word; therefore, in

20See Antilla & Bodomo 1996 for a parallel result in Dagaare where lexical accent is likewise argued to be more prominent than non-lexical accent.
words with more than one inherently accented affix, the rightmost inherent accent wins as an effect of ALIGN-R(PK, PrWd). As illustrated below, this result requires ranking ALIGN-R(PK, PrWd) above INIT-PROM, because the presence of a level 3 grid mark entails a subordinate level 2 grid mark, which by INIT-PROM, is properly aligned at the left edge of the word.

(41) Rightmost Affix Stress: / áf + root + áf ... / → [ af-root-áf ... ]

<table>
<thead>
<tr>
<th></th>
<th>ALIGN-R(PK, PrWd)</th>
<th>INIT-PROM</th>
</tr>
</thead>
</table>
| a. | ( x_a)-3  
|   | ( x )-2     
|   | pé-yax-qal   | yax-qal!  |
| b. | ( .  x_b)-3 
|   | ( .  x )-2  
|   | →  pe-yax-qal| pe-yax    |

In sum, the conflicting patterns of directionality are handled as conflicting Alignment constraints which refer to different levels of prominence structure; where these constraints conflict, rightmost inherent accent prevails because of the ranking of ALIGN-R(PK, PrWd) above INIT-PROM.

One question this analysis raises concerns the behavior of level 2 grid marks: are lexical stress prominences faithfully preserved in output forms, and if so, how are they influenced by the conflicting Alignment constraints? As there is no need to distinguish between level 2 and 3 grid marks with the Prosodic Faithfulness constraints, it is clear that a lexical level 2 prominence would be preserved, and hence will pattern with stress prominences elsewhere in the system if present. However, it turns out that the lexical inventory does not have this type of prominence structure, given the principles of learning discussed in §1.2.2.3. The overt structure needed to posit a lexical accent in the first place is surface stress. Given a choice between positing a lone level 2 grid mark over the stressed syllable or a column of grid marks reaching to level 3, it is clear that the latter option will be chosen because the input-output mapping resulting from such a decision is more harmonic than if a level 3 grid is not assumed in the underlying representation. Positing lexical accent as a level 3 prominence therefore avoids a violation of HEADEDNESS(PrWd), given the ranking assumptions laid out above.

To summarize the results of this section so far, the observations concerning root and affix stress in Cupeño are captured by the following constraint rankings.

---

21The change to alphabetic indices here in marking the correspondence relations between prominences is simply to avoid confusion with the numbering for grid levels and is of no theoretical significance.
(42) Summary Ranking

\[
\begin{align*}
&\text{MAX-PROM}_{\text{Root}} \\
&\text{MAX-PROM}_{\text{Affix}} \\
&\text{ALIGN-}(PK, PrWd) \\
&\text{INIT-PROM}
\end{align*}
\]

Because of the intrinsic ranking between Root and Affix Faithfulness, \(\text{MAX-PROM}_{\text{Root}}\) dominates \(\text{MAX-PROM}_{\text{Affix}}\); this ranking explains the fundamental observation that root stress overrides affix stress. This ranking is also shown to be crucial in the analysis of two additional morpho-accentual phenomena explored in the next subsection. The Alignment constraint for word-level prominence, \(\text{ALIGN-}(PK, PrWd)\), is ranked below \(\text{MAX-PROM}_{\text{Affix}}\), accounting for the fact that lexical prominences may be non-final. \(\text{ALIGN-}(PK, PrWd)\) is responsible for the observed rightward edge orientation of lexical accent which is found in words with more than one accented affix. Finally, the lowest ranking constraint, \(\text{INIT-PROM}\), describes the pattern of initial stress by default in words with no inherently accented morphemes and is dominated by \(\text{ALIGN-}(PK, PrWd)\) because of the structural assumptions of stress peaks versus stress prominences.\(^{22}\)

2.4.3 Extending the Analysis

The discussion so far has focused squarely on the interaction between root and affix stress where the affixes are themselves stressed. A large number of affixes in Cupeño, however, may contribute an accent, but do not themselves surface with stress. These are the pre-accenting suffixes, which typically cause accent to fall on the root-final vowel. Any analysis of Cupeño accent must account for these cases, and as will be shown directly below, the ideas developed so far provide a clear line of analysis for pre-accentuation. The analysis will also be extended to account for the unique phonology of the nominalizer suffix -\(t\).

