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Department of Linguistics
The University of Calgary
2500 University Drive N.W.
Calgary, Alberta, CANADA
T2N 1N4

FOREWORD

The editors of this volume, Susan Atkey, Jana Carson, and Michael Dobrovolsky, are pleased to present the twenty-second issue of the Calgary Working Papers in Linguistics published by the Department of Linguistics at the University of Calgary. The papers contained in this volume represent works in progress and as such should not be considered in any way final or definitive.

This volume of CWPL includes papers by professors and students, both graduate and undergraduate, of the Department of Linguistics of the University of Calgary. This year, we are also pleased to include a guest submission from Obáfẹ́mi Awólọ́wọ̀ University in Nigeria. The articles in this issue discuss a broad range of topics from the fields of syntax, phonology and acquisition.

Rebecca Hanson's submission is the first of two papers on pronouns. Hanson examines children's acquisition of pronouns and accounts for both patterns of variability and uniformity using Ritter & Harley's Morphological Feature hierarchy. A second paper on pronouns, submitted by Tim Mills, looks at the unique organization of Morley Stoney pronouns, also in the framework of Ritter & Harley's Morphological Feature hierarchy.

In addition to the syntactic articles, this issue includes three papers written in the field of Phonology. The paper by Olga Karpacheva discusses secondary stress in Russian compound words. Using examples from Russian poetry, Karpacheva argues that secondary stress is imposed on existing word level stress by rhythm. Andrea Wilhelm's submission takes a closer look at the phonological alternation known as the Slave D-Effect. Within the framework of Optimality Theory, Wilhelm provides a uniform analysis of coalescence in Athapaskan. Also working within Optimality Theory, Suzanne Urbanczyk looks at the correlation between reduplicative size and segmental content, and shows that in languages with reduplicative morphemes, no languages are found in which the the smaller reduplicant has more marked structure than the larger reduplicant.

Finally, in a paper entitled Head in Yorùbá Derived Nouns, L.O. Adéwọlé argues that Yorùbá is a language with a left-hand head in morphology, and that this is exceptional in language.

We wish to express our sincere gratitude to Linda Toth for her assistance in this project. We would also like to thank the University of Calgary Department of Linguistics for providing the necessary funding to produce this volume. A final word of thanks is owed to each of our contributors without whom we would, of course, have no issue at all.

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CALL FOR PAPERS

Calgary Working Papers in Linguistics is an annual journal which includes papers by faculty and students in Linguistics and related disciplines, both at the University of Calgary and elsewhere.

The editors would like to encourage all readers to submit papers for future publication. The deadline for submission of papers is August 30 in order to meet the publication date. The editors would like contributions on 3 1/2" Micro Floppy Disks (preferably formatted for Microsoft Word for Macintosh version 5 or higher). We further request that the submissions follow the Style Sheet provided at the end of the journal. All submissions should be camera-ready. Page numbers should not be included on the front of the papers, but should be lightly printed on the back of the pages in pencil. Authors should submit their papers to the address listed below. The editors reserve the right to return papers for revisions if they do not conform to the Style Sheet as outlined at the end of the journal. Appearance of papers in this volume does not preclude their publication in another form elsewhere.

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CWPL
Department of Linguistics
The University of Calgary
2500 University Drive N.W.
Calgary, Alberta, Canada
T2N 1N4

Phone: (403) 220-5469
Fax: (403) 282-3880

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Pronoun Acquisition and the Morphological Feature Geometry

Rebecca Hanson
University of Calgary

Abstract

The acquisition of pronouns has received limited attention in the literature, and there are few studies which deal with this topic in detail. From the data available, clear and sometimes surprising patterns of uniformity and variability emerge. Previous attempts to account for these patterns have all faced similar problems, specifically in explaining the heterogeneous initial set of pronouns (first person singular, and third person singular inanimate), and in accounting for the variation that is found. In this paper I find that these previously problematic areas are readily accounted for using the hierarchy of morphological features proposed by Ritter and Harley (1998).

1. Introduction

The hierarchical arrangement of both the phonological and the syntactic components of language have been extensively studied, but only recently have there been attempts to determine whether or not the morphology is likewise hierarchically arranged. Ritter and Harley (1998) provide a detailed proposal for a morphological feature hierarchy, based on the crosslinguistic interaction and behavior of phi-features in adult languages. In this paper, I test Ritter and Harley's model against acquisition data, and find that, with minor modifications, it successfully accounts for both the uniformity and the variability found in the acquisition of pronouns.

The organization of the paper is as follows. I begin by outlining the theoretical assumptions which form the backbone of my analyses, followed by a survey of the relevant material from the literature. In response to the consistent patterns I find in the recorded acquisition data, I step back from the analysis to consider the advantages of proposing default interpretations within the Ritter and Harley model. Based on child and adult data, I incorporate the notion of underspecification into the geometry and return to the acquisition data. Examining in detail the acquisition paths of two English-learning children, I find that all the observed patterns there are neatly accounted for. I conclude with a brief summary of the paper followed by suggestions of several morphological and syntactic areas where the feature geometry could be a valuable resource.

2. Background

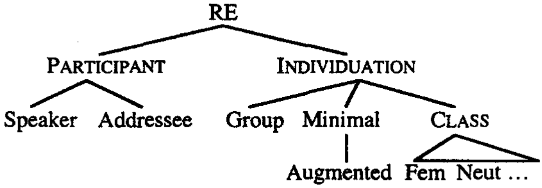
2.1.1 Feature Geometry

The analyses in this paper begin with the assumption, argued by Noyer (1992) and Ritter and Harley (1998), that morphological features are hierarchically arranged in a

UG-constrained structure. This hierarchy, or feature geometry, is responsible for all existing systems of phi-features, though it is unlikely that any one language will exploit the entire structure. The morpho-syntactic feature geometry assumed here is that proposed by Ritter and Harley (hereafter R&H). As discussed there (p.5), it has formal properties similar to those found in phonological geometries: the hierarchy is composed of a Root node dominating Organizing nodes[1], which in turn dominate terminal features. Features are monovalent and contrasts are represented via the presence or absence of a feature rather than through 'plus' and 'minus' values. Markedness is reflected in the complexity of a given tree.

The full structure of the R&H feature geometry is supplied in (1). Throughout this paper, Organizing nodes will be in small caps in the diagrams.

(1)



Within the hierarchy, lower nodes are said to be dependent on those which dominate them; for example, in (1) the CLASS node is a dependent of the INDIVIDUATION node, and [Augmented] is a dependent of [Minimal]. The referential purpose of these phi-features is reflected by the designation of the Root node as R(eferring) E(xpression), and the dependents of the Root node serve the following purposes:

(2) a. PARTICIPANT: encodes person features; active for first and second person, inactive for third person.
   i) Speaker: first person
   ii) Addressee: second person

b. INDIVIDUATION: organizes discourse-independent features (number and gender).
   i) Minimal: singular
   ii) Group, Augmented: non-singular
   iii) CLASS: encodes gender features

A full discussion of (1) is given in R&H, along with analyses of various (adult) pronominal systems. In the course of this paper I will propose some minor modifications and revisions of the geometry above, regarding feature underspecification and the CLASS node.

[1] I make a small departure here from the terminology in R&H, where the term "(major) class node" is used instead of "organizing node." I use the latter in order to avoid confusion between the class/organizing nodes and the CLASS node (which is itself an organizing node).

2.2 Morphological Underspecification

Phonological theory has made extensive use of the notion of underspecification in both developing and developed languages (eg. Archangeli, 1988; Avery and Rice, 1989; Rice and Avery, 1995; Ingram, 1996). There are several versions of this theory, but in general the claim is that universal markedness is encoded in the feature geometry: the unmarked dependent of a given node is not specified underlyingly, and may be filled in later on by default fill-in rule. Underspecification has been used to account for phenomena such as consonant harmony, transparency effects, assimilation, and segmental acquisition patterns (see for example the papers in Paradis and Prunet, eds. (1991)).

As alluded to earlier, phonological feature geometries to some extent find a ready parallel in the morphosyntactic geometry in (1): in both, contrasts are encoded by a hierarchy of distinctive features which are themselves minimal units of that area of the grammar. At least for theoretical reasons, then, there should be evidence of "phonological" principles applying on the morphological level. A claim of this sort has widespread consequences, of course, but for the purposes of this paper I will focus only on one: that underspecification is found with morphological as well as phonological features. Specifically, I assume Avery and Rice's (1989) modified version of contrastive specification: a default feature may be specified underlyingly, but only if it dominates a secondary feature which is contrastive in the system. An example given in Avery and Rice (p.184) involves Coronal underspecification: the presence of a contrastive secondary feature (eg. [retroflex]) beneath [coronal] forces the specification of [coronal] in all relevant underlying representations.

The underspecification of a default feature can, then, be overridden by a contrast in the language. For example, R&H (p.15) maintain that the unmarked PARTICIPANT value, [Speaker] (see 4.1 below), is specified as an enhancing feature in languages with "2nd person inclusive" forms. Similarly, the full underlying specification of both [Speaker] and [Addressee] might be found in languages where the inclusive is the only dual form (thus 'dual' could be expressed through the activity of both PARTICIPANT dependents, rather than through the INDIVIDUATION node).

2.3 The Structure-Building Hypothesis

Following research done in the acquisition of both syntax (eg. Guilfoyle and Noonan, 1992; Radford, 1996) and phonology (eg. Brown, 1997; Rice and Avery, 1995), I adopt the structure-building hypothesis and assume that an adult morphological system is acquired by elaborating a minimal initial structure[2] to allow the necessary contrasts. New structure is only added when necessary to represent a contrast used in the ambient language, and underspecification is maintained wherever possible throughout the developing system.

3. Literature Survey

The acquisition of pronouns, outside of binding, has received only sporadic attention in the literature, and to my knowledge there has been no attempt to analyze the

[2] At this point, without more explicit, crosslinguistic data about the earliest stage of pronoun acquisition, I avoid making any claims about what this initial structure looks like.

process with a hierarchy of person, number and gender features. However, there are a few studies which provide detailed data on the relative order of emergence of the various pronouns, and it is from these that I draw the material for the analyses below. In this section a summary is given of these studies.

The Data

The available information about the relative appearance of personal pronouns in six languages is summarized in Table 1, followed by a short discussion[3]. Note that entries in the same column of the table do not necessarily correspond to the same age or even the same stage of acquisition. In all cases, the first pronoun(s) recorded by the study are placed in column 1, the second in column 2, etc.

Table 1. Order of emergence of personal pronouns in child speech

	Language (Source)	1	2	3	4	5	6
A	**ASL** (Petitto 1987)	Inanimate	1sg	2sg	3sg	Plurals	
B	**English** (Brown, 1973)	1sg; 2sg; 3sgn	others				
C	**English** (Chiat 1978)	1sg	3rd person	2nd person			
D	**English** (Huxley 1970: K)	1sg; 3sgm; 3sgf; 3sgn	2sg	3pl	1pl		
E	**English** (Huxley 1970: D)	3sgn	1sg	3pl	1pl	3sgm; 3sgf	2sg
F	**French** (Clark, 1985)	1sg	2sg; 3sgm	2pl; 3plm	1pl	3plf	
G	**Hebrew** (Berman1985)	3sgn (*ze)*	1sg; 3sgm	3sgf	2sg; all plurals		
H	**Kaluli** (Schieffelin, 1985)	1st, 2nd person	Others				
I	**Mohawk** (Feuer, 1980)	1st person	2nd person	3rd person			
J	**Mohawk** (Mithun, 1989)	Singular	3pl	1pl	dual		

Abbreviations: sg = singular; pl = plural; m = masculine; f = feminine; n = neuter

Clearly, there is a lot of variation in this data: out of ten studies, no two report the exact same order. However, there are also patterns that appear again and again, so that the variation can be neatly broken up into the two categories given in (3).

(3) a. variation in the first pronoun to emerge, between 1st person singular and 3rd singular neuter/inanimate.
b. variation in the relative order of acquisition of second and third person, singular and plural.

[3] For the purposes of this paper, the data presented in the literature has been taken at face value, thus overlooking some theoretical concerns, especially monotonicity. Chiat (1986) gives an overview of the difficulties inherent to studies of child language, including the difficulty of delineating stages, with specific reference to the acquisition of pronouns.

There is no crossover between these categories; for example, 2nd person or 3rd animate pronouns never emerge before both 1st person and 3rd inanimate.

Several researchers (eg. Chiat, 1986; Brown, 1973) have commented on the fact that the 3rd singular inanimate pronoun (3sg.inan) emerges not with the other 3rd person pronouns, as would be expected on grounds of semantic features, but with the 1st person singular (1sg). This observation seems to militate against the idea that a hierarchy of (person) features is involved, since such a hierarchy would predict the straightforward emergence of 1st person before 2nd person before 3rd person. The 3sg.inan pronoun is obviously not co-operating, and the observed variation in the other pronouns (see (3b)) is likewise problematic. However, I will demonstrate in this paper that these observations are readily explained by R&H's geometry of phi-features.

First consider (3a). Consistently, cross-linguistically, either 1sg or 3sg.inan is the first pronoun to appear in a child's inventory (see columns A, C, E, F, G, and I). And whichever one comes first, the other follows immediately after. Such consistency strongly suggests UG involvement; in fact, it looks like 1sg and 3sg.inan are both defaults of nodes with equal status in the geometry. Therefore, before going any further into an analysis of the data in Table 1, the status of defaults and underspecification in the current feature geometry should be clarified.

4. Default Interpretations of the Organizing Nodes

The patterns in the acquisition data indicate that 1sg and 3sg.inan are both unmarked pronouns relative to the others. A full breakdown of these into distinctive features yields person ([speaker]), number ([singular]), and gender/class ([inanimate]) – each of which corresponds to an Organizing node: respectively PARTICIPANT, INDIVIDUATION, and CLASS.

The INDIVIDUATION side is more complex, so I'll begin with the PARTICIPANT node. The overall acquisition data is unanimously in favor of a [Speaker] default, since 2nd person forms never come in before 1st person (though at times they appear at almost the same time (Chiat, 1986)). However, if there is a true default involved there should be further evidence; in this section I will argue that this is in fact the case, looking at the asymmetrical reversal errors produced by Matthew in Chiat's (1982) study.

4.1 At the [PARTICIPANT] Node

Pronoun reversal in acquisition:

The term 'pronoun reversal' refers to a common occurrence in acquisition: children appear to reverse the roles of speaker and addressee, using "you" to refer to him or herself and "me" to refer to the addressee. Chiat (1982) gives an indepth look at pronoun reversal, drawing on information both from the literature and from a case-study of Matthew (age 2;4.24 at the relevant session). Although Chiat concludes that the main cause for reversal is perspective-shifting on the part of the child, there is reason to suspect that morphology is also involved: not all pronouns are reversed equally. The data I use in this section is taken from Session 2 of Chiat's study, when reversal is most prominent in Matthew's speech.

Overall, in Session 2, pronouns are correct significantly more often than they are reversed. But among the errors, an asymmetry appears between 1st and 2nd person: the 2nd person pronoun, when used (and it was rarely used) was more often reversed than correct; 1st person was more often correct than reversed. And again, Matthew showed significantly more reversal errors in reference to his addressee than in reference to himself. In other words, 1st person pronouns were not as susceptible to reversal as 2nd person; and both pronouns referred more often to the speaker than to the addressee.

Assuming a [Speaker] default helps to account for this bias towards the 1st person. If Matthew has not yet made any elaboration under PARTICIPANT, then any reference to a participant will be represented by the bare node – which is then filled in by UG with [Speaker].

However, if this were the whole picture, we would expect to find only the 1st person pronoun in Matthew's production, which is not the case. And on the side of comprehension, there was no evidence of any difficulty: Matthew had almost perfect comprehension of *I* and *you*, yet he often confused them in production. It could be the case, then, that he recognized two PARTICIPANT pronouns (*I* and *you*) but wasn't able to represent them distinctly when it came to producing them. If *I* was analyzed as the spell-out of the UG-supplied [Speaker] default, then by process of elimination, *you* must be some other participant. This knowledge, accompanied by other non-linguistic cues, could very easily account for his successful comprehension. However, unable to represent *you* as distinct from *I*, Matthew either avoided the 2nd person pronoun altogether (thus it rarely showed up in the data), or used it much the same as he would use *I*. This second strategy would result in a sort of pronoun reversal in which 2nd person was "reversed" more often than 1st – just as we saw in Matthew's data.

This proposal is not intended to provide a full, exclusive account of pronoun reversal in child language (for more on this topic see Chiat (1986) and Charney (1980)); what it does do, however, is give an explanation for the observed asymmetry between reversal in 1st versus 2nd person pronouns, based on the assumption that [Speaker] is the default interpretation of a bare PARTICIPANT node.

4.2 At the [INDIVIDUATION] Node

In dealing with the PARTICIPANT node, the consistently early acquisition of 1st person led me to consider the activity of a [Speaker] default. Now, turning to INDIVIDUATION, it appears that the same thing is happening with the 3rd singular inanimate form; but it is not as easy to propose a default for this pronoun. To begin with, there are now two features involved, number ('singular') and gender/class ('inanimate'); and neither 'singular' nor 'inanimate' is explicitly represented in the geometry. However, with some minor revisions to (1), motivated below, defaults can be seen in all Organizing nodes.

[INDIVIDUATION]

First let's look at the number features. R&H maintain that 'singular' is the interpretation given to a bare PARTICIPANT node, a designation which corresponds closely to the notion of a default argued for in this paper. However, if the current proposal is to be kept uniform, there should not be a default interpretation which is not itself a dependent of the node – but this problem is quite easily solved using the available structure. If we assume that 'singular' is represented using [Minimal] (since the minimum number of referents is *one*), and that [Minimal] is the default interpretation of a bare INDIVIDUATION node, we end up with a representation of number features that differs very little from that proposed by R&H (p.16-17), quoted in (9):

(9) Number representation in R&H:
   a. "The distinction between singular and plural is normally expressed by the presence or absence of the [Group] node".
   b. "the addition of dual to a number system is attributed to the activation of the node [Minimal] as an enhancing feature for [Group]."
   c. "languages with a trial/paucal number utilize the feature [Augmented]."

Relegating [Minimal] to the status of a default does not change any of these designations, but it does call for minor adjustments. These are noted in (10a) through (10c), which parallel (9a) through (9c):

(10) Number representation with [Minimal] default:
   a. *same as (9a)*; however, I assume that this is because [Minimal] is the default feature under the INDIVIDUATION node and is thus (normally) absent from the underlying representations of singular pronouns.
   b. *same as (9b)*; note that just as an inclusive/exclusive distinction might force the specification of [Speaker] in UR's, [Minimal] likewise can be forced into underlying representations by the contrastive use of dual number in a system. As in R&H, dual is represented as a "minimal group" in such languages.
   c. *same as (9c)*; note that here is an instance where a contrastive dependent ([Augmented]) would force the underlying specification of a default feature ([Minimal]), directly comparable to Avery & Rice's discussion of underspecification outlined above.

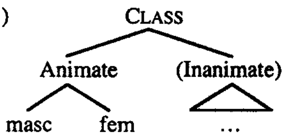
The proposal that [Minimal] is the default interpretation of a bare INDIVIDUATION node allows for a principled explanation for the early acquisition of the singular 3rd person pronoun; from a theoretical perspective, this proposal is favored because of parallels it allows between the PARTICIPANT and INDIVIDUATION nodes. Both have default specifications which may or may not remain absent from underlying representations; for both, a relatively marked contrast in the system can force the underlying specification of the default feature; and finally, the full specification of each node, including all the relevant dependents (ie. person and number), results in more marked structures which are relatively rare in the world's languages (inclusives, duals, and trials/paucals).

[CLASS]

Since there is good evidence that defaults exist for the other two Organizing nodes, we would also expect to find one at the CLASS node. The acquisition data, following the same reasoning as for [Speaker] and [Minimal], suggests that there is some sort of [Inanimate] default: it is always the neuter/inanimate gender that emerges first, never masculine or feminine. Further, there is no evidence that children use the inanimate pronoun to refer to animates, which is what would be expected if it was an unmarked form lacking the CLASS node altogether. In fact, there is clear evidence, typified by Petitto's study on ASL, that this first 3rd person pronoun is specifically inanimate. Petitto observed that children acquiring ASL pointed[4] freely at people and objects beginning at 10-12 months; from 12-18 months the children stopped pointing at people, but continued pointing at objects. There is obviously a distinction being made between animate and inanimate, and inanimate appears first. Likewise, in addition to the English and Hebrew data (see Table 1), in the Scandinavian languages the inanimate 3rd person *det* appears before the common-gender *den* (Plunkett and Stromqvist, 1992).

Based on such (admittedly limited) evidence, I propose the following internal structure for the [CLASS] node. The default, [Inanimate], is enclosed in parentheses:

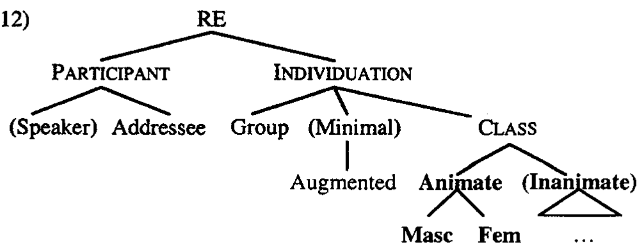
(11)



More research is certainly necessary in this area, and I will return to the problem of gender in Section 6 below. For now, the structure in (11) is sufficient to explain the 'inanimate' status of the first non-participant pronoun in children's inventories, and to give a provisional representation for adult gender systems.

To summarize this section: I have argued that each Organizing node has its own default specification. The strongest motivation for this came from the acquisition data, where pronouns composed of the features [Speaker], [Minimal] and/or [Inanimate] were always the first to emerge. Further support for the default at the PARTICIPANT node was supplied based on both child and adult data; and some, mostly theoretical, evidence was also given for the defaults at INDIVIDUATION and CLASS. The resulting geometry is given in (12), with bold type indicating a revision to (1), and parentheses around the defaults:

(12)



[4] In ASL, personal pronouns are expressed by pointing at the referent.

In the next section, I return to the acquisition data assuming the underspecification of default interpretations, and give a detailed analysis, according to (12), of two observed paths of acquisition.

5. Acquisition Data Revisited: Huxley (1970)

This section is dedicated to the information contained in Huxley's (1970) longitudinal study of two children's acquisition of personal pronouns in English. The children, Katriona and Douglas, followed very different paths and nicely illustrate the observations in (3) above. Both children were two years three months at the beginning of the study.

5.1 Katriona

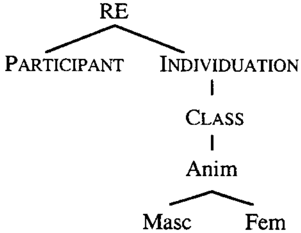
The order of pronoun acquisition for Katriona is presented in Table 2; the row labelled **Week** records the week of the study in which a given pronoun emerged. Week 1 corresponds to an age of 2;3, and where "<1" appears it indicates that the pronoun was already in use at the beginning of the study. There is no data available for the 2nd person plural form.

Table 2. Order of emergence of pronouns: Katriona

Pronoun	I	You	He	She	It	We	You	They
Week	<1	4	<1	<1	<1	21	?	20

By Week 1, Katriona had acquired all the singular pronouns except *you*. The details of the relative appearance of 1st and 3rd person are therefore not available; but the fact that 2nd singular and all plurals are missing from her inventory can easily be accounted for with the feature geometry. The [Addressee] and [Group] nodes are not yet acquired, but [PARTICIPANT] is, and the [CLASS] node is fully elaborated as in (13)[5]. I have omitted the defaults from the representations because I assume they are absent.

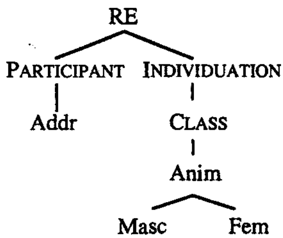
(13)



The next pronoun to appear is the second person singular, reflecting the addition of [Addressee] around Week 4 and yielding the structure in (14):

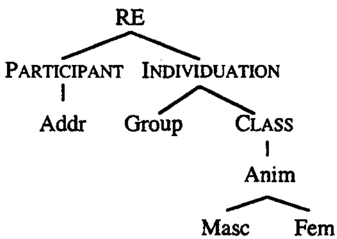
[5] The abbreviations used in the figures are: RE=Referring Expression; Anim=[Animate]; Inan=[Inanimate]; Masc=[Masculine]; Fem=[Feminine]; Spkr=[Speaker]; Addr=[Addressee]

(14)



Finally, around the twentieth week of the study, Katriona begins to show a singular versus plural distinction in 1st and 3rd person. This can be accounted for by the acquisition of [Group] as in (15), resulting in the full English structure:

(15)



Huxley (p.154) notes the lack of the 2nd person plural pronoun, mentioning a strong preference (in both children) to address only one person at a time and suggesting either cognitive reasons or discourse factors as an explanation. Coupled with the fact that there is no phonetic difference between 2nd singular and 2nd plural in English, it is not surprising that there is no record of the latter in either Katriona or Douglas. Crucially, however, it is not the developmental inability to represent 2nd person plural that motivates its absence.

5.2 Douglas

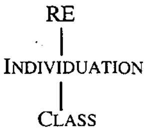
Now consider the path chosen by Douglas. It is notably different from the one just described for Katriona, and is summarized in Table 3.

Table 3. Order of emergence of pronouns: Douglas

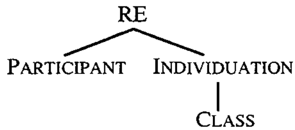
Pronoun	I	You	He	She	It	We	You	They
Week	17	34	22	22	16	20	?	19

The first pronoun to appear in Douglas' speech is the 3rd singular inanimate *it* at Week 16, followed a week later by the first person singular. This data corresponds to the acquisition of the Organizing nodes and the default interpretations of each. The structures at Week 16 and Week 17 are illustrated in (16) and (17), respectively:

(16)

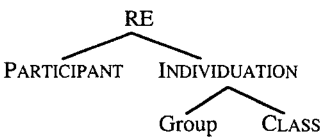


(17)



The next pronoun to appear is the 3rd person plural at Week 19, again followed a week later by the corresponding 1st person. From a semantic point of view, it is surprising that 3rd plural should emerge before 3rd singular (animate), since a group of non-participants is more complex than a single one. According to the feature geometry, however, the plurals appear first simply because Douglas has chosen to elaborate the [Group] node rather than [CLASS] as Katriona did. Hence, Douglas' feature geometry at Week 19 looks like (18).

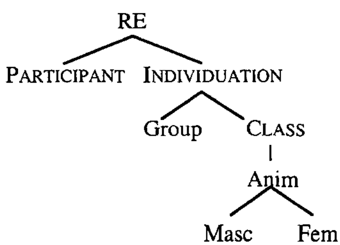
(18)



Given the representation in (18), we might expect the 1st plural to show up at the same time as the 3rd plural; but the recorded data indicates a week's delay. While the feature geometry itself cannot account for the time lag, it is interesting to note that this pattern in the plurals exactly follows what happened in the singular (see (16) and (17) above). Douglas seems to be showing a preference for the INDIVIDUATION side of the tree. Note that 3rd person makes use of only this side, while 1st person requires the activity of both branches; thus 3rd person is simpler to represent (at least until the CLASS node is elaborated). The preference for the less complex option would then account for both observed instances of 3rd person before 1st.

The INDIVIDUATION node is again the target of elaboration at Week 22, when the 3rd person singular pronouns appear. These pronouns are marked for gender in English, and are expressions of the [Animate] node dependents:

(19)



The final elaboration for Douglas is the addition of the [Addressee] node by the 34th week of the study, to complete the adult structure as supplied in (15) above.

6. Discussion and Conclusions

To summarize this paper briefly: after an overview of my theoretical framework, I presented the pronoun acquisition data from ten studies and summarized the overall observations; these led me to assign default interpretations to each of the Organizing nodes, and to make a proposal about the internal structure of the CLASS node; with these modifications, I returned to the acquisition data and gave a step-by-step, feature-geometric analysis of two children's acquisition of English pronouns. In the course of the analyses I found that both uniformity and variation were accounted for by the (modified) geometry.

In Section 4.2 above, I proposed that the inanimate 3rd person singular pronoun was acquired so early because it is the expression of defaults on the Individuation side of the geometry; however, the treatment of the CLASS node especially was not well-motivated. While the proposal of an [Inanimate] default at this node does provide a reasonable explanation of the acquisition data, it can only be provisional, subject to further research. For a more certain account, an in-depth look at gender is necessary both in acquisition and in adult language. Corbett (1991) provides an excellent resource for such a study.

The vast majority of acquisition studies involve gender systems; there are none to my knowledge which provide a detailed account of the acquisition of pronouns in noun-class systems. Because of their more extensive elaboration of the CLASS node, these systems could provide some essential information about the acquisition of gender/class and the representation of these features. Information could also be gained from further research into the acquisition of agreement, demonstratives, and possessives in a wide range of languages.

The purpose of this particular paper has been to examine the R&H feature geometry, proposed for adult systems, against the acquisition of these features. From such a vast topic, I focused on one area, pronouns, with a particular focus on English. A possible next step, but one that goes beyond the scope of this paper, would be to consider further the role of defaults and underspecification, in acquisition and in adult language. Again, this is a potentially huge topic, as it could extend into several areas of the grammar. In the phonology, underspecification plays a central role in the interaction of distinctive features, with extensive implications including those mentioned in 2.1.2 above. Are there correlates in the morphology? What are the implications of this feature geometry, defaults and all, for the syntax – binding, coreference, long-distance anaphora, logophoric pronouns, agreement – and for other areas of the grammar? There are, undoubtedly, many instances where two minimally distinct sets of phi-features show different behavior; such minimal pairs would be ideal places to start when considering the consequences of morphological underspecification and the feature geometry.

With the acquisition of pronouns, it turned out that assuming the feature geometry in (12) allowed the resolution of two previously unsolved problems: the heterogeneous initial set of pronouns and the extensive variation in the acquisition path. It is thus worth considering the issues mentioned in this current section, and any other issues that might arise, in light of the feature geometry.

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Rebecca Hanson
Department of Linguistics
University of Calgary
2500 University Drive NW
Calgary, Alberta, CANADA
T2N 1N4
rjhanson@ucalgary.ca

Morley Stoney pronouns: a feature geometry

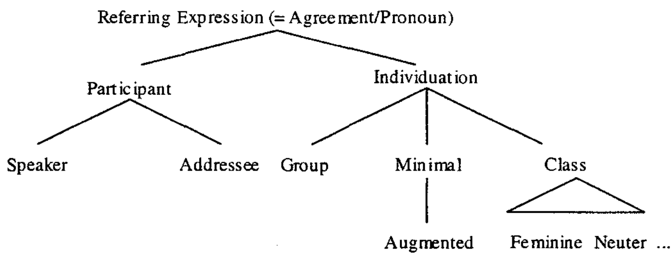
Timothy Ian Mills
University of Calgary

0. Introduction

Pronouns are a puzzle. Even the pervasive language of English has peculiarities. Why is gender only seen in the third person singular? Why is the second person pronoun the same for nominative and accusative, and for singular and plural? These are questions that must be addressed when analyzing English. Other languages have other peculiarities. As Harley and Ritter (1998) note, the variation seen in languages is wide, but constrained—we do not see unlimited variation in every way, but a systematic selection of paradigms based on some sort of underlying properties.

Harley and Ritter go further, in that they posit a structure for the underlying representation of person and number features. This feature geometry takes into account the variability across languages, as well as the apparent constraints that no language can violate. The cross-linguistic base for what they call a *referring expression (RE)* is shown in (1). (Note that the [Class] features such as gender are alluded to, but not addressed by Harley and Ritter. I will hereafter dismiss those features, as they are not relevant for the topic of this paper.

(1) (Item (7) in Harley and Ritter (1998) manuscript)



Within this framework, Harley and Ritter analyse a variety of languages which highlight the characteristics and behaviours of the geometry in language-specific applications. An example of a language-particular behaviour is in determining which nodes are active and which are not in a given language. A language with no number or gender contrasts, for example, would not make use of the [Individuation] node, or any of its dependents. There are some structures associated with the same phenomenon cross-linguistically. Such behaviours include, for example, the fact that the absence of the [Participant] node denotes third person.

Complex systems such as those that have an 'inclusive' person, 'dual' number distinctions, and unusual patterns of affixes are all dealt with by Harley and Ritter. However, the variation across languages is quite diverse, and there are bound to be languages which diverge from the set shown in their paper. The question is this: "Will all languages fit this framework, or is its usefulness limited to a specific set of paradigm types?"

One language that is unlike any in the set shown by Harley and Ritter is Stoney, as spoken in Morley, west of Calgary, Alberta. The pronoun set of Morley Stoney (referred to simply as Stoney from this point) is not complex—it contains only seven forms—but it is organized in a unique way. In this paper, I will argue that, despite its uniqueness, the pronominal system in Stoney fits the geometry set out in Harley and Ritter's (1998) manuscript. I will demonstrate how Stoney reflects some of the more straightforward aspects of the theory, as well how one might account for the language's idiosyncratic aspects without straining the theory.

In this paper, I will present the basic pronominal system of Morley (**section I**). Then, in **section II**, I will cover some of the basic properties and behaviours of Harley and Ritter's feature geometry. Finally, I will bring the two together – **section III** involves an analysis of the Morley Stoney pronouns within Harley and Ritter's framework.

1. Morley Stoney pronoun system

First, I will present the facts about Stoney as observed during our class's elicitations from a native speaker. In aid of that, the list in (2) shows the set of pronouns we observed.

(2)
miye 'me' (speaker only)
niye 'you' (addressee, singular)
iye 'him/her' (non-participant, singular)
ĩgiye 'you & me' (speaker and singular addressee only)
ĩgiyebi 'me and you (pl)', 'me and him/her/them', 'me and you and him/her/them' (speaker and any group not comprised solely of the one addressee)[1]
niyebi 'you (pl)' (addressees, plural)
iyebi 'them' (non-participants, plural)

This same pattern is seen in verbal subject agreement, as in the paradigm in (3). Thus, when I begin to analyse person and number structures within the framework given in (1), it can be understood that I am dealing with the structure for both independent pronouns and subject agreement forms on verbs. Harley and Ritter define the term *referring expressions* to include both pronouns and pronominal agreement patterns.

(3)
maxmat[2] 'I am sleepy'
nĩxmat 'you (sg) are sleepy'
xmat 'he/she is sleepy'
ĩxmat 'you and I are sleepy'
ĩxmabit 'we are sleepy'
nĩxmabit 'you (pl) are sleepy'
xmabit 'they are sleepy'

[1] I will refer to the interpretation of this form as simply 'we', with the understanding that it refers to any interpretation of the English word *we* **except** the case "you (sg) and me", which is the interpretation reserved for the form *ĩgiye*.

[2] The final *–t* in these forms appears, on the basis of other data, to mark "untensed" on verbs, generally but not exclusively interpreted as "present".

Immediately, certain patterns are recognizable. First, the morpheme *-bi*, suffixed in both sets (2) and (3), is a plural marker. Second, the forms for non-participants show the cross-linguistic tendency to have null person agreement. This will be reflected in the geometry I posit for Stoney referring expressions.

The second person (addressee) forms pattern in a straightforward fashion for singular and plural. However, the forms corresponding to English *we*—namely, *ĩgiye* and *ĩgiyebi*—do not seem to pattern with the first-person singular form, *miye*. The form *ĩgiye*, denoting specifically the speaker and the single addressee, has itself a couple of possible interpretations that parallel examples from Harley and Ritter (1998). The first is that it might be an inclusive form. Languages that divide the English concept of *we* into exclusive (*we* not including the addressee) and inclusive (*we* including the addressee) sometimes have a 'singular inclusive' form, which patterns morphologically as singular and includes only the speaker and the one addressee. The problem with this is that the form that is morphologically a plural of this—*ĩgiyebi*—is not specified as inclusive or exclusive.

Another alternative is that *ĩgiye* is a dual form, as it picks out precisely two individuals. Again, this is typologically awkward. If we posit a number structure for dual under the [Individuation] node for this form, then the components of that structure are active in Stoney. The problem here is the complete absence of any other dual form in the language. If *ĩgiye* is dual, it is the only dual in Stoney. Thus, an alternative explanation would be preferred.

One commonality between the interpretations of *ĩgiye* and *ĩgiyebi* which may shed some light on our problem is that they both denote **mixed** or **heterogenous** groups. As Harley and Ritter (1998) point out, the supposed 'first person plural' in language is a necessarily heterogenous group. That is, since the speaker is unique, any form corresponding to English *we* must refer to the first person and either second or third person entities, or both. The second person plural refers only to those the speaker is addressing—the members of the set of addressees—and the third person plural refers only to non-participants, or third person entities. Thus, in Stoney, the only heterogenous groups are the ones picked out by the interesting pronouns *ĩgiye* and *ĩgiyebi*. How this can be worked into a feature hierarchy will be seen in section III. First, I will present an overview of the properties and behaviours of Harley and Ritter's feature geometry in some more detail.

2. How feature geometries of person and number work

There are a few basic properties of the feature geometry that should be understood before we proceed with an analysis of the Stoney pronoun system.

First, let me emphasize that the features (or nodes, as I sometimes refer to them) are unary. A feature is either there or it isn't—there are no plus and minus values. If a feature is not present, none of its dependent nodes are present. A dependent node is one that is further down in the hierarchy. Conversely, the presence of a node that is a dependent of another node implies the presence of that other node.

Next, and equally important, is the idea of underspecification. The idea is that only the nodes that are absolutely needed to express the language's contrasts are active.