---

\(^{22}\)René Kager (personal communication) points out an interesting prediction of this analysis, given the position of the WSP in the system (see §2.3.2): a long vowel in an affix could attract stress, even when attached to an inherently accented root. Interestingly, there appear to be no affixes with long vowels, save one suffix, -\(kwáani\) ‘for the sake of’ (from Hill & Nolasquez’s 1973 list of affixes), which is probably derived historically from the bare noun stem -\(kwaan\) ‘worth, value’. The absence of long vowels in affixes therefore suggests an additional role for Root and Affix Faithfulness, where the constraint banning long vowels is interleaved between Root and Affix Faithfulness for vowel length.
A list of the pre-accenting suffixes in Cupeño is given below.\textsuperscript{23}

(43) Pre-Accenting Suffixes (see Hill 1967, Hill & Hill 1968, and Hill & Nolasquez 1973)

\begin{itemize}
  \item `-?aaw  ‘at’
  \item `-či ‘with, by means of’ (WITH)
  \item `-maa ‘diminutive’ (DIM)
  \item `-nuukV ‘punctual subordinator’ (PUNCT)
  \item `-ŋa ‘in’
  \item `-ŋa?aw ‘on’
  \item `-ŋax ‘from’
  \item `-pe ‘place of’
  \item `-wi ‘augmentative’ (AUG)
  \item `-i ‘objective case’ (OBJECT)
  \item `-yka ‘to’
\end{itemize}

The examples below illustrate the behavior of the pre-accenting suffixes. One consistent fact in these examples is that the accent contributed by the pre-accenting suffix always surfaces on the root-final syllable, as shown in (44) with some monosyllabic and disyllabic stems.

(44) Unaccented Root + Pre-Accenting Suffix

\begin{enumerate}
  \item /wena + nuk\textsubscript{pre}/ \rightarrow wená-nuk ‘having put it’ H: 192
  \item /ki + ŋa\textsubscript{pre}/ \rightarrow kí-ŋa ‘at the house’ 2.63
    \item /ki + ŋax\textsubscript{pre}/ \rightarrow kí-ŋax ‘in the house’ 10.42
  \item /ku + yka\textsubscript{pre}/ \rightarrow kú-yka ‘into the fire’ 3.136
\end{enumerate}

The following three sets of data show the behavior of the pre-accenting suffixes when they follow a sequence of accented prefix + unaccented root. As illustrated in all three sets, the accent contributed by the pre-accenting suffix always wins out over an accented prefix.\textsuperscript{24} Also, the forms in (48) show the same pattern as those in (45-47), except the roots are disyllabic, which shows that the size of the root does not affect the dominance relations between the affixes involved.

\textsuperscript{23}A distinction is made in Hill & Hill 1968 between the suffixes given in (40) and ones which are claimed to yield root-initial stress in unaccented forms, e.g. -\textit{we ‘present imperfect (plural subject)’, -weene ‘past imperfect’}. The evidence given for this two-way distinction is largely based on theory-internal assumptions with regard to syncope, and for this reason I will only discuss the root-final accenting suffixes.

\textsuperscript{24}Unfortunately it is impossible at this time to determine if the accent contributed by a pre-accenting suffix also takes precedence over an inherent suffix accent. The indeterminacy of the data, however, will not have crucial implications for the analysis presented here.
Accented Prefix + Unaccented Root \(v\)ma ‘hand’ + Pre-Accenting Suffix

- /né + ma + ê\(i_{\text{pre}}\) → ne-má-ê\(i\) ‘with my hands’ H: 192
- /pé + ma + ê\(i_{\text{pre}}\) → pe-má-ê\(i\) ‘by the hand’ 10.52
- /pé + ma + i\(i_{\text{pre}}\) → pe-má-y ‘his paws (obj.)’ 8.126

cf. /pém + ma/ → pé?-ma ‘their hands’ 8.130

Accent Prefix + Unaccented Root \(v\)yu ‘head’ + Pre-Accenting Suffix

- /né + yu + î\(i_{\text{pre}}\) → ne-yú-y ‘my hair (obj.)’ 23.71
- /pém + yu + î\(i_{\text{pre}}\) → pum-yú-y ‘their heads (obj.)’ 14.206
- /pém + yu + ŋ\(a_{\text{pre}}\) → peme-yú-ŋa ‘on their heads’ H: 192

Accented Prefix + Unaccented Root \(v\)ki ‘house’ + Pre-Accenting Suffix, cf. (42)

- /pé + ki + yka\(i_{\text{pre}}\) → pe-kí-yka ‘to his house’ 10.49
- /pé + ki + î\(i_{\text{pre}}\) → pe-kí-î ‘his house (obj.)’ 12.148
- /pé + ki + ʔaw\(i_{\text{pre}}\) → pe-kí-ʔaw ‘at (his) house’ 12.154
- /c\(e\) em + ki + ʔaw\(i_{\text{pre}}\) → c\(e\) em-kí-ʔaw ‘in our homes’ 21.1
- /pém + ki + î\(i_{\text{pre}}\) → pem-kí-y ‘their homes (obj.)’ 22.18
- /ém + ki + î\(i_{\text{pre}}\) → em-kí-y ‘your homes (obj.)’ 23.20

Accented Prefix + Unaccented Root (Disyllabic) + Pre-Accenting Suffix

- /pé + tama + ŋ\(a_{\text{pre}}\) → pe-tamá-ŋa ‘in his mouth’ 1.37
- /pé + qewi + ʔaw\(i_{\text{pre}}\) → pe-qewi-ʔaw ‘at (on) its forehead’ 11.108
- /pé + qi?i + ʔaw\(i_{\text{pre}}\) → pe-qi?i-ʔaw ‘on nape of his neck’ 15.240

A significant and important fact of pre-accentuation in Cupeño is that this process is blocked in words that have inherently accented roots (Hill & Hill 1968). That is, when a pre-accenting suffix attaches to an accented root, no accent is inserted by the suffix and the root accent is realized, as illustrated below.