Within a language, only the nodes that are needed to minimally distinguish one form from the rest will be used for each pronominal element. In aid of this, it is useful to understand the principle of **blocking**. In a case where one form has a less specified structure than another form, the interpretation of the less specified member is blocked from coinciding with the more fully specified one. The result of this is that bare nodes, such as [Individuation] or [Participant], will get different readings from language to language, depending on which dependent nodes are active in each language. See Harley and Ritter's (1998) comparison of French and English representations of first and second person for an example of this.

Now that the basic building blocks of the feature geometry are established, let's look at how this system can be applied to Stoney ...

3. Feature trees for Stoney pronouns

The following analysis of Stoney pronouns will draw heavily on comparisons to the languages analyzed by Harley and Ritter in their manuscript. For a summary of the feature trees, interpretations, and pronouns in this paper, see the appendix.

First, we will take care of the non-participants. These are the forms traditionally called **third person**. According to Harley and Ritter's (1998) analysis, third person is always represented by the absence of the [Participant] node. The number system of Stoney is a simple singular-plural contrast, which is dealt with quite easily by the tree. Items (4) and (5) show the feature trees I suggest for the forms *iye* (him/her) and *iyebi* (them), respectively.

(4) *iye* (non-participant, singular)

RE (Referring Expression)
|
Individuation

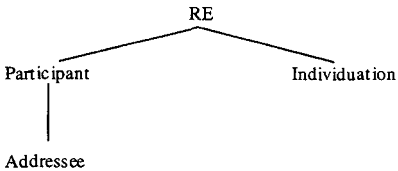
(5) *iyebi* (non-participants, plural)

RE
|
Individuation
|
Group

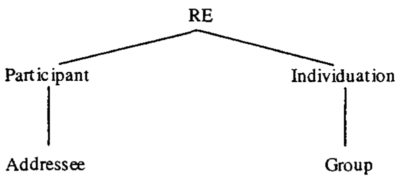
In Stoney, I suggest, the node [Group] denotes plural. Thus, with this node present and the [Participant] node absent in (5), the form *iyebi* gets the interpretation of a plural set of non-participants—the equivalent to English *them*. The contrast with (4), where the [Individuation] node has no dependents, gives the form *iye* the unmarked interpretation of singular. In their discussion of Mam, Harley and Ritter state, "This is the unmarked way in which number is represented."

The addressee (or second person) forms are just about as simple. Items (6) and (7) illustrate the structures for *niye* and *niyebi*. The only difference between these and the third-person forms is the presence of the [Participant] node dominating the [Addressee] node. I am suggesting that these forms are fully specified so that they can contrast with the "heterogenous-group" forms. This will be further addressed below.

niye (addressee, singular)

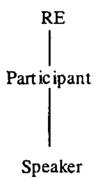


(7) *niyebi* (addressees, plural)



The form *miye*—first person singular—is somewhat less straightforward to construct. The [Speaker] node is present as a dependent of [Participant]. Since there is no morphological plural to this form, it need not be specified for number. The implication of this for the feature geometry of the pronoun is that the [Individuation] node need not be present. Item (8) shows the structure of *miye*.

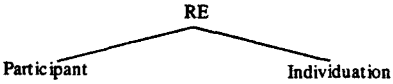
(8) *miye*



Now that all of the other forms are specified, our attention can be turned to a treatment of the forms *ĩgiye* and *ĩgiyebi*—the two forms with no exact parallels anywhere in Harley and Ritter's analysis.

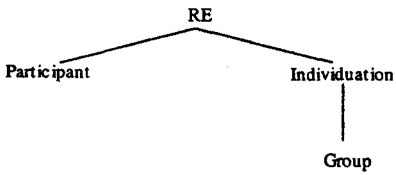
To construct and interpret the feature trees for *ĩgiye* and *ĩgiyebi*, we will have to take advantage of the ideas of blocking and underspecification. Item (9) is the structure I am positing for the form *ĩgiye*. The bare [Individuation] node reflects that it is morphologically singular, in specific contrast to the plural *ĩgiyebi*. The bare [Participant] node is interpreted as including the speaker and the addressee—the minimal group of speech-act participants that contrasts with the more fully specified [Participant] structures in (6) and (8). There are problems with this structure, which I will address shortly.

(9) *īgiye* (speaker and addressee only)



In item (10), I posit a structure for *īgiyebi* that is a simple variation on (9). The only difference is that it is specified as plural—a fact which is supported by the relationship between the two forms.

(10) *īgiyebi* (speaker and any group not comprised of only the one addressee)

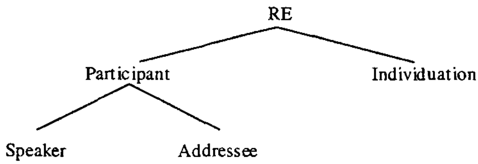


The interpretation, as we have seen, is somewhat more complex to derive. We see that the interpretation of this necessarily includes the speaker. Why is this? The bare [Participant] node indicates that at least one of the speech participants is involved here. As Harley and Ritter (1998) note in their analysis of Berik, "the fact that speakers are the only necessary participants in a discourse suggests that a bare [Participant], in opposition to both [Speaker] and [Addressee], is interpreted as including at least the speaker." For Berik, this is referring to a simple first-person plural, where the language in general has no number distinctions. For Stoney, I would suggest that a similar preference of interpretation gives *īgiyebi* a "speaker and others" meaning. The presence of *īgiye* in the system gives us a block, so that the meaning of the plural form specifically excludes that of the singular form.

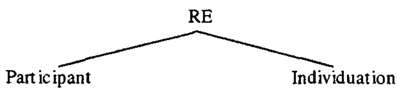
Now we run into a problem. If a bare [Participant] node only implicitly includes the speaker for *īgiyebi*, why should the same structure for *īgiye* be interpreted as referring to the speaker and the addressee? It is conceivable that a minimal mixed group would be just as easily formed by combining the speaker and a non-participant – an interpretation not available to Stoney speakers. (Keep in mind that the bare [Participant] node includes at least the speaker, ruling out the interpretation of the minimal heterogenous group as "addressee and a non-participant".)

In order to solve this problem, another trick of the tree structure comes into play. Consider the somewhat unnatural class of "first person inclusive and third person" in Mam, a Mayan language (Harley & Ritter 1998), which seem to pattern together in being realized as a null person marker. Harley and Ritter use the process of **impoverishment**. They suggest that an overloaded geometry is deleted before **Spell-Out**, the stage at which structures become morphologically realized. I propose that a structure identical to that underlying the inclusive forms in Mam is present underlyingly in Stoney. The structure before impoverishment is shown in (11). Note that here I am diverging from my previous comment that morphologically similar items must have the same underlying structure. If two forms have the same structure at Spell-Out, that is enough. As you can see in the impoverished structure in (12), the structure of *īgiye* becomes identical to that of *īgiyebi* (see item (10)), except of course for the number. Thus, the morphological similarities are taken care of, and the differences in interpretation are also accounted for.

(11) *īgiye* before impoverishment



(12) *īgiye* after impoverishment



Unlike Mam, however, the impoverished form for *īgiye* retains the [Participant] node. In Mam, the impoverishment leaves a bare [RE] node. If this were to happen in Stoney, however, the form *īgiye* would have an identical structure to *iye*, thus eliminating any underlying contrast at spell-out. If this were to happen, we would not see a phonetic difference between the two forms as we do. Therefore, we get the impoverishment seen in (12), which gives us a structure distinct from all of the others.

So there it is—the feature geometric analysis of Stoney pronouns, using only tools available within the framework of Harley and Ritter's (1998) analysis.

4. <u>Summary</u>

The propositions presented in Harley and Ritter's (1998) manuscript are still young, and will not become generally useful unless people begin to apply them to a wide range of languages, working out the problematic points. The structure does not address gender features except in passing, for example, and gender is a pervasive phenomenon. However, the strength of the theory will rest in its ability to describe all and only possible natural language systems. The fact that their feature geometry works for a language with such an odd pronoun system as Stoney, and yet still constrains us against creating geometries that are never reflected in languages, is a point in its favour. I would suggest that a further elaboration of the behaviour of the individual nodes of the geometry — such as cross-linguistic restrictions on possible interpretations—is in order. This would also, of course, include an analysis of gendered pronouns, and how gender might be incorporated into the geometry. Also, applying this geometry to a wide range of languages, fully specifying each pronominal form in each language's paradigm, would highlight more the strengths of the theory, and the places where improvement is suggested. In light of the current facts, it is reasonable to say that the feature geometry is a valuable addition to the field of linguistic theory.

5. Acknowledgements

I would like to thank Peter Wesley, our language consultant, for his time in helping us gather all the data we gathered on his language. Also, Doctor Elizabeth Ritter, co-author of my principle reference material, provided some helpful insights into the feature geometry that helped me to analyze the data. The research into the Morley Stoney language was conducted under the supervision of Doctor E. D. Cook.

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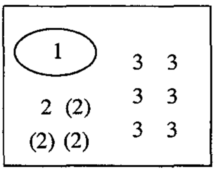
Timothy Ian Mills
Department of Linguistics
University of Calgary
2500 University Drive Northwest
Calgary, Alberta, CANADA
T2N 1N4
timills@ucalgary.ca

Appendix: Pronoun and feature tree summaries.

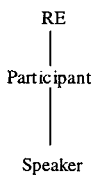
I will use the following conventions in representing the interpretations of the pronouns: "1" will refer to the speaker; "2" will refer to an addressee; "3" will refer to a non-speech-act-participant. A number in brackets will indicate an individual whose presence or absence is optional in the immediate context. A circle will enclose all of the individuals being referred to in the expression. Each item in the list is actually an interpretation, the corresponding pronoun being shown below the diagram indicating who is being referred to. The feature geometry of the given pronoun will then follow.

a. Interpretation:

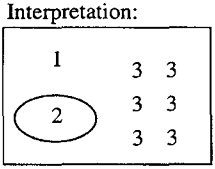


Pronoun: *miye*

Geometry:

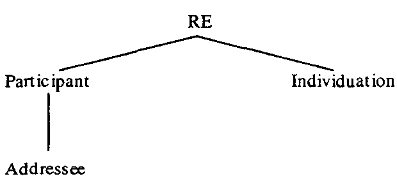


b. Interpretation:

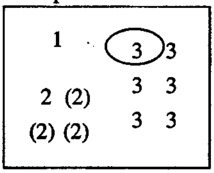


Pronoun: *niye*

Geometry:

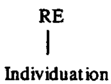


c. Interpretation:

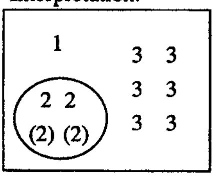


Pronoun: *iye*

Geometry:

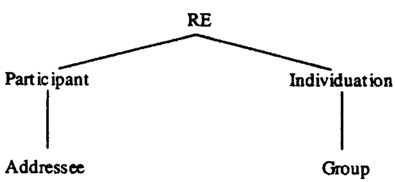


d. Interpretation:

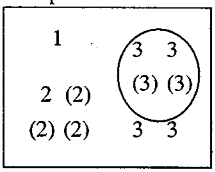


Pronoun: *niyebi*

Geometry:

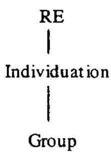


e. Interpretation:

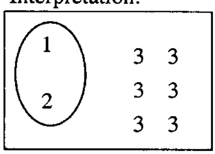


Pronoun: *iyebi*

Geometry:



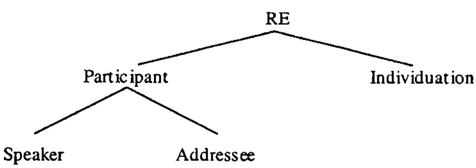
f. Interpretation:



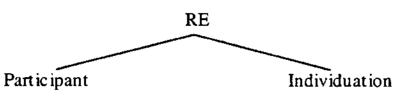
Pronoun: *īgiye*

Geometry:

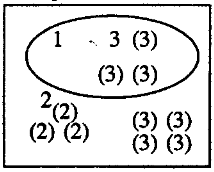
(Before impoverishment)



(After impoverishment)

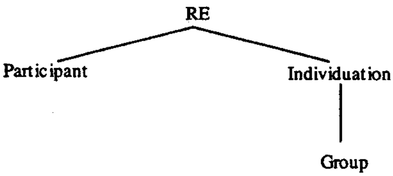


g. Interpretation:

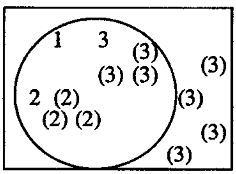


Pronoun: *ĩgiyebi*

Geometry:



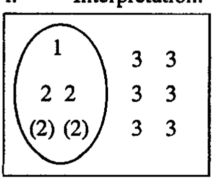
h. Interpretation:



Pronoun: *ĩgiyebi*

Geometry: (see item g.)

i. i. Interpretation:



Pronoun: *ĩgiyebi*

Geometry: (see item g.)

Secondary Stress in Russian Compound Words:

Evidence from Poetic Metrics

Olga Karpacheva

University of Calgary

In this paper I argue that it is necessary to distinguish between stress which is inherent in words and stress which is assigned at a phrasal level. More specifically, I argue that secondary stress in Russian compounds is superimposed on the existing word stress contours by rhythm. Support in favor of this claim comes from the distribution of secondary stress in Russian poetry. I show that secondary stress in Tutčev's verse is assigned to the first constituent of compounds only in strong metrical positions.

1. INTRODUCTION

It is generally recognized that Russian compound words tend to have one stress. However, most linguists agree that, under certain conditions, compound words in Russian may have more than one stress. When this is the case, the primary stress usually falls on the rightmost stressed syllable, the other stresses being perceived as secondary ones. In this paper, I show that secondary stress is not inherent in Russian compound words, but is rhythmically overlaid on the existing word stress contour.

Attempts have been made to identify the factors determining presence or absence of secondary stress in particular words. Avanesov (1958) claims that Russian compound words have secondary stresses in the following cases:

a. If a word has a "specialized"(scientific or technological) meaning and is rarely used, or if the first constituent of a compound word is of foreign origin: *gal'vanoplastika* ('electroplating'), *sudoverf'* ('shipyard'), *cel'nometalličeskij* ('all-metal'), *fotosnimok* ('photograph'), etc.:

b. If the two constituents are clearly separable in terms of meaning: *korablekrušenie* ('ship-wreck'), *temno-zelenyj* ('dark green'), *samoletostroenie* (aircraft construction'), etc.

c. If a potential stress is "very far" from the primary stress: *vodonepronicaemyj* ('impermeable to water'), *vremjapreprovoždenie* ('way of spending one's time'), *xlopkoočistitel'nyj* ('cotton cleaning'), etc.

It should be noted, however, that Avanesov provides long lists of exceptions to these general tendencies and points out that in many cases secondary stress is optional.

Some dictionaries (Avanesov and Ožegov 1960) show secondary stresses for compound words. Thus, these stresses appear to be lexical. Sometimes recommendations regarding secondary stress assignment are inconsistent. It is not clear, for example, why, according to Avanesov and Ožegov (1960), secondary stress is not assigned to the words *photographíčeskij* ('photographic'), *maloljúdnyj* ('not crowded'), *starorežímnyj* ('of old regime'), *vneuróčnyj* ('extracurricular'), but is assigned to the words *phòtotexníčeskij* ('phototechnical'), *màloópytnyj* ('of little experience'), *stàropečátnyj* ('of old style print'), *vnèslužébnyj* ('out-of-office') which have the same morphological and rhythmical structure. According to my informants, each of the above-mentioned words can be pronounced both with and without secondary stress. It appears that the contradictory data can be accounted for if we distinguish between two levels of prosody, i.e. word and phrase prosody.

According to Kalenčuk and Kasatkina (1993), the level of word prosody features a certain rhythmical organization of a word, "close intersyllable ties", clearly defined boundaries, and a single "accentual center" which defines a pattern of vowel reduction.

Phrase prosody has different characteristics. At the phrase level boundaries between words are usually less clearly defined and there can be several "accentual centers" within one word, giving rise to secondary stresses along with the primary stress.

It appears that lack of uniform treatment of the same language phenomenon stems from different understanding of the articulatory nature of secondary stress in Russian. Russian word stress is believed to be created by a number of different phonetic means. The most frequently mentioned phonetic means are greater force of exhalation and associated tension of vocal cords, greater vowel length, and a special timber.

Among acoustic properties of secondary stress most linguists give priority to vowel quality (Avanesov 1958, Zlatoustova 1953, Loginova 1977, Žirmunskij (1925/1966). These linguists equate lack of vowel reduction with stress.

Kalenčuk and Kasatkina (1993) convincingly argue that vowel reduction and secondary stress take place at different levels of prosody: vowels are reduced at the level of word prosody, while secondary stress is assigned at the level of phrase prosody. This approach allows us to account for the "optionality" of secondary stress, as well as for the peculiar assignment of secondary stress to reduced vowels in both simple and compound words that appear in emphatic positions:

(1) *v[ì]likolépno* ('splendid '), *z[ə̀]mečátel'no* ('wonderful'), *p[ə̀]trjasájuščʹe* ('amazing'), *s[ə̀]obakovódstvo* ('dog breeding'), *m[ə̀]lokozavód* ('milk plant')

Note that, contrary to expectation, the vowels that bear secondary stress in (1) are reduced. This fact suggests that vowel reduction applies to these words before secondary stress assignment. Also, in the compound words *sobakovodstvo* 'dog breeding' and *molokozavod* 'milk plant' the secondary stress is "misplaced". In the root *-sobak-* the stress normally falls on the second syllable, but when it is part of a compound, its first syllable can be stressed, as shown in (1). The root *-molok-* is a post-accenting morpheme, but in (1) it is the first syllable of this root that has secondary stress. Again, the "misplacement" of the secondary stress can be explained by its assignment at the phrasal level.

In this paper I will provide additional evidence from Russian poetry to support the claim that secondary stress is not inherent in compound words, but is assigned at the phrasal level. On the one hand, the rhythm of Russian syllabic-accentual verse depends in part on the distribution of secondary, as well as primary stresses, as I will show below. On the other hand, under the influence of rhythm, secondary stresses in Russian compound words often acquire considerable prominence. I will use Halle and Idsardi's (1995) theory for my analysis of stress in Russian compounds and show that, while their algorithm correctly predicts the placement of primary (lexical) stress, an additional rhythmic rule is required to account for the placement of secondary (non-lexical) stress. [1]

2. SECONDARY STRESS IN RUSSIAN POETRY

2.1 Degrees of Stress in Russian Versification

Russian poetry uses three types of verse: syllabic verse, based on the sole constant principle of a given number of syllables in each line, accentual verse, characterized by a set number of stresses in each line, regardless of its total number of syllables, and syllabic -accentual verse, which combines in each line a given number of stresses with a given number of syllables whose stresses are distributed regularly throughout the line. Syllabic-accentual verse has dominated Russian poetry for over two hundred years. It is this type of verse that I am concerned with in this paper.

In dealing with the Russian syllabic-accentual verse, one inevitably arrives at the question as to how various lines should be pronounced. In many cases there is no doubt whatsoever about the location of stresses, while other cases give rise to disputes. Thus, the verse of Tjutčev, an undisputed master of syllabic-accentual poetry, is believed to have a significant number of "deviations" from regular meters. Analysis of these "deviations" is outside the scope of this paper, but, since it is Tjutčev's poetry that I use for analysis of secondary stress assignment, a few remarks are in place here.

Žirmunskij (1925/1966) was the first to develop the idea of differentiating several degrees of stress in Russian verse. He distinguishes "obligatorily stressed", "absolutely unstressed" and "metrically ambiguous" word classes.

In the class of obligatorily stressed words belong nouns, adjectives, verbs (except auxiliary) and adverbs (except pronominal). When they occur in a metrically weak position in the line, these words still retain their stress, creating a rhythmical stress which is outside the regular pattern, i.e. a hypermetrical stress. However, according to Žirmunskij, the syllable bearing the hypermetrical stress is still weaker than the following (or preceding) syllable. Consider the example in (2).[2]

(2) Na staroj bašne, odinok, – ́ | – ́ | – – | – ́
Dux rycarja stoit... (́) ́ | – – | – ́

(Tjutčev 1987: 88)

Both words at the beginning of the second line are nouns and belong to the class of obligatorily stressed words. The monosyllabic noun *dux* occurs in a metrically weak position and its stress is weakened, but retained.

The class of absolutely unstressed words comprises particles, prepositions and conjunctions. They attach to the preceding or following word as absolute proclitics or enclitics. In a line of verse, they always remain unstressed both in metrically strong and metrically weak positions.

(3) ...Veka **by za** vekami proxodili – ́ | – – | – ́ | – – | – ́ | –
I ja by vas vsju večnost' slušal i molčal.

(Tjutčev 1987: 272)

In the first line in (3) there are two absolutely unstressed words: the particle *by* and the preposition *za*. The former is in a metrically weak position, the latter is in a metrically strong position. Neither of these words has stress.

Pronouns and pronominal adverbs, auxiliary verbs and interjections form the class of metrically ambiguous words. These words are not wholly enclitic or proclitic. In the immediate vicinity of a stress, they lose their stress. In the vicinity of an unstressed syllable they retain a more or less noticeable stress, but it has less force than that of an obligatorily stressed word. Thus, the possessive pronoun *moj* has no stress in (4) where it appears between two stressed syllables, but has a considerable degree of prominence in (5) where it appears at the end of the line and is preceded by an unstressed syllable.

(4) Drug **moj** milyj, vidiš li menja? ⁄– |⁄– |⁄– | – –| ⁄

(Tjutčev 1987: 222)

(5) Kakije pesni, milyj **moj**, – ⁄ |– ⁄| – ⁄| – ⁄
Kogda vokrug liš nenavisti kriki...

(Tjutčev 1987: 282)

Žirmunskij points out that in the binary meters a special place is occupied by certain "very weakly stressed" disyllabic conjunctions and prepositions, such as *ili, čtoby, čerez, pered, meždu, protiv,* etc. While in prose they are completely subordinate to the stress of the following word, in verse they have a weak stress, sometimes on the first, sometimes on the second syllable, depending on which of the syllables happens to be in a metrically strong position. For example, the preposition *pered* has a very weak stress on the first syllable in the example in (6) and on the second syllable in the example in (7).

(6) Zelenejuščije bregi
Pered nami razdalis'. (`)– | ´– | – – | ´

(Tjutčev 1987: 68)

(7) ...
Pered toboj, svjatoj istočnik slez ´(`) | – ´ | – ´ | – ´ | – ´
Rosa božestvennoj dennici!..

(Tjutčev 1987: 66)

Žirmunskij proposes to set up at least two degrees of stress for the stressed syllables (strong and weak stress) and two degrees of stress for the unstressed ones (completely unstressed and very slightly stressed). Given the relative degrees of stress, the cases of so-called "omitted stress" or "supplementary stress" are to be considered as cases in which certain syllables are made more or less prominent, but in no sense are they disruptions of the basic metrical pattern. The ideal pattern in our mind makes us perceive the syllables in the actual line as stressed or unstressed and is, in most cases, also realized in actual pronunciation. Where it is not realized (e.g. when the stress is shifted from a metrically strong to a metrically weak syllable[3]), we perceive a disruption in the rhythm.

While I agree with Žirmunskij in many respects, I believe that it is necessary to distinguish between stresses inherent in words and stresses assigned at the phrasal level. For example, secondary stresses in Russian compounds are superimposed on the existing word stress contours by rhythm. On the other hand, lack of stress on a particular word can be either inherent or result from suppression of lexical stress at the phrasal level. In this context, the words classified by Žirmunskij as metrically ambiguous are, in fact, words that undergo lexical stress suppression more readily than the obligatorily stressed ones.[4]

It appears to me that in stress assignment at the phrasal level not only grammatical categories of words are taken into consideration, but their morphological structure and the position of lexical stress, as well. The first constituents of compound words, as well as prefixes of simple words, for that matter, generally receive a stronger stress in metrically strong positions than any of the suffixes following the primary word stress. According to my informants, placement of secondary stress on the suffixes following the primary stress sounds very artificial. Thus, I will posit a secondary (rhythmical) stress in those cases where there is a perceptible stress on the first constituent of a compound or on a prefix of a simple word, and I will consider suffixes following the primary stress to be unstressed even in metrically strong positions.

It should also be noted that, for the purposes of this paper, I will posit only one degree of stress - primary stress - for the obligatorily stressed words and I will disregard the very light stress on disyllabic conjunctions and prepositions.

Two types of meter modifications used by Tjutčev should be pointed out here. Unbegaun (1963) gives a few relevant examples.

(8)	Molči, skryvajsja i tai	–´ | –´ | – – | –´
	I čuvstva i mečty svoi:	–´ | – – | –´ | –´
	Puskaj v duševnoj glubine	–´ | –´ | – – | –´
	Vstajut i zaxodjat one	–´ | – – | ´– | –´
	Bezmolvno kak zvezdy v noči -	–´ | – – | ´– | –´
	Ljubujsja imi i molči.	–´ | –´ | – – | –´

"Silentium"

The verse is clearly iambic, but in the fourth and fifth lines in the third foot the stress is shifted onto a weak syllable, which transforms both into ternary amphibrachic lines.

In another poem we find a deviation of a different kind: [5]

(9)	O, kak na sklone našix let	–´ | –´ | –´ | –´
	Nežnej my ljubim i suevernej...	–´ | –´ | + | – – | –´ | –
	Sijaj, sijaj, proščal'nyj svet	–´ | –´ | –´ | –´
	Ljubvi poslednej, zari večernej!	–´ | –´ | + | –´ | –´ | –

"Poslednjaja ljubov'"

This stanza begins with a perfectly regular iambic line. The third line too is regular. The second and the fourth lines show a regular iambic beginning, but in the middle they are modified by the introduction of hypermetrical syllables which are shown in the diagram by a plus sign.

2.2 Secondary Stress in Compounds

It is a general rule of Russian to admit the use of compound words in verse under the same conditions as those governing the use of simple words, i.e. the primary word stress is aligned with the required metrical stress, regardless of any possible distribution of secondary stresses. As to the secondary stresses, they appear to be assigned in accordance with the metrical constraints of a poem and can be found both on the root vowel of the first constituent and the linking vowel, which is not normally stressed in colloquial speech. In both cases the vowel bearing secondary stress tends to be reduced, as shown in (10) and (11) below. This fact suggests that secondary stress assignment takes place after primary stress assignment and vowel reduction.

In the following example the metrical stress falls on the vowel of the first root *blag-*, resulting in a secondary stress on that vowel.[6]

(10) I donosilisja poroj   – – | – ´ | – – | – ´
Vse zvuki žizni **bl[ə]godatnoj**, -   – ´ | – ´ | – (\`) | – ´ | –
I vse v odin slivalos' stroj,   – ´ | – ´ | – ´ | – ´
Stozvučnyj, šumnyj - i nevnjatnyj.   – ´ | – ´ | – – | – ´ | –

(Tjutčev 1987:85)

In the example provided in (11) the secondary stress is perceived on the vowel of the root *perv-* which is in the strong metrical position of the trochaic line.

(11) ...
P[i]rvorodnyx pokolenij,   (\`) – | ´ – | – – | ´ –
Glasu božiix velenij...   ´ – | ´ – | – – | ´ –

(Tjutčev 1987:90)

In the following examples the metrical stress and a perceived secondary stress fall on the linking vowel of compounds which use the same roots *blag-* and *perv-*.

(12) ...
I kto - nedarom - providen'em
Na mnogotrudnom ix puti,
Postavlen novym pokolenjam –´ | –´ | – – | –´ | –
V **blag[ə]nadežnye** voždi... (\`) | –´ | – – | –´

(Tjutčev 1987:90)

(13) Predan'e ožilo svjatoe –´ | –´ | – – | –´ | –
Perv[ə]načal'nyx lučšyx dnej... (\`) | –´ | –´ | –´

(Tjutčev 1987:254)

Within the root of the first stem a secondary stress can fall on a syllable other than the normally stressed one:

(14) Sveršaetsja zaslužennaja kara –´ | – – | –´ | – – | –´ | –
Za tjažkij grex, **tysjačeletnij** grex... –´ | –´ | –(\`) | –´ | –´

(Tjutčev 1987:237)

The root *tysjač-* normally has stress on the first syllable, not on the second one as in the above-given example.

(15) Gljažu s učast'em umilennym,
Kogda, probivšis' iz-za tuč,
Vdrug po derevjam ispeščrennym,
S ix vetxim list'em iznurennym, –´ | –´ | – – | –´ | –
Molnievidnyj bryznet luč! (\`) | –´ | –´ | –´

(Tjutčev 1987:167)

In the root *molni-* it is usually the first, not the second vowel that bears stress.

The distribution of secondary stresses in the examples above - some secondary stresses appear on the root vowel of the first constituent of a compound, some are placed on the linking vowel - and the easy migration of secondary stress from one vowel to another within the root of the first constituent, provides evidence that they are not part of the lexicon and are assigned in accordance with the rhythmic constraints of a particular line.

3. HALLE AND IDSARDI'S (1995) ALGORITHM FOR STRESS ASSIGNMENT

3.1 Building the Grid

In constructing metrical grids, Halle and Idsardi employ only placement of abstract marks and placement of parenthesis. The mechanism implementing the interface between the metrical grid and the string of phonemes is called *projection.* Projection adds an element to the grid and links it to the element which is projected. Projection involves both phonemes and syllable boundaries. Only phonemes that can bear stress are projected onto the metrical plane. In most languages the stress-bearing phonemes are the phonemes that are heads of syllables.

Halle and Idsardi argue that a limited number of parameters and constraints can account for stress contours found in different languages. These parameters are as follows:

(16) *Syllable Boundary Projection parameter*

Project the {left/right} boundary of *certain syllables* onto line 0.

(17) *Edge-Marking parameter*

Place a {left/right} parenthesis to the {left/right} of the {left/right}-most element in the string.

(18) *Head Location parameter*

Project the {left/right}-most element of each constituent onto the next line of the grid.

For languages with alternating stress they set the additional Iterative Constituent Construction parameter, given in (19).

(19) *Iterative Constituent Construction parameter*

Insert a {left/right} boundary for each pair of elements.

Going from left to right, ICC inserts right parentheses. Going from left to right, it inserts left parentheses. According to Halle and Idsardi, (19) actually governs the application of two rules in (20).

(20) ICC:L = ∅ → (/ ______xx (right to left)

ICC:R = ∅ →) / ______xx (left to right)

The ICC rules do not have the option of generating constituents with less than two elements. In a string with an odd number of syllables the application of a binary rule leaves the furthest element unmetrified.

Creation of certain disfavored grid configurations in Halle and Idsardi's framework is prevented by addition of *Avoidance* Constraints. For example, the constraint in (21) specifies the metrical configuration - "stress clash"-that some languages do not tolerate:

(21) Avoid (x(

According to Halle and Idsardi, the constraints act as output conditions on the rules. The rules are the only means of constructing metrical grids, while the function of the constraints is to limit the application of these rules.

One of the most important innovations of Halle and Idsardi's theory is the procedure for placement of parentheses. "Superfluous" parentheses have been eliminated. In their framework a single parenthesis is sufficient to delimit a metrical constituent. Thus, metrical constituents can be open-ended and can be modified later in the derivation. Moreover, no exhaustive parsing of the sequence of elements is required, i.e. it is not the case that every element must belong to some constituent.

Another major innovation is the Edge-Marking parameter which, among other things, captures word-initial and word-final stress, extrametricality, pre- and post-accenting morphemes.

3.2 Halle and Idsardi's Analysis of Russian Stress

In Russian, stress is an idiosyncratic property of individual morphemes. The description of Russian stress is provided in (22).

(22) When a word has one or more inherently stressed morphemes, stress surfaces on the left-most accented vowel. Otherwise, stress falls on the initial syllable.

Halle and Idsardi assume that in Russian the Syllable Boundary Projection parameter is triggered not by a phonetic property of the syllable, but by an idiosyncratic property of certain morphemes. They set the parameters for Russian as follows:

(23) **Line 0**

Syllable Boundary Projection parameter.

Project the *left* boundary of the stress-bearing syllable of an inherently accented morpheme onto line 0.

Edge-Marking parameter

Place a *right* parenthesis to the *right* of the *right*-most element in the string.

Head Location parameter

Project the *left*-most element of each constituent onto the next line of the grid.

Line 1

Edge-Marking parameter

Place a *left* parenthesis to the *left* of the *left*-most element in the string.

Head Location parameter

Project the *left*-most element of each constituent onto the next line of the grid.

An example of distinctive stress patterns in the nominal inflection of Russian nouns is given in (24).

(24)

	cow	head
nominative singular	koróv-a	golov-á
accusative singular	koróv-u	gólov-u

The morphemes *korov-* and *-a* are inherently accented and lexically marked to trigger Syllable Projection on one of their syllables. The derivations for the stress patterns of the words in (24) are given in (25).

(25)

Line 0	Project:L	x(x (x korov-a	x(x x korov-u	x x (x golov-a	x x x golov-u
	Edge:RRR	x(x (x) korov-a	x(x x) korov-u	x x (x) golov-a	x x x) golov-u
	Head:L	x x x(x (x) korov-a	x x(x x) korov-u	x x x (x) golov-a	x x x x) golov-u
Line 1	Edge:LLL	(x x x(x (x) korov-a	(x x(x x) korov-u	(x x x (x) golov-a	(x x x x) golov-u
	Head:L	x (x x x(x (x) korov-a	x (x x(x x) korov-u	x (x x x (x) golov-a	x (x x x x) golov-u

Notice that by setting the Edge-Marking parameter to RRR, i.e. by placing a *right* parenthesis to the *right* of the *right*-most element we get initial stress in words without inherently accented morphemes. In words with at least one inherently accented morpheme, the placement of a right parenthesis at the end of the word does not define a constituent distinct from the one defined by the right-most accented vowel. This prevents assignment of stress to the initial syllable in these words.

In addition to primary stress, the settings in (23) also generate secondary stresses which are not present in the words under consideration. According to Halle and Idsardi, Russian is subject to a special rule of Conflation which eliminates all but primary stress in the word.[7]

4. RUSSIAN COMPOUNDS REVISITED

As shown in sections 1 and 2, Russian compound words can have secondary stresses. We have seen that their placement is determined by the rhythmical constraints of an utterance or, in case of Russian poetry, by the meter chosen by a poet. Given certain additional assumptions, primary (lexical), but not the "misplaced" secondary stress in Russian compounds can be accounted for in Halle and Idsardi's (1995) framework.

Following Halle and Vergnaud (1987), I assume that secondary stresses are generated in both constituents dominated by a lexical category and that assignment of stress in compounds requires addition of a new line to the metrical grid. It should be noted, however, that, unlike English compounds, most Russian compounds are formed with the help of a *linking vowel*. I assume that the linking vowel is inserted by a morphological process after the derivations at line 0 and 1.

It is at line 2 that the metrical constituents constructed at lines 0 and 1 are united into a larger constituent and the linking vowel comes into play. I set two parameters for line 2:

(26) Line 2 Edge:RRR[8]

Head:R

After the derivation at line 2 is completed, lines 1 and 2 are conflated and all but the primary stress are eliminated.

Let us consider the derivation for the word *molnievidnyj* with a primary stress on the penultimate syllable and a secondary stress on the second syllable perceived in one of Tjutčev's (1987: 167) poem with iambic meter. Both stems *molni-* and *vidn-* are inherently accented, the suffix *-yj* is inherently unaccented.

(27)

Line 0	Project:L	(x x x (x x molni- -vidnyj
	Edge:RRR	(x x) (x x) molni- -vidnyj
	Head:L	x x (x x) (x x) molni- -vidnyj
Line 1	Edge:LLL	(x (x (x x) (x x) molni- -vidnyj
	Head:L	x x (x (x (x x) (x x) molni- -vidnyj
Line 2	Edge:RRR	x x) (x (x (x x) x (x x) molni- e -vidnyj
	Head: R	x x x) (x (x (x x) x (x x) molni- e -vidnyj
	Line Conflation	x x) (x x x x (x x) molni- e -vidnyj

The application of the parameter settings in (23) and (26) has generated the correct primary stress for the word *molnievidnyj*. However, Halle and Idsardi's theory does not predict the secondary stress in this word[9] as used by Tjutčev (1987:167), since it is not the first, but the second syllable that is stressed and "undoing" the Line Conflation would produce a secondary stress on the first syllable.

To account for the placement of secondary stresses in Russian compounds I propose a language-specific Metrical Rhythm Assignment Rule. I formulate it in (28).

(28) **Metrical Rhythm Assignment Rule:**

Going from left to right, align an abstract mark x^R on line 1 with every abstract mark x on line 0 that matches a strong metrical position. Enhance the primary stress, signaled by the presence of an abstract mark x on line 1, by aligning an abstract mark x^R on line 2 with the abstract mark x on line 1.

Note that the Metrical Rhythm Assignment Rule in (28) makes no reference to syllables or terminal segments.[10] It makes use of a "matching process": abstract marks are placed in accordance with a "preexistent" metrical pattern which, in poetic language, is highly constrained and determined by binary or ternary feet.

I assume that, before the Metrical Rhythm Assignment Rule is applied, all constituency information in the metrical grid is eliminated. Only two minimally required lines - line 0 and line 1 - and the abstract mark on line 1 indicating primary stress are preserved.