Accented Prefix + Accented Root + Pre-Accenting Suffix (Hill & Hill: 236)

- /ʔisi + l\(y\)e + î\(i_{\text{pre}}\) → ʔisi-l\(y\)-î ‘coyote (obj.)’
- /même + yke\(i_{\text{pre}}\) → même-yke ‘to the ocean’
- /tivi? + ma\(a_{\text{pre}}\) + le\(i\) → tivi?-ma-l ‘small round basket’

To summarize the main features of pre-accentuation, pre-accenting morphemes cause root-final stress. Also, pre-accenting morphemes win out over accent in a prefix, but lose to a root accent. The analysis given below builds on the ideas developed in §2.4.2 in accounting for these facts.25

In order to study the interaction between pre-accentuation and inherent accent in roots and affixes, it is necessary to have a concrete analysis of pre-accentuation. While at present there is no ‘standard’ theory of pre-accentuation, I will commit for the moment to a specific analysis as a means of developing my argument for the root-controlled analysis of Cupeño accent. The analysis of pre-accentuation in Cupeño in particular, and pre- and post-accentuation in general, will be significantly modified in chapter 5, section 3, where this phenomenon is studied in detail. However, as is made clear in the analysis of Cupeño

25Hill & Hill 1968: 236 suggest that there is a locality condition on the distance between the pre-accenting suffix and the root, essentially that there cannot be more than one intervening suffix. I have not be able to find an ample body of examples supporting this observation, so this condition is not analyzed here. However, in §5.3, where pre-accentuation in Cupeño is revisited, I sketch an analysis, assuming that the locality condition is in fact significant, as this type of condition is an important theoretical implication following from the theory of pre-accentuation developed there.
presented there, the changes in the theory of pre-accentuation do not affect the argument presented here for root-controlled accent, as the same principles apply in both analyses.

Observationally, pre-accenting suffixes have two basic requirements: they must appear to the right of a root or stem, and they must directly follow a stressed syllable. Following Kager 1996, this combination of alignment properties can be formalized within Generalized Alignment Theory (McCarthy & Prince 1993a), as in the complex constraint below.26

\[
\text{PRE-ACCENT} \equiv \text{ALIGN(Affix}_{\text{pre}}, \text{ L}, \text{ Root}, \text{ R)} \vee \text{ALIGN(Affix}_{\text{pre}}, \text{ L, PROM, R)}
\]

The left edge or pre-accented suffixes (a lexically marked affix class) must coincide with both the right edge of the root and the right edge of a prominent syllable.

According to the above constraint, pre-accenting affixes are formal suffixes: they have the subcategorization requirements typical of suffixes, namely coincidence at the left edge of the affix with the right edge of the root. In addition, pre-accenting suffixes must be left-aligned to the right edge of a prominent syllable, whether this prominence is an emergent lexical accent or an inserted prominence. PRE-ACCENT must therefore be ranked above INIT-PROM, as words with an unaccented root and a pre-accenting suffix receive non-initial stress, in contrast with words which have no inherently accented morphemes (see §2.4.1 and §2.4.2. for data and analysis). Thus, PRE-ACCENT has a dual role: it ensures that the pre-accenting morpheme is a suffix and that it is properly aligned with a stressed syllable, which may be a non-initial syllable, as illustrated below.

\[
\text{(51) Root-Final Stress in Pre-Accentuation: } / \ldots \text{root + af}_{\text{pre}} / \rightarrow [ \ldots \text{rőot-af}_{\text{pre}} ]
\]

<table>
<thead>
<tr>
<th></th>
<th>PRE-ACCENT</th>
<th>INIT-PROM</th>
</tr>
</thead>
<tbody>
<tr>
<td>/\text{wenə</td>
<td>nuk}_{\text{pre}}/</td>
<td></td>
</tr>
<tr>
<td>a. \text{wénə</td>
<td>nuk}_{\text{pre}}</td>
<td>*!</td>
</tr>
<tr>
<td>b. \rightarrow \text{wená</td>
<td>nuk}_{\text{pre}}</td>
<td>*</td>
</tr>
</tbody>
</table>

The two candidates above differ in their obedience to the prominence subcategorization requirement. The losing candidate has initial stress, and while this pattern leads to satisfaction of INIT-PROM, it is fatal because the pre-accenting suffix is not properly aligned with the stressed syllable. The winner is thus the form with root-final stress because such a pattern satisfies PRE-ACCENT.