The application of the proposed Metrical Rhythm Assignment Rule is illustrated in (29).[11]

(29)

	Constituency Information Elimination	x x x x x x molni- e -vidnyj
Lines 1 and 2	Metrical Rhythm Assignment Rule (for iambic meter)	∪ – ∪ – ∪ – ------------------------ x^R x^R x x x x x x molni- e -vidnyj

The Metrical Rhythm Assignment Rule in (28) has generated the correct secondary stress on the second syllable in (29). However, in some cases, the Metrical Rhythm Assignment Rule alone cannot produce correct secondary stresses. Consider the stress contour of the word *blagonadežnyje* in (12), repeated here as (30).

(30) ...
I kto - nedarom - providen'em
Na mnogotrudnom ix puti,
Postavlen novym pokolenjam   – ´ | – ´ | – – | – ´ | –
V **blagonadežnye** voždi...   ´(`) | – ´ | – – | – ´

(Tjutčev 1987:90)

The stems *blag-* and *nadežn-* and the suffix *-ye* are all inherently stressed. The primary stress in the word *blagonadežnye* falls on the second syllable of the second stem. A secondary stress can be perceived on the linking vowel in this word. The derivation of the primary and secondary stresses is provided in (31).

(31)

Line 0	Project:L	(x x (x (xx blag- - nadežnye
	Edge:RRR	(x) x (x (xx) blag- - nadežnye
	Head:L	x x x (x) x (x (xx) blag- - nadežnye
Line 1	Edge:LLL	(x (x x (x) x(x (xx) blag- - nadežnye
	Head:L	x x (x (x x (x) x(x (xx) blag- - nadežnye
Line 2	Edge:RRR	x x) (x (x x (x)x x (x (xx) blag-o- nadežnye
	Head: R	x x x) (x (x x (x)x x (x (xx) blag-o- nadežnye
	Line Conflation and Constituency Information Elimination	x x x x x xx blag-o- nadežnye
Lines 1 and 2	Metrical Rhythm Assignment Rule (for iambic meter)	∪ – ∪ – ∪– ----------------------------------- x^R x^R x x^R x x x x xx blag-o- nadežnye

The parameter settings in (23) and (26) have correctly located primary stress on the second syllable of the second stem. The Metrical Rhythm

Assignment Rule has generated two secondary stresses in the word *blagonadežnye* - on the linking vowel and on the suffix, following the primary stress. However, as noted in section 2.1, secondary stress on suffixes, following the primary stress is not likely to be perceived. To account for the stress contour of the word *blagonadežnyje* , it is necessary to take into consideration the phonological and morphological factors and suppress the secondary stress on the suffix *-ye*.

It appears that there exists a scale of stress suppression preferences: certain morphemes in certain positions are more likely to be suppressed than others. Consider, for example, supression of secondary stresses in the word *čelovekonenavistničestvo* ("hatred of mankind"). The primary stress in this word falls on the third (root) syllable of the second constituent. The Metrical Rhythm Assignment Rule places four secondary stresses on the word in a phrase based on iambic meter.[12]

(32) *Čèlovèkonènavístničèstvo*

The secondary stress that falls on the suffix *-estv*-following the primary stress is very unlikely to be pronounced, i.e. it is most likely to be suppressed. The next most likely secondary stress to be suppressed is the one located on the first (root) syllable of the second constituent. Out of the two remaining secondary stresses, both of which are located on the first constituent root syllables, the stress on the initial syllable is more likely to be suppressed than the one on the third syllable.

Further study is required to determine why the tendency to stress the initial syllable fails in words like *čelovekonenavistničestvo* and whether the scale of suppression preferences which manifests itself in the pronunciation of the word *čelovekonenavistničestvo* is applicable to many other Russian words.

5. CONCLUSION

In this paper I have shown that secondary stress in Russian compounds is a rhythmic phenomenon. It is superimposed on the existing stress contour in accordance with the rhythmical constraints of an utterance or, in case of Russian verse, the meter.

In view of the limited scope of this study I have analyzed primarily the assignment of secondary stress in Tjutčev's verse based on iambic meter. My analysis has shown that secondary stress on the first constituent of compound words is placed only in strong metrical positions.

In my analysis I have used Halle and Idsardi's (1995) framework which allows a large number of distinct stress patterns to be generated by setting a limited number of parameters that interact with universal and language-specific constraints.

Halle and Idsardi (1995) do not provide an algorithm for stress assignment in compound words. I have shown that, provided another line is added to the metrical grid and parameters are set for this line, it is possible to extend the theory to account for the lexical (primary) stress assignment in Russian compounds. To account for the assignment of secondary stresses, I have posited a language-specific Metrical Rhythm Assignment Rule. This Rule interacts with stress suppression which is governed by phonological and morphological factors to generate secondary stress in Russian compounds.

FOOTNOTES:

[1] In this paper I do not provide translations of examples from Russian poetry. Even a faithful rendering of the poetic excerpts would have failed to meet their true purpose, which was to illustrate the effect of rhythm and meter on the assignment of stress.

[2] I have selected my own examples to illustrate the points that Žirmunskij (1925/1966) makes, since references to authors are often abbreviated or missing in the original, as well as the later edition.

[3] See the example in (8) below.

[4] Alternatively, it is possible to argue that variably stressed words do not have lexical stress and can acquire stress at the phrasal level. It seems to me, however, that the considerable degree of prominence that these words can have in metrically strong position cannot be accounted for by rhythmical stress.

[5] Note that in the third foot of the second line the prefix *sue-* appears in a metrically strong position and can be easily pronounced with a secondary stress.

[6] In the diagrams secondary stresses will be shown with a grave accent sign in parentheses.

[7] According to Halle and Vergnaud (1987), line conflation is a rule that collapses adjacent lines in the grid through suppression of material on the lower line. A

constituent on the lower line is preserved only if its head is also the head of a constituent on the higher line.

[8] A different setting of this parameter is possible: Edge: LLL. I am not aware of any evidence that makes either of the possible settings preferred.

[9] While in the iambic line by Tjutčev (1987:237) the secondary stress in the word *molnievidnyj* is placed on the second syllable, it can be predicted that in a line with a ternary meter the secondary stress will be placed on the first syllable. Also, in colloquial speech the secondary stress in this word is more likely to be placed on the first syllable which is, probably, due to the tendency to stress the initial syllable in compound words noted in section 1.

[10] I believe that the actual text in the line is considered only when stresses are suppressed: it is then that the syntactic and morphological factors that were mentioned in section 2.1 come into play. Whether the Rhythm Rule and Stress Suppression are applied simultaneously or whether the latter applies after the former is an open issue.

[11] In (29) I use a standard system of signs to show feet: the breve [∪] indicates a normally unstressed (weak) position, the macron [–] stands for an ictus (strong position).

[12] Mills (1988) claims that Colloquial Russian has iambic nature.

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A Closer Look at Coalescence: The Slave D-Effect*

Andrea Wilhelm
The University of Calgary

1. Introduction

In this paper, I will offer an in-depth account of one type of coalescence, the Athapaskan D-effect, which occurs when *d* meets a consonant-initial verb stem. For example in Slave, a Northern Athapaskan language:

(1) a. /ná-ʔede-ne-**d**-∅-táh/ —> [náʔedena.**ta**] '3 kicked 3-self' (Rice 1989:445)

b. /lé-ye-**d**-∅-ɣe/ —> [léye.**ge**] 'it is cut' (Rice 1989:444)

I will analyze the Slave D-effect in the framework of Optimality Theory (Prince & Smolensky 1993). My analysis will cover the full range of phenomena and will not refer to morphological information. This makes it superior to previous analyses of the D-effect, e.g., Lamontagne & Rice 1994, 1995, which have to refer to morphological information, and which do not account for all D-effect alternations. I will propose constraints guiding the inner workings of coalescence (which features of which input segment are maintained), thus shedding light on the nature of coalescence in general. Finally, I will show that my analysis is more valid universally, as it is compatible with accounts of coalescence in child language (Ganandesikan 1995).[1]

Before beginning the analysis, I will introduce the D-effect (section 1.1.), review previous accounts (section 1.2.), and present my hypothesis and assumptions (section 1.3.). The actual analysis first discusses the constraints motivating coalescence (section 2) , and full coalescence (section 3). Then the inner workings of coalescence are discussed by major feature groups: place (section 4), manner (section 5), laryngeal features (section 6), nasals (section 7). The conslusions are presented in section 8.

1.1. The D-Effect

The D-effect is a well-known phonological alternation in Athapaskan languages. It is just one of the many instances of fusion which occur among the verb stem and the closer (called "conjunct") prefixes in these polysynthetic languages. In the D-effect, a *d* and certain stem-initial consonants are coalesced, (1b), while before other stem-initial consonants *d* seems to be deleted, (1a).

The source of the *d* is either one of the so-called classifiers, or the first person dual/plural subject agreement prefix. The four Athapaskan classifiers, *Ø, l-, ɬ-* and *d-* (Krauss 1969; Slave *Ø, l-, h-* and *d-* respectively) are the prefixes closest to the verb stem. They often have a derivational and valency-changing function. For example, the classifier *d-* is used in many, but not all, passives and reflexives. There are also numerous instances where the classifiers do not have any obvious function, but seem to be lexicalized. All four classifiers undergo fusion or deletion (for an OT account of the l-classifier in Navajo and Chipewyan, see Causley 1997).

The next-closest prefixes, immediately preceding the classifier, are those which mark subject agreement. The affix for first person dual/plural subject has the form *(V)Vd* , for example, *íd-* in Slave (Rice 1989). If the classifier is *Ø,* the final *d* of this prefix directly meets the stem-initial consonant and shows the same behavior as the d-classifier[2].

The following will be an Optimality Theory (OT) analysis of the D-effect in Slave. Slave is a Northern Athapaskan language consisting of four dialects: Hare, Bearlake, Mountain, and Slavey. Unless otherwise noted, examples will be from Slavey (Rice 1989). (1) below, is an overview of the D-effect in Slavey. All consonant phonemes and their interactions with *d* are shown. *d* plus bolded segments results in a new segment, given in brackets; all other segments remain unchanged after *d,* and *d* seems deleted. (Actual examples will follow throughout the analysis.)

(2) **Slavey consonant inventory & D-effect** (based on Rice 1989):

v.l.. unasp.	(b)	dð	d	dz	dl	dʒ	g	
v.l.. asp.		tθ	t	ts	tl	tʃ	k	
glottalized		tθ'	t'	ts'	tl'	tʃ'	k'	ʔ (> t')
prenasalized	(mb)		(nd)					
v.l.. fric.		θ (> dð)		s (> dz)	ɬ (> dl)	ʃ (> dʒ)	x (> g)	h
vcd. fric.		ð (> dð)		z (> dz)	l (> dl)	ʒ (> dʒ)	ɣ (> g)	
glides	(w)		(r)			y (> dʒ)		
nasals	m (> b)		n (> d)					

Some comments on this inventory are in order. Note that the symbols for the stops do not reflect their laryngeal quality: voiceless ("plain") stops are represented by the symbols [d] etc., voiceless aspirated stops by the symbols [t] etc. This convention suggests that voicing is distinctive in stops, an assumption not shared by all Athapaskanists.

The symbol *y* is used for IPA [j]. This segment is in free variation with *ʒ*, and both show the same D-effect *dʒ*. The phonemic status of the segments in brackets, *b, mb, nd, w, r,* is not well established. *b* occurs mostly in loan words, and in native *ʔabá* 'father'. The prenasalized stops *mb, nd* are allophones of /m/ and /n/ respectively. They occur mostly in prefixes, more rarely in stems. *w* is unusual in Slavey and not found in the other dialects. Finally, *r* occurs in some loan words, and is otherwise an allophone of /d/ in onset position.

Also worthy of note is the fact that *h* does not occur stem-initially, and is the only permissible coda (as well as the epenthetic consonant) in the language.

In short, the segments *h, w, mb, nd* do not or only very rarely occur stem-initially, hence do not undergo the D-effect, and will be omitted from my analysis. I will also not treat *y* separately, but subsume it under the analysis of *ʒ*.

Three broad patterns of the D-effect can be observed from this table. First of all, if possible, the outcome of the D-effect is a full combination of all features of the two underlying segments, as in *d* + coronal fricative —> coronal affricate, and *d* + *ʔ* —> *t'*. If no full combination is possible, there are two further possibilities: (i) *d* plus a (dorsal) fricative or a nasal results in a coalesced segment which retains some features of each underlying segment, and (ii) *d* plus a stop results in a stop, which looks like deletion of *d*.

1.2. Previous Analyses

Most descriptions of the D-effect are simply lists of rules for those segments undergoing changes, with a note that *d* is deleted before all segments not listed. It is usually left to the reader to find out what these other segments are, and whether there is a general pattern. The first and groundbreaking formal analysis of the D-effect was presented in Howren (1971). Howren suggests "that the multiplicity of rules might be reduced to a single principle: the output segment is a recombination of sets of features from each of the input segments" (Howren 1971:99). He proposes a general rule which basically merges the stricture ([-cont]) of the *d* with the place, voicing and nasality features of the stem-initial consonant. In other words, the D-effect is always coalescence, never deletion. To make the general rule work for all the languages he discusses, Howren assumes abstract phonemic representations and derivations in which various language-specific adjustment rules further change the outputs of the D-effect rule until the actual surface forms are achieved.

Subsequent discussions of the D-effect are mostly language-specific analyses using derivations with ordered rules. Some, e.g., Rice (1987), Hargus (1988), Randoja (1990), Shaw (1991) propose that the d-classifier, which is never seen overtly, consists of only the feature [-cont] or [stop]. This is consistent with Howren (1971) in that only the stricture of the d-classifier is maintained. These analyses need ordered rules as well as constraints to adjust ill-formed rule outputs.

The first and only analyses in the framework of Optimality Theory (OT) are offered by Lamontagne & Rice (L&R). They do not take up Howren's idea that there is one general process, and that the coalesced segment always contains features of *both* input segments. Instead, the D-effect is divided into two separate processes, coalescence with some segments, ***and deletion*** with other segments.

L&R (1994) is a typology of Athapaskan languages. It shows that the D-effect occurs in those languages where preserving syllable structure is more important than the loss or addition of a segment/feature—in OT terms, syllable structure constraints are ranked above faithfulness constraints. In languages with the reverse ranking (preserving syllable structure is less important than preserving the segmental makeup of a form), epenthesis or syllabification of *d* as coda occurs . However, for the D-effect languages, L&R only discuss deletion and do not attempt to analyze the cases of true coalescence.

L&R (1995) discusses the constraints needed in those cases where coalescence is favored over deletion, as in *d+x —> g*. It proposes a new constraint "*Multiple Correspondence (*MC)" (L&R 1995:218), which bans fusion of segments (but not deletion), and argues that coalescence results if a language ranks *MC over constraints banning deletion (such as "PARSE" of L&R 1995:215).

However, L&R's analyses have two weaknesses. First, in the version of faithfulness theory needed to formulate the *MC constraint (correspondence rather than containment theory), it becomes difficult to predict those cases where apparent deletion occurs. L&R cite constraints against feature cooccurrence and against identical features in a single segment. I will show in section 4 that neither of these can successfully ban coalescence. Second, L&R have to use morphological information (alignment of left root edge and left syllable edge) to predict which segment is deleted and to predict the featural makeup of the coalesced segment. Also in section 4, I point out that the same patterns can be observed *within* a morpheme, and that these cases are not satisfactorily explained by morphological constraints. In fact, the wrong features are predicted to be maintained.

In the Athapaskan literature and in general, it seems to me that most accounts of coalescence shed little light on the nature of the process. While it may be predicted under which circumstances coalescence (rather than deletion/epenthesis/etc.) occurs, there is usually no or only a weak explanation of the featural makeup of the coalesced segment. Particularly in OT, coalescence seems to be a "black box": the input and the output are known, but not what happens inside the black box to create this particular output from these particular inputs. It is one of the goals of my analysis to look inside this black box, and to find out which constraints are operative in determining the makeup of the output segment.

1.3. Hypothesis and Assumptions

The central hypothesis of my analysis, based on Howren's insight, is that the D-effect is always coalescence. This includes the cases of apparent deletion, which I will call "vacuous coalescence". I propose that such a uniform treatment is not only possible and more elegant than the deletion analysis, but that it is actually required by OT, which does not allow reranking of constraints within a language. Moreover, such an analysis sheds light on the motivation and the nature of the D-effect, and of coalescence in general.

I propose that coalescence is consistently motivated by the need to preserve as much of the input as possible, while having to meet certain well-formedness/markedness constraints (e.g., syllable structure constraints). Similarly, the featural makeup of the coalesced segment is determined by the interaction between (featural) faithfulness and markedness constraints. This, then, is the nature of coalescence: a sort of compromise between markedness and faithfulness, at the cost of linearity. Most of the constraints active in coalescence are independently evident in the phonology of the language; constraints using morphological information are not necessary.

The analysis is carried out in Optimality Theory and shares the theory's assumptions. Universal grammar is thought to consist of universal constraints, many of which conflict. Forced to choose which of any two conflicting constraints to obey, individual languages rank the constraints in a particular way. The language-specific constraint hierarchy selects an optimal output candidate for each input: the candidate with the least violations of high-ranking constraints.

The theory is representational and output-oriented. Intermediate stages between the input (underlying representation) and the output (surface representation) do not exist. Inputs and output candidates are generated freely; the constraints apply only to the output, testing each candidate for well-formedness and faithfulness, and selecting a single optimal one.

The relevant well-formedness/markedness constraints will be presented throughout the analysis. For the evaluation of faithfulness, I am adopting the Correspondence Theory of faithfulness (e.g., McCarthy & Prince, to appear; S_1 is the string of segments of the input, S_2 of the output):

(3) Correspondence Theory
Given two strings S_1 and S_2, **correspondence** is a relation $\Re$ 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 when $\alpha \Re \beta$.

In Correspondence theory, the faithfulness constraints Parse and Fill are replaced by Max and Dep, respectively:

(4) Max: Every element of S_1 has a correspondent in S_2.

Dep: Every element of S_2 has a correspondent in S_1.

This means that deletion is represented as the actual loss of a segment (under violation of Max), rather than as an unparsed segment. Likewise, epenthesis means the real insertion of a segment in the output string (violating Dep). Notice that colaescence does not violate Max or Dep because each input segment has a corresponding output segment and vice versa (featural identity of correspondents is not required by Max/Dep). For example:

(5) /lé-ye-**d**-Ø-**ɣ**e/ —> [léye.ge] 'it is cut' (Rice 1989:444)

INPUT: l_1 $é_2$ y_3 e_4 $\mathbf{d_5}$ $\mathbf{ɣ_6}$ e_7

OUTPUT: l_1 $é_2$ y_3 e_4 $\mathbf{g_{5,6}}$ e_7

By looking at the indices, one can see that this representation claims that output *g* corresponds to both input *d* and input *ɣ*. This is well motivated since *g* retains features of each input correspondent, as I will demonstrate in the following sections.

All other relevant faithfulness constraints will be introduced in the course of the analysis.

2. Constraints motivating coalescence

Coalescence is one strategy employed in Athapaskan to deal with medial consonant clusters. As most (conjunct) prefixes have the form (C)V̀ and most stems have the form CV(C) (Krauss & Golla 1981), medial clusters do not usually arise. The only exception to this pattern are the classifiers (C) and 1Pl subject agreement (VC), resulting in an input ...*V<u>CC</u>VC*. As demonstrated by L&R (1994), different Athapaskan languages resolve this situation in different ways. Consider the following examples:

(6) <u>Ahtna:</u>
/qw+**D**=**b**a'/ —> [qω**d.ba**'] 'it became twilight' (Lamontagne & Rice 1994:344 (Kari 1990:650))

(7) <u>Koyukon:</u>
/no+ɣə+**D**+nəG/ —> [naɣə**də.n**əG] 'it (string, seam, cloth) unravelled' (L & R 1994:345 (Axelrod 1993:38))

(8) <u>Slave:</u>
/ná-ʔede-ne-**d**-Ø-táh/ —> [náʔedena.**t**a] '3 kicked 3-self' (R 1989:445)
/na-í-**d**-Ø-seh/ —> [nahí.**dz**eh] '3 lets out a yell, yells again' (R 1989:444)

Ahtna-type languages keep both consonants at the cost of allowing codas. They violate the constraint NoCoda while obeying the constraints Dep and Max. Koyukon-type languages obey NoCoda and Max. In order to be able to keep both consonants (as onsets), schwa is inserted in violation of Dep. Thus, we have the following rankings:

(9) a. <u>Ahtna-type</u>
Max, Dep >> NoCoda

b. <u>Koyukon-type</u>
Max, NoCoda >> Dep

Slave-type languages obey NoCoda and Dep and, as all Athapaskan languages, *Complex (=no complex onsets or codas). They violate some other faithfulness constraint, which for now I will call "Faith". The following tableau[3] shows the constraint ranking for Slave:

(10)

na-í-**d**$_1$-Ø-s$_2$eh	Dep	*Complex	NoCoda	Faith
nahíd$_1$.z$_2$eh rt rt			*!	
nahí.d$_1$ə.z$_2$eh rt rt	*!			
nahí.d$_1$z$_2$eh rt rt		*!		
=> nahí.dz$_{12}$eh rt				*

The question is, of course, which faithfulness constraint is violated in Slave. It is not Max, since every element in S_1 has a correspondent in S_2. Max does not demand complete (featural) identity of the correspondents, nor is it violated if two elements share a correspondent. L&R (1995:218) propose that the violated constraint is *Multiple Correspondence:

(11) *Multiple Corespondence(=*MC)
Elements of the input and the output must stand in a one-to-one correspondence relationship with each other.

*MC is symmetrical, banning multiple corresondents in either the input or the output. McCarthy & Prince (to appear) use a more specific constraint which asymmetrically bans multiple correspondents in the input:

(12) Uniformity
No element of S_2 has multiple correspondents in S_1.

For the present analysis it does not matter which of these two constraints is used. Since I have no evidence in Slave of multiple output correspondents, I prefer to use the more specific constraint, Uniformity.

To sum up, Slave-type languages have the following constraint ranking:

(13) NoCoda, *Complex, Dep, Max >> Uniformity

This is the ranking which motivates coalescence. Coalescence occurs when (syllable) markedness constraints and segmental faithfulness are high-ranked. In other words, coalescence is a strategy to maintain an unmarked (syllable) structure without deleting or inserting a segment.

Any markedness constraint (plus Dep and Max) can motivate coalescence. Gnanadesikan (1995) is an example of coalescence satisfying *Complex, and in Pater (to appear) coalescence (nasal substitution) occurs to satisfy another type of markedness constraint, *NÇ, which bans nasal/voiceless obstruent sequences.

Satisfying markedness and segmental faithfulness comes at the cost of non-uniformity[4]. In addition, certain input features are lost (violating Faith[F]) when the output cannot retain all features of both input segments. Before I determine the relevant constraints on the featural level (cf. sections 4–7), I briefly want to discuss the cases of full coalescence, where no features are lost. They provide additional evidence that Max is not violated, i.e., that coalescence is not deletion.

3. Full coalescence: segmental and featural faithfulness

Full coalescence, fusion of two segments without loss of features, occurs in Slave when the resulting segment is permitted in the inventory of the language. There are two cases: *d* + *ʔ* (14), and *d* + coronal fricative (15).

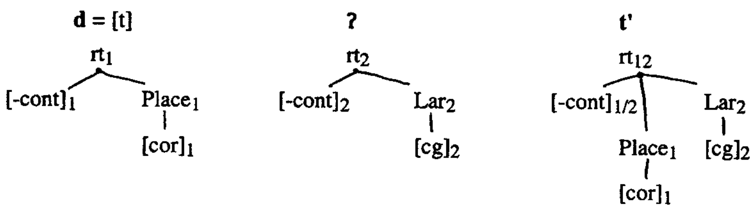
(14) /í**d**-Ø-ʔáh/ —> [hí**t'**á] 'we eat' (R 1989:440)

(15) a. /dah-ʔede-de-í-**d**-Ø-**ɬ**eh/ —> [daʔededí.**dl̲**éh] '3 hangs 3-self' (R 1989:444)

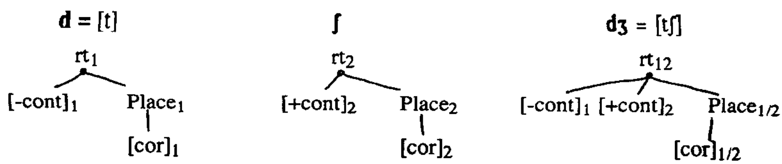
b. /be-k'é-go-de-**d**-Ø-**ʃ**on/ —> [bek'égode.**dʒ**ǫ] 'it is known of 3' (R 1989:444)

The output of full coalescence is a segment which corresponds to both input segments. So, Max is not violated: there is no deletion. In addition, full coalescence obeys featural faithfulness: *t'* retains all features of both input segments, as shown in (16). Likewise, the coronal affricates of (15) contain all input features, including both the stop's feature [-cont] and the fricatives' feature [+cont], compare (17).[5]

(16) input: output:



(17) input: output:



Assuming that features are entities which can stand in correspondence, each input feature corresponds to an identical output feature, and vice versa. Thus, there are no violations of Max[F] and Dep[F].[6] Full coalescence is perfectly faithful at the featural level, as well as at the segmental level. The only constraint violated is Uniformity. Tableau (18) sums up full coalescence:

(18)

í**d**$_1$-Ø-ʔ$_2$áh	Max	Max[F]	Uniformity
hí.ʔ$_2$áh	*!	*!	
hí.**d**$_1$á	*!	*!	
=> hí**t'**$_{12}$á			*

If full coalescence would result in a segment not permitted in the language, certain input features must be lost. This is "partial" coalescence, where featural faithfulness is violated. The following sections examine the featural constraints and rankings which determine the structure of the output segment. I will begin with place features.

4. Place

4.1. d + noncoronal fricative

When *d* meets a noncoronal fricative, the output is not an affricate, but a stop at the place of the fricative:

(19) /lé-ye-**d**-Ø-**ɣ**e/ —> [léye.ge] 'it is cut' (R 1989:444)
*[léye**dɣ**e], *[léye**gɣ**e], *[léye**dz**e]

Full coalescence, as in *[léye**dɣ**e], is banned here because Slave does not allow segments which have two different places of articluation (cf. L&R 1995). This is a constraint from Slave's "background phonology" (McCarthy & Prince, to appear). I am calling the constraint SamePlace:

(20) SamePlace (=SamePl): *Place linked to α and β — where α, β are features.

Also active in Slave's background phonology is a constraint/constraint family which bans all affricates but coronal ones. How could this be formulated? First of all, consider that affricates are more marked universally than simple stops or simple fricatives. There are languages which have only plain stops, but there do not seem to be languages which have only affricates. Maddieson (1984) notes that all languages have stops, and "a language with only one stop series almost invariably has plain voiceless plosives..." (p. 27). For this reason I am assuming the existence of a constraint *Affric, dominating *Stop (and *Fricative).

Since Slave (like many other languages) allows only coronal affricates, *Affric must be broken down into more specific constraints by place of articulation:[7]

(21) *Affric, *Affric >> *Affric
[dors] [lab] [cor]

The full hierarchy may actually rank *Affric[dors] above *Affric[lab]. This is supported by the extent of affrication in the High Germanic Sound Shift: Low German languages like English and Dutch have only coronal affricates; High German has coronal and labial affricates, and Upper German (Swiss German) has coronal, labial, and dorsal affricates (e.g., von Polenz 1978).

(21) has the effect of ruling out the dorsal affricate *[léyeg**ɣ**e]. So far, all the proposed constraints are independently needed to account for the Slave consonant inventory. They select the stop in [léye.ge] as the optimal candidate, thus yielding the correct output. ([léye.ge] may violate lower-ranked *Stop, which is not included in the tableau. The choice of stop versus fricative is examined in section 5.)

(22)

d$_1$ + ɣ$_2$	SamePl	*Affric [dors],[lab]	*Affric [cor]
dɣ$_{12}$	*!	*!	*
gɣ$_{12}$		*!	
dz$_{12}$			*
=> g$_{12}$			

However, these constraints by themselves cannot determine the place of articulation of the stop, which could be coronal [d] or dorsal [g]. In order to decide between these two candidates, I adopt the following hierarchy from Pulleyblank (1998):

(23) Max[dors], Max[lab] >> Max[cor]

This hierarchy means that, in the case of a place conflict, the more marked place is maintained, since faithfulness to a marked place dominates faithfulness to an unmarked place. Such a hierarchy is known as "Markedness-as-Faithfulness" because markedness is reflected in the ranking of faithfulness constraints, and has been proposed by Pulleyblank (1998) and Kiparsy (1994). Again, there may be a subranking of Max[dorsal] >> Max[labial] (Gnanadesikan 1995), which is irrelevant to this analysis.

(19) together with SamePl and the affricate hierarchy yields the correct output:

(24)

d_1 + ɣ$_2$	SamePl	*Affric [dors],[lab]	Max [dors],[lab]	Max [cor]	*Affric [cor]
dɣ$_{12}$	*!	*!			*
gɣ$_{12}$		*!		*	
dz$_{12}$			*!		*
d_{12}			*!		
=> g_{12}				*	

Note that the candidate [d_{12}] contains no features of the input segment [ɣ$_2$]. It is therefore not in correspondence with [ɣ$_2$] and should be indexed as [d_1]. So, to be precise, this candidate is also ruled out by Max. Does this mean that we do not need the hierarchy in (21)? No; it is still needed to determine the place of articulation of coalesced stops, as I will now show.

4.2. d + stop

When *d* coalesces with another stop, it is also the most marked place which is maintained.

(25) a. /í**d**-∅-**kw**e/ —> [hí**kw**e] 'we cut' (Bearlake; R 1989:441)
b. /ʔededeyį-**d**-∅-**k'**o/ —> [ʔededeyį**k'**o] '3 stretched 3-self' (R 1989:470)

The same constraints as those in the analysis of fricatives account for these facts. SamePl militates against stops with two places of articulation, and the Markedness-as-Faithfulness hierarchy selects the candidate with the more marked place of articulation:

(26)

		Max	SamePl	Max [dors],[lab]	Max [cor]	*MC
$d_1 + k'_2$:	dk'_{12}		*!			*
	d_{12}			*!		*
	=> k'_{12}				*	*

So, the hierarchy in (23) is well-motivated, as it accounts for the place of articulation of coalesced stops as well as coalesced stops plus fricatives.

L&R (1994, 1995) use constraints containing morphological information to account for the place of articulation of the coalesced segment. Assuming that in the case of *d* + stop there is deletion rather than coalescence, they propose that (27) decides which input segment is deleted:

(27) Align-L (Root) (L&R 1994:344)

$[_{Root} = [_\sigma$

Align-L (Root) "requires coincidence of left root edge and left syllable edge" (ibid.) and will therefore always force deletion of the d-classifier rather than of the stem- (or root-)initial consonant. However, this does not explain the choice of place in *d* + noncoronal fricative, where there is no deletion. Here, L&R have to extend Align-L to the featural level. They have to assume a high-ranked Align-L ([Place]) which forces maintenance of the stem-/root-initial place feature. Not only is this an unusual constraint, it also fails to explain the choice of place if coalescence occurs root-internally, as it does in child language:

(28) /twi/ —> [pi] 'tree' (Gnanadesikan 1995:14)

Alignment predicts that the place feature [coronal] of the root-initial consonant, rather than the feature [labial] of the second consonant, should be kept, yielding [ti]. This is obviously wrong. Instead, as Gnanadesikan observes, it is the *more marked* place which is kept. The child language facts are consistent with the markedness-as-faithfulness hierarchy, rather than with Alignment.

A second argument against the Alignment analysis comes from the case of *d+ʔ—> t'*. If, as Lombardi (1996) suggests, glottals are not placeless, but have a place feature [pharyngeal], then Alignment predicts that [pharyngeal], which is stem-initial, will be maintained over coronal, yielding the wrong output [ʔ].

In contrast, the markedness-as-faithfulness hierarchy still predicts the correct output. This is because in Lombardi's theory [pharyngeal] is the least marked place, less marked than [coronal]. The markedness-as-faithfulness hierarchy would then look as follows,

(29) Max[dors], Max[lab] >> Max[cor] >> Max[phar]

and it would still yield the desired result: a coronal [t'][8]. L&R, on the contrary, would have to make the strange assumption that [ʔ] is not pharyngeal in order for their analysis to work in Lombardi's framework.

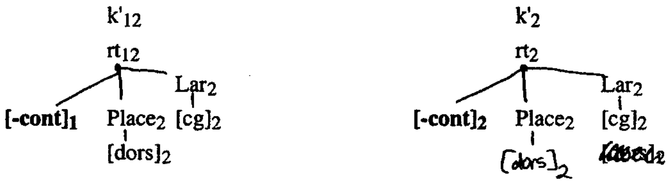
It seems, then, that my analysis, which uses markedness-as-faithfulness to predict the place of a coalesced segment, is able to handle a broader realm of phenomena and theories than the Alignment analysis. It can account for *d + ʔ —> t'* whether glottals are placeless or [pharyngeal], while the Alignment constraint only works if glottals are placeless. And, more importantly, markedness-as-faithfulness can explain root-internal coalescence in child language, where Alignment predicts an output with the wrong place of articulation. Clearly, the problem with L&R's Alignment analysis is that it uses a constraint referring to morphological information. I conclude that my analysis of place features in coalescence in terms of markedness has to be favored over that of L&R.

4.3. Vacuous coalescence

As already mentioned in the introduction, there is another difference between L&R's and my analysis. L&R assume that the D-effect with stops involves deletion, while I follow Howren (1971) and propose that even with stops, there is (vacuous) coalescence rather than deletion. The difference between vacuous coalescence and deletion is illustrated in (30) for example (25).

(30) $d + k' \rightarrow k'$

a. vacuous coalescence b. deletion



The subtle and formal difference between these two representations is that (30a) contains features of both input segments, while (30b) doesn't. Because (30a) has features of both input segments, it is in correspondence with both of them, and represents a coalesced segment. In contrast, (30b) is not in correspondence with the input d_1 (featurally), so it is a case of deletion. L&R do not make this formal distinction between (30a) and (30b). They simply assume deletion whenever the output looks identical to only one of the input segments. However, (30a) is theoretically possible and, I argue, even desired, for the following reasons.

First of all, it is in fact impossible to rule out (30a). Given the ranking which motivates coalescence in the first place, Max >> Uniformity, (30a) will always win over (30b), as evident in tableau (31), an expanded version of tableau (26).

(31)

		Max	SamePl	Max [dors],[lab]	Max [cor]	*MC
$d_1 + k'_2$:	dk'_{12}		*!			*
	d_{12}			*!		*
(30b):	k'_2	*!			*	
(30a):	=> k'_{12}				*	*

In order to force deletion (30b), as the optimal candidate, the opposite ranking would be necessary. In other words, there is a ranking paradox: Max >> Uniformity for the coalescence cases versus Uniformity >> Max for the deletion cases.

In order to avoid this paradox, L&R use a third, independent constraint to rule out coalescence: the "Shared Feature Convention" (following Steriade 1982). However, the Shared

Feature Convention only prohibits like features within a single segment, something like *k'* with the feature $[\text{-cont}]_1$ as well as the feature $[\text{-cont}]_2$. But this is different from (30a), which contains only one feature of each kind. Thus, the Shared Feature Convention cannot rule out (30a). As I said above, there is no way of ruling out (30a), therefore vacuous coalescence will always win over deletion.

Secondly, the fact that vacuous coalescence always wins over deletion is the desired result, because it provides a more consistent and insightful analysis of the D-effect. If the D-effect is always coalescence, it is always motivated by the same constraints, namely high-ranking segmental faithfulness in conjunction with high-ranking syllable structure constraints. As pointed out in the introduction, this is a unified account of the D-effect which sheds light on its nature: The D-effect occurs in order to be segmentally faithful while having to satisfy markedness (syllable structure constraints). As much as possible of the input, i.e., of both consonants, is maintained. Through coalescence, deletion is avoided, thus segmental faithfulness (Max) is respected. Coalescence also maintains as many input features as possible, thus also obeying featural faithfulness (Max[F]) as much as possible. Segmental and featural faithfulness come at the cost of uniformity, which is a type of linearity (McCarthy & Prince, to appear): the linear sequence of the input segments/features is lost.

If the D-effect were sometimes coalescence and sometimes deletion, there would be no uniform motivation for it, as reflected in the ranking paradox mentioned above. Sometimes segmental and featural faithfulness would be more important than uniformity/linearity (coalescence), and sometimes the priorities would be reversed (deletion), all without apparent reason, as no independent constraint could be found to motivate such a reversal.

For this reason, an analysis of the D-effect in which coalescence always wins over deletion is more insightful and more desirable.

I conclude that my account of the D-effect consistently as coalescence is superior to the commonly held "split" view, and that it is in fact the only possible analysis in OT. Gnanadesikan (1995) in her analysis of cluster reduction in child language comes to the same conclusion.

4.4. Summary

This section has established that the place of articulation of a coalesced segment is determined by a markedness-as-faithfulness hierarchy, which selects the candidate with the most marked place as optimal. Also active are two constraints from Slave's backgroud phonology, SamePlace and a *Affric hierarchy. They serve to exlude noncoronal affricates as outputs of the D-effect and in the language in general.

The constraint(s) Align-L (L&R 1994, 1995) were rejected as explanation of place of articulation because they do not cover as wide a range of data as the markedness-as-faithfulness hierarchy. In particular, Align-L cannot explain the choice of place in root-internal coalescence in child language.

Finally, I have shown that the D-effect always involves coalescence and never deletion, contrary to the commonly held view. I have argued that in OT, it is impossible to analyze the instances of vacuous coalescence as deletion, and that a uniform account of the D-effect as coalescence provides more insight into the nature of this phenomenon.