Concerning the interaction between roots and pre-accenting suffixes, root accent overrides pre-accentuation, as it does with accented suffixes. The explanation of this fact is very much on par with the explanation of overriding root stress given above. The competition for word stress is again a result of top-ranked Root Faithfulness.

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26The conjunction of the two Alignment constraints here is derived through the disjunctive mode defined in Hewitt & Crowhurst 1996, according to which the complex constraint is violated if either of the conjuncts are violated (cf. Smolensky 1993 et seq. where violations of conjoined constraints involves violation in both conjuncts).
This result truly shows the importance of Prosodic Faithfulness in the analysis. Here, the competition is between two morphemes, both of which yield stress on the root. Therefore, it is only by considering the lexical sources of accent, and its morphological affiliation, that the correct outcome is arrived at. In particular, the inherent root stress here wins not because stress surfaces within the root; the accent contributed by the pre-accenting suffix surfaces as well. Rather, it is the affiliation with the root which leads to satisfaction of top-ranked MAX-PROM Root.

Turning next to words with an accented prefix and a pre-accenting suffix, for example, /pé + ma + i\textsubscript{pre} / → pe-má-y ‘his paws (objective)’, the lack of evidence concerning the interaction between accented suffixes and pre-accenting suffixes makes it difficult to be sure about the constraint rankings involved here. However, the two possible scenarios can be handled straightforwardly as follows. If a pre-accenting suffix generally wins out over affixes, that is, pre-accenting suffixes cause root-final accent in words which either have an accented prefix or suffix, then this observation can be accounted for with the ranking PRE-ACCENT >> MAX-PROM Affix. On the other hand, if it turns out that pre-accenting suffixes win out over accented prefixes, but lose to an accented suffix, then these patterns are consistent with the general pattern of rightward edge orientation. After all, the pre-accenting suffix brings an accent closer to the right edge of the word than a prefix accent can, which fares better on ALIGN-R(PK, PrWd). Thus, while the data does not allow for a ranking of PRE-ACCENT relative to MAX-PROM Affix, it is clear that the two logically possible states of affairs concerning the interaction between the accented affixes and the pre-accenting suffixes can be countenanced within the set of assumptions laid out here.

As a final puzzle, let us examine the special phonology of the nominalizer -í, which is characterized by Hill & Hill 1968: 236 as being intermediate between a root accent and an affix accent. The nominalizer is weaker than a root accent because it is not stressed when it combines with an accented root, as shown in (53). But it is stronger than a suffix accent, as shown by the fact that it can cause deletion of a subsequent accent (54), going against the pattern of retention of the rightmost affix accent.
(53) Intermediate Behavior of the Nominalizer -í

wíw-i-š /wíwe + í + če/
‘acorn mush’ ROOT+NOM+ABSO

pác ik-i-š /pác ike+ í + če/
‘leached acorn meal’ ROOT+NOM+ABSO

(54) Intermediate Behavior of the Nominalizer -í

a. yex-i-qe-t /yax+ í + qá + te/
   ‘one who is going to say’ SAY+NOM+PRES+ABSO

b. kwa?-í-qa-t /kwa+ í + qá + te/
   ‘I’m gonna eat ...’ EAT+NOM+PRES+ABSO
   kwa?-í-qa-te-m /kwa+ í + qá + te + m/
   ‘we’re gonna eat ...’ EAT+NOM+PRES+ABSO+PLUR

c. max-i-qa-t /max + í + qa + te/
   ‘(I’m) gonna give’ GIVE+NOM+PRES+ABSO
   ne-max-i-ve-ŋax /né + max + í + ve + ŋaxpre/
   ‘(the way) I always do’ 1sg+GIVE+NOM+SUBORD+FROM

When compared to other morpho-accentual phenomena examined in subsequent chapters, the behavior of the nominalizer suggests several possible analyses. For example, as a stem-forming suffix, -í may be ascribed the special Faithfulness properties characteristic of derivational affixes to account for the retention of its accent over an affix accent (see especially Revithiadou 1997). Alternatively, the nominalizer could be approached as another well-known accentual class, namely dominant morphemes, which trigger a deletion of a neighboring accent (see chapter §5.2 for detailed discussion), and in turn allows the suffix to realize its own inherent accent. Third, as a noun-forming affix, the intermediate status of -í may also be attributed to a Faithfulness effect due to its membership in the class of nouns, providing further support for the notion of Noun Faithfulness proposed in Smith 1996, 1997. For the matters at hand, however, the specific details of the analysis are not directly relevant. The importance of the nominalizer is that it has an intermediate status among the accentual types of morphemes in Cupeño, e.g., roots versus affixes, and thus, it must be distinguished from these types in a formal way. Consistent with the line of analysis pursued in this thesis, morphemes of different accentual types are distinguished through constraint ranking. Together with the ranking assumptions laid out above, this approach to the nominalizer provides an additional argument for the distinction between Root and Affix Faithfulness, as I will now illustrate.

Let us assume that there is a rankable constraint, STRESS-TO-í, which specifically requires stress on the nominalizer. This constraint must be ranked above MAX-PROMAffix to account for the fact that -í is stressed over an inherently accented affix, as shown below.
(55) Special Behavior of Nominalizer \(-i\): \(\ldots i + \acute{a}f / \rightarrow [\ldots i-\acute{a}f] \)

<table>
<thead>
<tr>
<th>(x_1 /yax + i + q\acute{a}t/)</th>
<th>STRESS-TO-(i)</th>
<th>MAX-PROMAffix</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. (x_1) yax-i-q\acute{a}t</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>b. (x_2) yax-(i)-q\acute{a}t</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The nominalizer loses to a root accent, however, which shows that STRESS-TO-\(i\) is dominated by MAX-PROMRoot. The result of this ranking decision is illustrated below.

(56) Root-Controlled De-Accenting in the Nominalizer: \(\ldots \text{r}\acute{o}ot + i / \rightarrow [\ldots \text{r}\acute{o}ot-\(i\)] \)

<table>
<thead>
<tr>
<th>(x_1 /p\acute{a}\text{c} \acute{i}ke + i + \check{e} /)</th>
<th>MAX-PROMRoot</th>
<th>STRESS-TO-(i)</th>
<th>MAX-PROMAffix</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. (x_2) p\acute{a}\text{c} \acute{i}ke-(i)-\check{e}</td>
<td>*</td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>b. (x_1) p\acute{a}\text{c} \acute{i}ke-(i)-\check{e}</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
</tbody>
</table>

The up-shot is thus that the special phonology of the nominalizer further substantiates the distinction between Root and Affix Faithfulness in the analysis. The intermediate status of the nominalizer is directly characterized by ranking STRESS-TO-\(i\) between Root and Affix Faithfulness.

To summarize the results of this section, the rankings shown below build on the constraint system of §2.4.2 to account for pre-accentuation and the behavior of the nominalizer \(-i\).

(57) Summary Ranking

\[
\text{MAX-PROMRoot} \\
\text{STRESS-TO-}i \\
\text{MAX-PROMAffix} \\
\text{PRE-ACCENT} \\
\text{ALIGN-R(PK, PrWd)} \\
\text{INIT-PROM}
\]

Distinguished lexically from the accented suffixes, the pre-accenting suffixes attach to a root which ends in a stressed syllable. This subcategorization requirement, embodied in PRE-ACCENT, is ranked above the Alignment constraints because it may bring non-final and non-initial stress. However, PRE-ACCENT is ranked below MAX-PROMRoot because the presence of a root accent precludes pre-accentuation. Finally, the intrinsic ordering between MAX-PROMRoot and MAX-PROMAffix is crucial to the characterization of the
intermediate strength of the nominalizer, providing the right slot for the ranking of STRESS-TO-\(\uparrow\) in the system.

To complete the analysis, the constraint rankings from §2.3 must be incorporated into the system in (57) above. Specifically, the WSP is ranked above the Prosodic Faithfulness constraints MAX-PROM\(_{\text{Root}}\) and NOFLOP-PROM, which in turn both dominate FTBIN. The former ranking accounts for predictable long vowel stress, and the latter accounts for the lexical contrast between initial and peninitial stress.

In conclusion, the distinction between Root and Affix Faithfulness has two important functions in the analysis. First, it explains overriding root stress, even in subtle cases involving pre-accentuation. Second, it is instrumental in the analysis of the nominalizer. Thus, these two independently established ranking arguments converge on the same result, providing strong evidence for the distinction between Root and Affix Faithfulness.

### 2.5 Discussion of Alternatives

In this section, two alternatives to the Faithfulness-based analysis of overriding root stress are considered: the level-ordering analysis proposed in Crowhurst 1994 (§2.5.1), and a cyclic account along the lines of Halle & Vergnaud 1987a (§2.5.2).

#### 2.5.1 A Level-Ordering Account

Crowhurst 1994 gives a level-ordering account of overriding root stress. The crux of the analysis centers on a lexical distinction between accented and unaccented roots: accented roots have a lexical foot, and unaccented roots do not. Furthermore, on the root cycle prior to affixation (the Level 1 phonology), a word tree is built only over accented roots because of an additional assumption that feet may not be inserted at this stage. Accented roots hence leave the Level 1 phonology with word-level prosodic analysis, while unaccented roots exit with no prosodic structure above the syllable. At the next level, a different stress rule is proposed for affix stress, accounting for the difference between accented and unaccented roots with a two level grammar.