5. Manner

Next, I am concerned with explaining the manner of articulation of the coalesced segment. This question only arises in the case of *d* plus noncoronal fricatives (nasals will be dealt with in section 7). As shown in the previous section, they cannot become affricates, so a choice has to be made whether to maintain the feature [-cont] of the d-classifier or the feature [+cont] of the stem-initial fricative. As the following examples show, the feature [-cont] is maintained.

(32) /lé-ye-**d**-Ø-**ɣ**e/ —> [léye.**g**e] 'it is cut' (R 1989:444)
*[léye.**ɣ**e] *[léye.**z**e]

This can be derived from the respective faithfulness constraints:

(33) Max[-cont] >> Max[+cont]

$d_1 + \gamma_2$	Max[-cont]	Max[+cont]
z_{12}	*!	
γ_{12}	*!	
=> g_{12}		*

Such a ranking is well-motivated. It reflects the fact that universally, stops are less marked than fricatives: All languages have stops, but not all languages have fricatives in their inventory. While there are languages which have only stops, there are no languages which have only fricatives and no stops (Maddieson 1984). In OT, these typological facts are derived by combining the constraints *[-cont], *[+cont], Max[-cont] and Max[+cont]. A language with stops only ranks *[+cont] above the other three constraints, banning all fricatives. A language with stops and fricatives ranks Max[-cont] highest (using only *[-cont] >> *[+cont] does not work; it bans all stops, resulting in an unattested language with fricatives but without stops).

(34) Max[-cont] >> Max[+cont], *[-cont], *[+cont]

		Max[-cont]	Max[+cont]	*[+cont]	*[-cont]
g:	=> g				*
	ɣ	*!		*	
ɣ:	g		*!		*
	=> ɣ			*	

Thus, a language with stops and fricatives has the subranking *Max[-cont] >> Max[+cont]*, as in (33).

The question arises, however, whether this ranking will not perhaps ban *all* fricatives in Slave, i.e., whether it is too powerful. This is not the case. Stops are only chosen over fricatives in coalescence, where the output is checked against two input segments. A fricative output results if the input is a single fricative, as can be seen in (34) for input *ɣ*. Here, Max[-cont] is simply irrelevant.

A comparison between (33) and (34) reveals an interesting fact: While the markedness of fricatives is not respected in the inventory, it is respected in coalescence. In other words, the unmarked manner emerges in coalescence!

It seems to me, then, that there is a type of emergence of the unmarked which has not yet been noticed. Usually, the unmarked emerges as follows (cf. McCarthy & Prince, to appear). A markedness constraint C is dominated by I-O Faithfulness and as a consequence is inactive in the language as a whole: *I-O Faith >> C*. It can emerge, however, in a domain such as reduplicants which are not subject to I-O Faith, but to B-R Identity: *I-O Faith >> C >> B-R Identity* . Since the markedness constraint C dominates this third constraint, B-R Identity, the unmarked emerges in the reduplicant.

In coalescence, there are no two different domains. So the unmarked cannot emerge because C dominates the domain-specific constraints. Instead, the unmarked emerges because the dual input provides a *choice* between faithfulness to a marked or to an unmarked feature, a choice not usually given in the computation for best output.

I leave it to future research to determine the status of this possible new type of emergence of the unmarked.

To return to the analysis of the D-effect, Max[-cont] and Max[+cont] interact with the constraints established in section 4. The following tableau provides a summary of all the constraints involved in determining the place and manner of a coalesced segment.

(35)

		Max	SamePl	Max [-cont]	Max [dors]/ [lab]	*Affric [dors]/ [lab]	Max [cor]	Max [+cont]	*Affric [cor]	Unif.
$d_1+\gamma_2$	$d\gamma_{12}$		*!			*				*
	$g\gamma_{12}$					*!	*			*
	dz_{12}				*!				*	*
	z_{12}			*!	*!					*
	γ_{12}			*!			*			*
	d_2	*!			*!			*		
	=> g_{12}						*	*		*
d_1+z_2	z_{12}			*!						*
	d_{12}							*!		*
	=> dz_{12}								*	*
d_1+dz_2	dz_2	*!								
	d_{12}							*!		*
	=> dz_{12}								*	*
d_1+g_2	dg_{12}		*!							*
	d_{12}				*!					*
	g_2	*!					*			
	=> g_{12}						*			*

The constraints yield the correct forms in all cases and provide a unified account of the D-effect.

However, one last observation needs to be made. Notice that place of articulation is obtained by a markedness-as-faithfulness hierarchy, while manner of articulation is determined by an opposite hierarchy, where faithfulness to a less marked feature dominates faithfulness to a more marked one. I will call the latter type of hierarchy "markedness-as-markedness". These two distinct hierarchies capture the fact that in the D-effect, the most marked place and the least marked manner are kept. Several questions come to mind:

Are there phenomena which show reversed hierarchies, i.e. markedness-as-markedness for place, and markedness-as-faithfulness for manner? To my knowledge, markedness-as-faithfulness has only be suggested for place features. But why should there be such an asymmetry? Is there an inherent difference between place and manner features, which brings about the asymmetric behavior? In addition to coalescence, assimilation will provide fruitful exploration grounds for these questions.

In summary, manner of articulation of the coalesced segment is determined by a markedness hierarchy: Max[-cont] >> Max[+cont]. This ensures that the less marked manner of articulation is chosen in coalescence. Interestingly, this means that coalescence is another way of getting emergence of the unmarked (for manner of articulation).

6. Laryngeal features

The behavior of laryngeal features in the D-effect seems puzzling at first. Consider the following examples:

(36) a. /Ø-**s**eh/ —> [he**z**eh] '3 yells/shouts'
b. /na-í-**d**-Ø-**s**eh/ —> [nahí**dz**eh] '3 lets out a yell, yells again'
c. (obj) /léyį-Ø-**x**e/ —> (obj) [léyį**ɣ**e] '3 cut obj'
d. /lé-**d**-Ø-**x**e/ —> [léye**g**e] 'it is cut' (R 1989:444)

(37) a. /ná-ne-į-Ø-**t**áh/ —> (obj) [náneį**t**a] '3 kicked (obj)'
b. /ná-ʔede-ne-na-**d**-Ø-**t**áh/ —> [náʔedena**t**a] '3 kicked 3-self' (R 1989:445)

What is puzzling is that *d* seems to voice fricatives, but fails to voice stops. This confusion arises if one assumes that *d* has a feature [voice], as the symbol suggests. But recall that the voiced-stop symbols are used for voiceless unaspirated stops. If one compares the behavior of stops to that of fricatives, it becomes apparent that the stops do not have a feature [voice]. The patterns are as follows:

Stops (in stem-initial position) show no laryngeal alternations. They are phonetically plain or aspirated or glottalized, never voiced, and do not show any voicing or other assimilation. In contrast, stem-initial fricatives are phonetically voiced or voiceless. They are voiced between voiced segments and voiceless if preceded by a voiceless segment (usually [h]).[9]

I follow Rice (1993, 1994) in conluding from these patterns that there must be a fundamental difference between stops and fricatives in Slave. Fricatives pattern with sonorants; stops are the only true obstruents of the language. This difference can be captured by using different features for stops and fricatives: Distinctive laryngeal features for stops are [cg] and [sg]. Fricatives have no laryngeal features underlyingly, but have voiced allophones between voiced segments. In other words, [voice] can spread to fricatives but not to stops.

In OT, this background phonology translates into the following constraints: There is a universal constraint which bans voicing on obstruents, *Voi/Obs (cf. Pulleyblank 1997). Since neither stops nor fricatives have voiced phonemes, for both *Voi/Obs must dominate Max[voi].[10] As can be seen in tableau (38), irrespective of the input, the outputs never have a feature [voi].

(38)

		*Voi/Obs	Max[voi][11]
/s/	=> s		
	z [voi]	*!	
/z/ [voi]	=> s		*
	z [voi]	*!	
/d/	=> d		
	d [voi]	*!	
/d/ [voi]	=> d		*
	d [voi]	*!	

The voiced fricative allophones occur because of a constraint which requires identical voicing values of adjacent segments. I am not concerned here with the correct formalization of this constraint. It could be something like Spead[voi] (cf. Lombardi 1996) or a free interpretation of

ICC[voi] (Pulleyblank 1997). I will opt for the latter. ICC[voi], then, dominates *Voi/Obs, yielding voiced fricatives between voiced segments, as in (36a, c) above.

(39)

	ICC[voi]	*Voi/Obs	Max[voi]
a. /Ø-seh/ (= 33a)			
heseh	*!		
=> hezeh [voi]		*	*
b. /léyį-Ø-xe/ (=33c)			
[léyįxe]	*!		
=> [léyįɣe] [voi]		*	*

Note that the same outputs would result if the underlying fricatives were voiced.

Stops do not undergo voicing. This can be captured in several different ways. One is to build into the definition of ICC[voi] that it does not apply to stops. Another is to split *Voi/Obs into two constraints, *Voi/Stop and *Voi/Fric. They would have to be ranked as follows,

(40) *Voi/Stop >> ICC[voi] >> *Voi/Fric >> Max[voi][12]

where *Voi/Fric replaces the *Voi of (39). The ranking in (40) ensures that stops do not undergo voicing, while fricatives do. Furthermore, since OT is output-oriented, a coalesced segment behaves like a "simple" output. If the coalesced segment is a stop, as in the case of D-effect, it will not be voiced, even if one of its corresponding input segments is a fricative. Compare tableau (41):

(41)

	*Voi/Stop	ICC[voi]	*Voi/Fric	Max[voi]
a. /na-í-**d**-∅-seh/ (=36b)				
=> [nahí**dz**eh]		*		
[nahí**dz**eh][13] [voi]	*!			*
b. /lé-**d**-∅-xe/ (=36d)				
=> [léyege]		*		
[léyege] [voi]	*!			*
c. /ná-ʔede-ne-na-**d**-∅-táh/ (=37b)				
=> náʔedenata[14]		*		
náʔedena**d**a [voi]	*!			*

To sum up, OT uses the background phonology of Slave to account for the fact that the D-effect produces only voiceless stops. No constraints specific to coalescence are proposed in this section. While some of the constraints are not "pretty", e.g., ICC[voi]stop and ICC[voi]fric, they are all required independently, in order to account for the unique behavior of Slave stops and fricatives in general.

So far, I have accounted for the place, manner and laryngeal features of a coalesced segment. Most of the facts simply fell out from the background phonology of Slave. In the next section of the analysis I turn to the last feature involved in the D-effect, nasality.

7. Nasality

The only phenomenon still to be accounted for is coalescence involving nasals. Two examples are given in (42).

(42) a. /-k'e-na-go-de-**d**-∅-**ne**h/ —> [gok'eagoda**de**] '3 explored by talking'

b. /**d**-∅-**me**/ —> [(ʔeðéh) **ehbe**] '(the hide) is strung on a frame' (R 1989:445)

We can observe that when *d* meets a nasal, the nasality is lost, and the output is a—less marked—oral stop. Furthermore, the more marked place feature is kept as usual.

The markedness-as-faithfulness hierarchy for place is responsible for choosing the output place feature. The outcome in terms of nasality can be captured by the ranking Max[-nas] >> Max[+nas]. Tableau (43) illustrates this:

(43)

	Max[-nas]	Max[dors]/ [lab]	Max[+nas]	Max[cor]
a. $d_1 + n_2$				
=> d_{12}			*	
n_{12}	*!			
b. $d_1 + m_2$				
=> b_{12}			*	*
m_{12}	*!			*
d_{12}		*!	*	
n_{12}	*!	*!		

While tableau (43) yields the correct outputs, there is something unsatisfactory about this analysis. Note that it hinges on the use of the feature [-nas]. However, nasality is usually assumed to be a privative feature (e.g., Steriade 1995): [nas] corresponds to the lowering of the velum and airflow through the nasal cavity; the absence of [nas] indicates that no such articulatory movement has taken place and that the articulation is oral. I have no independent justification for the feature [-nas], other than to make the analysis work.

The question, then, is whether there is any other way to explain the orality of the output. Gnanadesikan (1995) proposes to derive the loss of nasality from syllable structure constraints. She proposes a universal hierarchy which forces the choice of the better (less sonorous) onset:

(44) μ/V >> μ/Glide >> >> μ/Approx >> μ/Nasal >> μ/Fric >> μ/Stop

If Max[nas] is interspersed in this hierarchy immediately below μ/Nasal, the coalesced segment has to be oral, violating Max[nas] under duress of obeying μ/Nasal. While at first this seems like an ingenious solution to account for the loss of nasality in coalescence, it makes the wrong predictions elsewhere. Max[nas] >> μ/Nasal effectively rules out *all* nasal onsets in the language. However, nasal onsets are attested in Slave as well as in child language:

(45) a.	**ná.da.ne.ʔį**	'3 whispers'	(R 1989:447)
b.	**nih.me**	' you (sg) boil object'	(Fort Liard Slavey, R 1989:473)
c.	fi.te.**n**ʌ	'container'	(Gnanadesikan 1995:11)

Gnanadesikan does not explain this contradiction. To me, this looks like another case of emergence of the unmarked (unmarked onsets) in coalescence, but certainly we have not found the formal means to ban nasal onsets in coalescence only.

One last possibility is that this pattern has to do with the representation of nasals in Athapaskan languages in general. To begin with, there are few stems which have an underlying nasal. Furthermore, those stems can be phonetically realized as nasals, prenasalized stops or oral stops, as in (46).

(46) -**n**ɛh/-**nd**ɛh/-**d**ɛh 'talk (imperf.)' (Slave, R 1993:325)

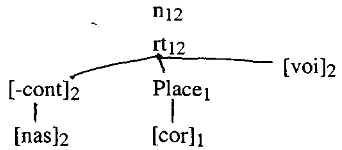
And finally, nasals are the only segments which show a high degree of cross-linguistic variation in the D-effect. *d+n* can result in *d*, as in Slavey, but it can also result in *n* (Sarcee/Tsuut'ina), in ^{d}n (Carrier) and in *n'* (Navajo) (Howren 1971).

All these facts indicate that there is some variation or uncertainty in the interpretation of nasals. For example, Rice (1993) suggests that nasal consonants do not have [nas] underlyingly, but that [nas] may be inserted by default. If this assumption is true, the variable interpretations of nasal stops are not surprising.

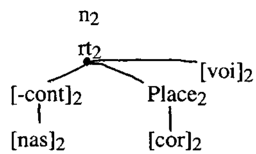
Following this line of reasoning, we can speculate that the output of *d+n* is *d* in Slave in order to maintain stronger faithfulness to both input segments. Note that an output *n* would not give a clear indication that it is a coalesced segment. It could either have the representation in (47a) or that in (47b)[15]:

(47) coalesced:

a.

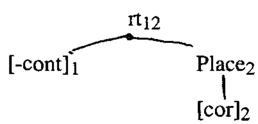


b. not coalesced:



In light of this ambiguity, and given the freedom in the pronunciation of nasals, speakers of Slave may just prefer an oral articulation, where there is no such ambiguity:

(48) d = [t]



Because of its orality, *d* is not identical to only one input segment (this is even clearer in the case of *d+m —>b* with the place feature $[labial]_2$) and is certain not to violate Max. It cannot be interpreted as deletion of input *d*, while *n* can.

This is an informal explanation, based on the motivation for coalescence to satisfy Max. If it is accurate, it provides strong evidence that the D-effect is indeed coalescence, even in the cases of *d* + stop. However, there is no straightforward way to represent this informal explanation in OT (or any other theory, for that matter).

In summary, coalescence of *d* plus a nasal involves the markedness-as-faithfulness hierarchy for place. No clear account for the loss of nasality has been found. The formal solutions make the wrong predictions or have to resort to uncommon representations, and the intuitive idea that the loss of nasality may be due to faithfulness cannot be represented formally.

Clearly, the representation of nasals in Athapaskan and their behavior in the D-effect needs more work.

8. Conclusion

This paper has presented an OT account of the D-effect in Slave, a Northern Athapaskan language. It has provided broad empirical coverage of the phenomenon of coalescence within the language and beyond, and has shed light on the nature of the process.

As to the nature of the process, the present analysis of the D-effect found that coalescence results from the interaction of faithfulness and markedness constraints. In particular, coalescence is a strategy to obey markedness as well as segmental faithfulness, and featural faithfulness as much as possible. In terms of constraints, this means that markedness , segmental faithfulness and featural faithfulness are high-ranked. The tradeoff is that Linearity or Uniformity are low-ranked: the linear sequence of the input is not recoverable.

This background of constraints predicts that the D-effect is always coalescence, even if the output looks like deletion. I argued that apparent deletion is in fact vacuous coalescence, and that the deletion analysis (for example, L&R 1994, 1995) is in fact impossible, given the OT constraints. This is desirable, since then the D-effect finds a uniform explanation which provides insight into its function.

The function of the D-effect and of coalescence in general is to maintain as much of the input as possible. With Max always satisfied, this is played out at the featural level: as many features as possible of both input segments are maintained. The language's background phonology and general, well-motivated markedness hierarchies determine how many and which features are maintained. Specific constraints, referring to morphological information, are not needed. This simple account can be extended beyond the D-effect, for example to coalescence in child language, something previous analyses have not achieved.

Besides providing a better understanding of the nature and the "inner workings" of coalescence, the study of coalescence raised some points of theoretical interest. For example, coalescence can yield emergence of the unmarked whenever there is a hierarchy Max[$F_{unmarked}$]

>> Max[F_{marked}], as in the choice of stops over fricatives. Usually, emergence of the unmarked involves faithfulness to different domains, in coalescence it involves computation over two inputs. Other interesting points are the special status of nasals, which needs further study, and the asymmetry between place and manner/stricture in terms of markedness and faithfulness. The further study of coalescence in Athapaskan and other languages is certain to shed more light on these questions.

Notes

* I thank Suzanne Urbanczyk for her encouragement, generous sharing of ideas, and enthousiasm. Without her, this paper would not exist. All errors and inadequacies are my own.

1 There is one other in-depth treatment of coalescence in Athapaskan: Causley 1996. Unfortunately, this work is not available to me at the time of writing.

2 The one exception to this is Sarcee/Tsuut'ina, where the D-effect is only caused by the classifier (Cook 1984).

3 Indices are used to show correspondence relations. Segments with the same index are correspondents of each other. Note that correspondents do not have to share all features.

4 Pater uses the more general constraint "Linearity" (cf. McCarthy & Prince, to appear).

5 While my analysis would also work in the aperture theory of Steriade (to appear), I am not using this framework. For reasons, see section 4, footnote 7.

6 If we were to use Ident[F] ("Correspondents are identical in their specification for F.", e.g., Pater to appear), there would be a violation from the output to the input: *dʒ* , a contour segment, is in correspondence with two non-contour segments, incurring one violation each of Ident[-cont] and Ident[+cont]. For this reason, Pater splits Ident[F] into IdentI-O[F] (similar to Max[F]) and IdentO-I[F] (similar to Dep[F]). Full coalescence violates only IdentO-I[F] (but not Dep[F]!), so this constraint is low-ranking.