This analysis is depicted graphically in (58) below. The inputs to the Level 1 phonology differ in the presence of a lexical foot, and they are likewise distinguished in the output by the presence of a word-level category. The root syllable in (58b) cannot by parsed directly by the prosodic word because this option violates the principle of Strict Layering (Selkirk 1984), and furthermore, this form cannot be supplied with an epenthetic foot because this strategy is not available.
(58) Level 1 Phonology

<table>
<thead>
<tr>
<th>INPUT</th>
<th>OUTPUT</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>PrWd</td>
</tr>
<tr>
<td></td>
<td>/ \</td>
</tr>
<tr>
<td>F</td>
<td>[F] \</td>
</tr>
<tr>
<td>\</td>
<td>/ \</td>
</tr>
<tr>
<td>σ σ σ</td>
<td>σ σ σ</td>
</tr>
<tr>
<td>te sí we</td>
<td>te sí we</td>
</tr>
<tr>
<td>b.</td>
<td>σ</td>
</tr>
<tr>
<td></td>
<td>yax</td>
</tr>
</tbody>
</table>

When these outputs are then subjected to the Level 2 phonology, the difference between accented and unaccented roots is exploited in the following way. Words with accented roots already have word-level structure, which in turn determines the position of the main stress foot (59a). On the other hand, words with unaccented roots will be devoid of such structure, and can therefore be assigned rightmost affix stress with a different set of stress principles (59b).

(59) Level 2 Phonology

<table>
<thead>
<tr>
<th>INPUT</th>
<th>OUTPUT</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>PrWd</td>
</tr>
<tr>
<td></td>
<td>/ \</td>
</tr>
<tr>
<td>F</td>
<td>[F] \</td>
</tr>
<tr>
<td>\</td>
<td>/ \</td>
</tr>
<tr>
<td>σ σ σ</td>
<td>σ σ σ</td>
</tr>
<tr>
<td>č em te sí wen</td>
<td>č em te sí wen</td>
</tr>
<tr>
<td>b.</td>
<td>PrWd</td>
</tr>
<tr>
<td></td>
<td>/ \</td>
</tr>
<tr>
<td>F</td>
<td>[F] \</td>
</tr>
<tr>
<td>\</td>
<td>/ \</td>
</tr>
<tr>
<td>σ σ σ</td>
<td>σ σ σ</td>
</tr>
<tr>
<td>yax qal í</td>
<td>yax qal í</td>
</tr>
</tbody>
</table>

In summary, the level-ordering analysis accounts for overriding root stress by defining a root cycle prior to affixation in which certain principles of prosodic organization apply, effectively distinguishing accented and unaccented roots in the relevant way. Crucial to this analysis, therefore, is the assumption that the grammar cycles on bound roots. This claim, however, has been argued against extensively in the literature (see e.g. Kiparsky 1982b and Inkelas 1989 and references therein). The empirical finding in these works is that bare bound roots do not form domains for cyclic rules. It would seem, therefore, that the level-ordering account bases its analysis on an assumption for which there is little cross-linguistic support.

There is an additional empirical problem with this analysis, stemming from the distinction made between accented and unaccented roots. The Level 1 phonology
distinguishes between accented roots and unaccented roots by the presence of word-level prosodic structure. In effect, unaccented roots are clitics when they leave the Level 1 phonology. As it happens, Cupeño’s Level 2 phonology supplies a word tree, so unaccented roots do not retain their clitic-like status. However, there is nothing inherent to the level-ordering analysis that ensures that this necessary step would take place. So the typological prediction is made that there should be some language where unaccented roots behave like clitics post-lexically. To my knowledge, however, no such language exists. For example, in Tokyo Japanese, unaccented roots have no specific prosodic properties other than their lack of tone structure. It seems, therefore, that the core idea of the level-ordering analysis has little empirical support outside of Cupeño.

2.5.2 A Cyclic Analysis

A different approach to overriding root stress can be modelled in the multi-stratal framework given in Halle & Vergnaud 1987a (HV). In this work, dominant morphemes are distinguished from recessive ones through cyclicity. In particular, dominant affixes are cyclic morphemes which are represented on a metrical plane that is distinct from that of other morphemes. Thus, in the examples from Vedic Sanskrit below, the accent of the dominant suffix -īn is represented on a different autosegmental plane than the one for the roots and noncyclic suffixes.

(60) /ráth+ín +e/ rath-ín -e ‘charioteer’ (dative singular)
/mitr+ín +e/ mitr-ín -e ‘befriended’ (dative singular)

Furthermore, cyclic affixation triggers a copying process from one metrical plane to the plane of the cyclic affix. This copying is governed by the Stress Erasure Convention (SEC), which essentially states that information about stress generated on previous cycles is carried over only if the affixed constituent is not a domain for the cyclic stress rules. Thus, as depicted below, the accented/unaccented contrast in roots is lost when they combine with dominant (cyclic) suffixes.

(61) Dominant Affixes in Vedic Sanskrit (HV)

<table>
<thead>
<tr>
<th>Cyclic Stratum</th>
<th>(Accented)</th>
<th>(Unaccented)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cycle 1</td>
<td>* ráth</td>
<td>mitr</td>
</tr>
<tr>
<td>Cycle 2</td>
<td>* ráth-ín</td>
<td>* mitr-ín</td>
</tr>
<tr>
<td>OUTPUT</td>
<td>rath-ín</td>
<td>mitr-ín</td>
</tr>
</tbody>
</table>

In this illustration, accented and unaccented roots are distinguished by the presence of stress above the root. This information is represented on a metrical plane apart from the one marking stress on cyclic affixes, which is placed directly below the form. Hence, when root stress is copied at Cycle 2, this information is lost because the larger constituent
forms a domain for the cyclic stress rules, in effect neutralizing the accentual contrast in roots.

Consider next the application of the basic proposal to overriding root stress in Cupeño. Suppose that the direction of copying can be parameterized on a language-particular basis. That is, suppose that instead of copying from the root stress plane to the cyclic plane, as in Vedic, stress information for affixes is copied to the root stress plane. Assuming that the affixed constituents form cyclic domains effectively accounts for overriding root stress with the SEC. This result is illustrated in the chart below.

(62) Overriding Root Stress in Cupeño

<table>
<thead>
<tr>
<th>Cyclic Stratum</th>
<th>(Accented)</th>
<th>(Unaccented)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cycle 1</td>
<td>* tesíwe</td>
<td>yax</td>
</tr>
<tr>
<td>Cycle 2</td>
<td>* č em-tesíwe</td>
<td>yax-qál-í</td>
</tr>
<tr>
<td>OUTPUT</td>
<td>* č em-tesíwe</td>
<td>* yáx-qal-i</td>
</tr>
</tbody>
</table>

With accented roots, it is clear how the SEC applies to give the correct result: when copying from the affix plane to the root plane, information specified for affixes is lost because the larger constituent forms a cyclic domain. This same principle, however, gives an incorrect result for words with unaccented roots. On a par with the accented roots, affix stress is lost with cyclic affixation, yielding a metrical plane with no stress information whatsoever, and which therefore receives a default initial stress. In sum, just as dominant affixes neutralize the accentual contrast in the roots they attach to, roots in Cupeño would neutralize the accentual contrast in affixes, leading to the incorrect outcome above with *yáx-qal-i.

The only way around this descriptive problem is to posit a feature [+/- cyclic], which governs the possibility of copying from the affix plane when applied to roots. That is, accented roots must be marked [+cyclic] in order to require copying, which results in deletion of affix stress, while unaccented roots must be marked [-cyclic] to preclude this copying. Going beyond the lack of explanatory insight, this approach leads to a more serious empirical problem. By introducing cyclicity as a marker of dominance which is independent of the accentedness contrast, the cyclic approach essentially claims that these two features will cross-classify roots in some language. However, a recent paper (Inkelas 1996) which surveyed effects such as these in a variety of languages, found that the dominant/recessive distinction is not used in any language to classify roots (see §5.2.4 for further discussion). The application of such a feature to account for overriding root stress in Cupeño, therefore, seems to make an empirical prediction for which there is no cross-linguistic support.
2.6 Summary and Implications

In this chapter, I have developed a comprehensive analysis of accent in Cupeño. At every stage in the analysis, the notion of Prosodic Faithfulness has played an important role in describing the diverse aspects of the system. First, Prosodic Faithfulness provided the formal means of characterizing phonemic stress. This set of constraints was segregated into Root and Affix Faithfulness constraints to account for the cross-linguistic observation that roots license a wider range of accentual contrasts than affixes. This division was in turn employed in the explanation of dominant root stress, a pattern which pervades the accent system of Cupeño. Finally, distinct Root and Affix Faithfulness proved essential in extending the analysis to the far corners of the system, including the analysis of pre-accentuation and the intermediate strength of the nominalizer.

In developing the Faithfulness-based analysis, I have made connections between these observations in an accent system and diverse phonological phenomena. By characterizing Cupeño accent as root-controlled, one can see parallels to well-known vowel harmony systems (McCarthy & Prince 1995, Selkirk 1995a, Beckman 1997 [1998]) and other segmental processes like dissimilation (Holten 1995, Selkirk 1995b, Alderete 1997b, Blake 1998). The domain-sensitive constraints employed in the analysis of Cupeño are in no way specific to this language and have been applied to a wide range of phenomena. The analysis proposed here therefore accomplishes one of the central goals in linguistic theory, namely the description of language particular patterns with universal principles.

In addition, I have argued for this analysis by contrasting it with the plausible alternatives. It was shown that, in contrast to the Faithfulness-based analysis, the alternatives employing phonological levels lead to descriptive problems and loss of generalization. First, the level-ordering account was shown to rely on the assumption that bare bound roots form cyclic domains, and this assumption was challenged on empirical grounds. Second, the cyclic alternative was shown to have a descriptive problem with dominant root stress, and the fix-up to this problem led to an ad hoc feature system which was also challenged. In summary, the available alternatives to the Faithfulness-based analysis are inferior on empirical and theoretical grounds.

I would like to conclude with a brief discussion of some further issues which are raised by the main ideas developed here. The first issue involves the examination of a set of languages which also require root stress, but where this requirement is apparently not a function of phonemic stress. For example, roots are always stressed in the Nicobarese language Nancowry, but the distribution of stress is predictable, falling on the last vowel of the root (Radhakrishnan 1981). Likewise, Chukchee has predictable root stress, typically falling on the rightmost vowel of the root (Krause 1979). A third case is Nisg̱a’a, where root-based stress exhibits an interesting interaction between edge alignment and quantity sensitivity (see Shaw 1992 and references therein). In these languages, there is a constraint requiring root stress, but this constraint cannot be an input-output Faithfulness constraint because it applies to all the roots in the language. This observation, therefore, raises the question of whether there are two sets of constraints in Universal Grammar, both of which encourage root stress. That is, the analysis of Cupeño proposed here involves a Faithfulness constraint which encourages realization of inherent root stress over affix stress, but a cross-linguistic perspective reveals a need for a constraint which also encourages root stress, but only evaluates outputs.

Evidence from the Athapaskan language Tahltan appears to resolve this issue because in this language both constraints function independently in the same system. A fundamental component of the Tahltan stress system is that every root must have a stress (Cook 1972), which classifies this language with Nancowry and Chukchee. Furthermore,
stress is also assigned to every odd syllable counting from the root stress, resulting in fixed root stress and variable affix stress, as in hóde-seeh ‘I talk’, cf. hodéthi-deeh ‘We talk’ (roots are underlined). Stress in polysyllabic forms is not fully predictable, however, as Nater 1989 shows that stress introduces phonemic contrast in longer words. Thus, stress is contrastive in roots, leading to variation in stress in longer words; furthermore, every root must have a stress. In this system, therefore, both a Faithfulness constraint for root stress and an over-arching constraint requiring every root to bear stress are needed (see Hewitt 1992, Kennedy 1994, and Fitzgerald 1997 for some leading ideas).

A second issue concerns the retention of accent in words with more than one inherently accented morpheme. According to the Root-Controlled Accent (RCA) hypothesis, accent in the root is retained over accent elsewhere in the word. An interesting feature of this hypothesis is that it assigns a role to the morphology in the description of a pattern that has formerly been treated as a directionality effect. Thus, in a very influential paper, Kiparsky & Halle 1977 describe accent retention in a variety of Indo-European languages in terms of a principle of edge orientation, according to which accent is lost in all but the first inherently accented morpheme in a word. Poser 1984 assumes a similar principle in the analysis of non-stress accent in Japanese. These precedents raise the issue of whether both the assumptions embodied in the RCA hypothesis and this principle of edge orientation are indeed necessary in the analysis of the retention of accent cross-linguistically.

It is helpful to return to the analogy of vowel harmony systems developed in §2.2 as a way of addressing this theoretical and empirical issue. The well-known cases of back (and round) harmony in Finnish and Turkish show alternations in suffixes which are amenable to a left-to-right spreading rule, an analysis which also involves a principle of directionality (see Bach 1968 and Lightner 1972). Considered alongside root-controlled [±ATR] harmony in Akan (Clements 1981), however, an equally coherent analysis of Finnish and Turkish is that the specification for vowel features in the suffix is root-controlled. In this analysis, the suffixing preference in these languages only gives the appearance of a directionality effect, but it is the vowel specifications in the root that have the formal role in the analysis.

In a similar way, the analysis of root-controlled accent in Cupeño presented here sheds new light on the two accent systems mentioned above. In particular, Japanese, as well as many Indo-European languages, shows a strong preference for suffixing morphology. Thus, in stem + suffix sequences where both morphemes have a lexical accent, the deletion of accent in the suffix may be analyzed in terms of the same principles of root-control employed in Cupeño. In the absence of prefixed structures which can decide between the two approaches, the RCA analysis is thus quite attractive because it explains retention of root accent in terms of a universal ordering between Root and Affix Faithfulness. Furthermore, root accentedness has the same effect of blocking morpho-accentual processes like pre- and post-accentuation in these languages, which is also explained in terms of Root Faithfulness. I therefore propose to investigate the interaction between root and affix accent in Russian and Japanese, and much of the next chapter is dedicated to developing this argument in more detail.

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27 An important difference between vowel harmony systems and accent systems is that only the former exhibits blocking effects from opaque vowels, for example low vowels in Akan. The analysis of this difference stems from the theory of autosegmental spreading: because root-control in vowel harmony systems is achieved through linking of a feature substantive constraints on these linkages can prohibit spreading across or through an opaque vowel; since grid marks cannot spread, such blocking effects are not possible in accentual systems described in terms of prominence on the grid.