However, I find using the Ident constraints problematic because one of them is *always* violated, even in cases of full coalescence. This does not capture the intuition that full coalescence maintains all features and is therefore perfectly faithful at the featural level—as opposed to partial [redacted] coalescence, where certain (input) features are lost. Max[F] and Dep[F] capture this intuition better, since they only show violations in cases of true coalescence.

For another account of coalescence which prefers Ident constraints, see Gnanadesikan (1995).

7 The fact that affricates are more marked than stops provides evidence against Steriade's (to appear) aperture theory. In aperture theory, stops and affricates have equally complex representations, consisting of a closure and a release node:

(i) a. stops: A_0A_{max}

b. affricates: A_0A_f

These representations wrongly predict that stops and affricates are equal in markedness. To get out of this dilemma, Steriade assumes that for stops, "releases are projected from underlying representations which are mere closures" (p. 208) by a Release Projection rule. However, this solution is not available in OT, which is a purely output-oriented representational theory.

For this reason, I am not using aperture theory in my analysis.

8 The output is still [t'], not [t], because the laryngeal feature [cg] is also maintained (cf. section 3 on full coalescence).

9 The patterning of stops is probably the same in all environments, but since I have only checked what happens in stem-initial position, I do not want to make such an unsubstantiated generalization.

With fricatives, there is a complication. In (initial position of) noun-stems, they are voiceless word-initially and voiced if preceded by any segment. Rice (1993) derives this difference between verb and noun stems from a morpheme [+voice], which intervenes between noun stem and prefix, but not between verb stem and prefix.

10 Also, in order to get the aspirated and glottalized stop phonemes, the following rankings must be assumed: Max[cg] >> *[cg] and Max[sg] >> *[sg].

11 Notice that Dep[voi] must also be low-ranking.

12 A third possiblity is to split ICC[voi] rather than *Voi/Obs. The relevant ranking would be ICC[voi]fric >> *Voi/Obs >> ICC[voi]stop >> Max[voi]. It is beyond the scope of this paper to determine which of these alternatives is the correct one. They all yield identical results in the analysis of the D-effect.

13 As is common in the Athapaskan literature, I am assuming that affricates are part of the stop series, cf. (2) in section 1.1. Thus, they are sensitive to *Voi/Stop rather than to *Voi/Fric.

14 Not inlcuded in this tableau are the constraints Max[cg] and Max[sg] (cf. footnote 10), which ensure that these distinctive laryngeal features of stops are maintained in coalescence.

15 Note that I also make the assumption that [-cont] dominates [nas]. Such an assumption is uncommon, but in the spirit of Rice (1987) who suggests that in Slave, the manner features are dominated by a manner node.

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Reduplicative Size-Segmentism Correlations as Root-Affix Asymmetries[1]

Suzanne Urbanczyk
University of Calgary

Abstract

While a great deal of research on reduplication has focused on deriving shape invariance or segmental identity, as yet no study has investigated whether there is a correlation between reduplicative size and segmentism. This paper fills this gap and presents evidence that there is a correlation between size and segmental content, which standard theories cannot account for. In languages with multiple reduplicative morphemes, no language was found in which the smaller reduplicant had more marked structure than the larger reduplicant. Based on proposals by McCarthy and Prince (1994a, 1999), a model is developed which precisely captures this pattern. The central assumption is that reduplicative morphemes can be specified as root or affix. The larger size and more marked segments found in root reduplicants parallels findings in prespecified morphemes. A detailed analysis of Lushootseed reduplication illustrates the predictions of the model.

1. Introduction

Reduplicative morphemes have two characteristic properties: they have an invariant shape and their segmental content is dependent on the neighbouring base. Standard approaches to reduplication either address the issue of invariant shape (McCarthy 1979, 1981; Marantz 1982, McCarthy and Prince 1986, *et. seq.*; Steriade 1988) or address the issue of segmental identity (Munro and Benson 1973; Wilbur 1979; Broselow 1983; Clements 1985; Kiparsky 1986; Mester 1986; Uhrbach 1987; Shaw 1987; Steriade 1988; Yip 1992). In these approaches shape properties are independent of segmental identity. However, interesting correlations between the size of the reduplicant and its segmental content do occur: larger reduplicants allow more marked segments, while smaller reduplicants are often found to exhibit less marked segments. For example, take the phenomena of reduplicative 'fixed segments' discussed by McCarthy and Prince (1990), where

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[1] This paper has evolved from several chapters in my thesis and hence has benefitted greatly from comments and suggestions of numerous people, including John Alderete, Emmon Bach, Dawn Bates, Laura Benua, Barry Carlson, Ewa Czaykowska-Higgins, Laura Downing, Thom Hess, Armin Mester, Nike Ola-Nike, Jaye Padgett, Joe Pater, Alan Prince, Doug Pulleyblank, Lisa Selkirk, Kimary Shahin, Pat Shaw, and Rex Wallace, as well as audiences at the Universities of British Columbia, Victoria, Calgary, Alberta, Washington, UMass, the University of California, Irvine, and NELS 24 at Harvard/MIT. I am particularly grateful to John McCarthy, for his generous feedback, advice, and critical acumen, which fed this research in its initial stages. All errors of fact, interpretation, and ommission are mine alone. This research was supported in part by SSHRCC doctoral and post-doctoral fellowships, and an NSF grant awarded to John McCarthy.

two situations are said to occur: epenthesis and 'melodic over-writing'. A brief survey shows that default epenthetic segments overwhelmingly occur with mono-syllabic reduplicants, as can be seen with the initial glottal stop in Nancowry (1a) and the non-base [i] in Lushootseed (1b).

(1) Default Segmentism

a. Nancowry (Radhakrishnan 1981)

cɯt	ʔit-cɯt	'to go, to come'
cuəc	ʔit-cuəc	'to massage'
rom	ʔum-rom	'to eat pandanus fruit'
ɲiak	ʔuk-ɲiak	'to bind'

b. Lushootseed Diminutive (Bates 1986)

tədᶻíl	tí-tədᶻil	'lie in bed/ lie down for a little while'
bəč	bí-bəč	'fall down/ drop in from time to time'
s-kʷəbšəd	s-kʷí-kʷəbšəd	'animal hide/ small hide'
s-qəlíkʷ	s-qí-qəlikʷ	'blanket/ small blanket'

The more marked segments characterized as 'melodic over-writing' tend to occur most with total or foot sized reduplicants, as can be seen in the echo-word formations found in English (2a) and Kolami (2b).

(2) Melodic Overwriting

a. English
table-schmable
Tolstoy-Schmolstoy
linguistic-schminguistic
abracadabra-schmabracadabra

b. Kolami (Emaneau 1955, cited in McCarthy and Prince 1990)

pal	pal-gil	'tooth/ tooth and the like'
kota	kota-gita	'bring it!/ bring it or the like'
iir	iir-giir	'water/ water and the like'
maasur	maasur-giisur	'men/ men and the like'

This paper argues that the relationship between size and segmentism is not spurious, and should follow from the architecture of Universal Grammar. A model is developed, within Generalized Template Theory (McCarthy and Prince 1994a, 1999), where size and segmentism are linked.

The central claim of the paper is that both size and segmental identity can be related to the morphological category of the reduplicative morpheme. While the range of reduplicative phenomena examined in the studies cited above has been varied and diverse, as yet no study has investigated whether or not there is a correlation between reduplicative size and segmentism. This study proposes to fill the gap by offering cross-linguistic evidence of a correlation between reduplicative size and segmentism. The central finding is that larger reduplicants permit more marked structure than smaller reduplicants. The size-segmentism correlation is analyzed as a case of a root-affix asymmetry in the reduplicative domain. There is a wide variety of synchronic and diachronic evidence that roots are larger than affixes and often have more marked segments in them. This phonological difference in size and segmental content will be called the root-affix asymmetry. A key finding is that the root-affix asymmetry is observed in the reduplicative domain.

The paper captures the root-affix asymmetry by extending proposals by McCarthy and Prince (1994a, 1999) that reduplicative morphemes can achieve shape-invariance by reference to morphological category alone - Generalized Template Theory. The extensions are twofold. First, while McCarthy and Prince propose that reduplicative morphemes can be either stem or affix, here it is proposed that they can be roots, thus extending the categories a reduplicative morpheme can be. Second, while McCarthy and Prince focused on shape, here it is proposed that a variety of phonological properties can be derived, one of which is the correlation between size and segmentism. The proposal is that size and segmental quality of reduplicative morphemes can be determined by reference to root or affix. Thus, the analysis of size-segmentism correlations reported on here provide further support for Generalized Template Theory. A consequence is that reduplicative templates are unnecessary, and we are one step closer to the goal of eliminating reduplicative-specific mechanisms from the grammar. Other work which supports the elimination of templates from Universal Grammar includes Spaelti (1997), Gafos (1998ab), and Walker (1999).

The paper is organized as follows. First, section 2 presents a discussion of the size-segmentism correlations that are found. This includes brief discussions of the typology of reduplicative size and segmental identity that have been discovered thus far. The correlation is restricted to languages which have more than one reduplicative morpheme. This is significant in establishing critiria for correlations. No language with multiple reduplicative morphemes has been found which eliminate marked structure from the large reduplicant, while maintaining marked structure in the smaller reduplicant. It is also shown that models of reduplication which have a separate copy mechanism (like those mentioned above) cannot account for the observed pattern. A formal discussion of the model is presented in section 3. The model is framed within Prince and Smolensky's (1993) Optimality Theory, with crucial reference to McCarthy and Prince's (1994a, 1995, 1999) Correspondence Theory. The central point is that reduplicative morphemes can be specified as roots. As such they exhibit canonical phonological pattern of roots of the language, which is manifest in size and segmental content. Section 3 also includes a detailed discussion of the predictions of the model. There are essentially two predictions. First, within a language, it is impossible to derive a system in which a large reduplicant has less marked segmental quality than the small reduplicant. Second, if a language has two reduplicative morphemes with the same morphological category, then they will exhibit similar size and segmental properties. The remainder of the paper (section 4) is dedicated to a detailed case study of three reduplicative morphemes in Lushootseed (Central Salish). Lushootseed was chosen because there is a correlation between size and segmental quality, where the larger reduplicant ('distributive') has more marked phonological structure. Some of the relevant data are presented below. Observe that the smaller 'diminutive' and 'out-of-control' morphemes both have the default *i* (3a and 3b), but the larger 'distributive' does not (3c).

(3) Lushootseed Reduplication Patterns (Bates, Hess and Hilbert 1994)

a.	'diminutive' (DIM)		
	ǰə́səd	ǰi-ǰəsəd	'foot/ little foot'
	tədᶻíl	tí-tədᶻil	'lie in bed/ lie down for a little while'
	bəč	bí-bəč	'fall down/ drop in from time to time'
	s-kʷəbšəd	s-kʷí-kʷəbšəd	'animal hide/ small hide'
b.	'out-of-control' (OC)		
	ʔəx̌íd	ʔəx̌-íx̌-əd	'what happened/ What's he done?'
	kʷ'əq	s-kʷ'əq-íq	'fall backwards/ robin (tilts head back)'
c.	'distributive' (DIST)		
	ǰə́səd	ǰə́s-ǰəsəd	'foot/ feet'
	dᶻə́x̌	dᶻə́x̌-dᶻəx̌	'move/ move household'
	s-čə́txʷəd	s-čə́t-čətxʷəd	'bear/ bears'

The analysis derives both the size and segmental quality of the three reduplicative morphemes above, by reference only to morphological category.

2. Size-Segmentism Correlations

In order to establish a correlation between size and segmental content, it is useful to first discuss the range of patterns independently observed about reduplicant size and segmentism. We first examine reduplicant size, establishing criteria for the set of reduplicative morphemes under investigation. Then we examine the typology of reduplicant segmentism, establishing the range of segmental identity observed in reduplication. Once the correlations are established, a few apparent counter-examples are discussed. These points are necessary prior to the analysis, because while some studies have focused on how to derive size or shape, and others have examined how to derive certain segmental properties, no study has investigated whether or not there is a correlation. Finally, before launching into the model, it will be shown that non-Correspondence models fail to capture the generalizations regarding size and segmentism.

2.1 Typology of Reduplicant Size

In the following discussion it is important to be clear about what is meant by the term reduplicant size and how this differs from reduplicant shape. By using the term size, it is possible to capture the generalization that CV- prefixes and -VC suffixes have the same phonological property: namely size. The term shape cannot capture the similarity, because CV- has an onset, while -VC lacks one. We will see below that being able to claim that these reduplicants have the same size is important in capturing a generalization.[2]

In determining the range of sizes, it is useful to establish how form and function match up in reduplication.[3] One possibility is that one meaning is associated with one size. Such languages only have one reduplicative morpheme and are not useful in establishing correlations. It is also possible that a language may associate one meaning to multiple shapes, which are often phonologically conditioned. Examples of these can be found in Nakanai and West Tarangon.

(4) Phonologically conditioned variation in shape/size

a. Nakanai (Carlson 1997; Spaelti 1997)

<u>ligi</u>ligi	'hurting'
<u>kau</u>kau	'wearing lime on the face'
<u>ba</u>beta	'wet'
<u>o</u>loli	'digging'

b. West Tarangon - Rebi dialect (Nivens 1992; Moore 1996; Spaelti 1997)

dɔ́am	<u>dɔ</u>dɔ́am	'pound'
lɔpay	<u>lɔp</u>lɔ́pay	'cold'
bitɛ́mna	bi<u>m</u>tɛ́mna	'small-3sg'

Because the shape differences are the result of eliminating marked structure and are determined by the properties of the base (Moore 1996; Carlson 1997; Spaelti 1997), these patterns are only indirectly relevant in establishing a correlation between size and segmentism. A third condition is that one shape is associated with multiple meanings. This pattern is found in some of the Salish languages, including Nuxalk (Bella Coola - coastal language isolate), Halq'eméylem (Central Salish), and Mainland Comox (Northern Coast Salish). In all of these languages the 'diminutive' and 'continuative' morphemes are CV- reduplicants.[4]

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[2] This discussion is intended to help clarify the difference between size and shape. There is no intention to make any claims regarding segment counting in reduplication, or to imply that schema like VCV, CVC, VCC form a natural class in terms of reduplicative shape.

[3] See Spaelti (1997) for a useful survey of the relationships found between reduplicant form and function, particularly phonologically determined shape/size differences.

[4] Nuxalk has the innovation that the reduplicant can also be CVC - only if C2 is a sonorant or fricative (Urbanczyk 1989; Carlson 1997). The data are not entirely regular and may involve an independent suffix (Bagemihl 1991).

(5) CV- multiple meanings - 'diminutive' (DIM) and 'continuative' (CONT)

a. Nuxalk (Bagemihl 1991)

kap'ay	kakp'ay	'humpback salmon/ DIM'
p'ɬa	p'ɬaɬa	'wink, bat the eyes/ CONT'

b. Halq'eméylem (Galloway 1993)

q'ɛ́:mi	q'ɛ́q'əmi	'adolescent girl/ DIM'
p'ɛ́tθ'	p'ɛ́p'ətθ'	'sew/ CONT'

c. Mainland Comox (Watanabe 1994)

supayu	suspayu	'ax/ DIM'
ʔuɬq^{w}u	ʔuʔuɬq^{w}u	'dig clams/ CONT'

Situations like this are often associated with a different phonological pattern for the base. For example, in Mainland Comox, all root vowels syncopate with 'diminutive', but not 'continuative' (Kroeber 1989; Blake 1992; Watanabe 1994). In Halq'eméylem, if the base begins with a sonorant-schwa sequence, the 'diminutive' is Cí-, while the 'continuative' is a non-reduplicative /hə́-/ sequence (Galloway 1993; Urbanczyk 1999a). Because the phonological differences are found in the stem as a whole and are not confined to the reduplicant, patterns like these are not useful in directly establishing a correlation. Finally, there are many languages with a more or less one-to-one relationship between form and function in which reduplicants have multiple meanings and multiple sizes. If there is more than one meaning and more than one size, then the only logical possibility is that one reduplicant will be larger than the other. It is these cases which will be of interest in establishing size-segmentism correlations. The other situations are not as useful because if a language has one form, the fact that it has marked segments in it will not reveal a direct correlation. A more useful test is to see what is correlated with both large and small sized reduplicants within a single language.

In terms of the range of possible sizes, the prosodic morphology research program has revealed the following possibilities: total reduplication, foot-size reduplication, syllable-size reduplication, and single segment reduplication. In total reduplication, the size of the reduplicant is maximal and varies with the size of the base. We will consider cases like these only in a superficial survey. For foot-size reduplicants, there are languages like Manam in which a reduplicant can be either CVCV or CVC (Lichtenberk 1985). Analyzing the reduplicant as a bimoraic foot makes it possible to be precise about what is meant by shape or prosodic size. However, syllabic size varies. Cases of single segment reduplication are not straight-forward either because analysts debate whether they are truly reduplicative or not. For example, the Yoruba Cí- morpheme has been analyzed as spreading a consonant (Pulleyblank 1988; Ola 1995) or as reduplication (McCarthy and Prince 1990; Alderete et. al. 1999). This leaves syllable-type reduplicants as the best case where size can truly vary. Syllable-shaped reduplicants can be CVC, CV, VC, or V.

2.2 Typology of Reduplicant Segmentism

In terms of reduplicant segmentism, two main patterns can be observed: total identity or lack of identity. Total identity can be of two basic types: over-application, where an alternation occurs without the phonological trigger and under-application, where an alternation fails to occur given the appropriate phonological trigger (Wilbur 1979). McCarthy and Prince (1995; 1999) have reanalyzed these identity preserving phenomena in Optimality Theory by making use of an explicit Correspondence Relation between reduplicant and base. Because identity is obeyed, it is not a straightforward issue to determine markedness.[5] A second situation is lack of identity. On the one hand, lack of identity can be the result of a phonological process applying to either reduplicant or base. This phenomena has been described by McCarthy and Prince as normal application. On the other hand, lack of identity can be due to what McCarthy and Prince (1994ab *et. seq.*) term 'emergence of the unmarked'. The reduplicant simply eliminates marked structure, without an overt trigger or context. This results in neutralization of a contrast or even wholesale insertion of a default segment. A third source of lack of identity is fixed segmentism, where the fixed segment cannot be equated with a default. Following McCarthy and Prince (1990) and Alderete et. al. (1999), this is analyzed as an input affix over-writing segments of the reduplicant. This latter source of markedness is morphological in nature and cannot be useful in establishing a phonological observation.

This brief overview reveals a key point of interest to the current study. The 'emergence of the unmarked' (or TETU) segmentism is the most useful in this survey. Because there is no obvious trigger, we can check whether there is marked or unmarked structure in the reduplicant with respect to the base. Thus, in terms of reduplicative segmentism, we confine our investigation to whether or not a reduplicant exhibits TETU effects.

2.3 Correlations

The correlations discussed here are based on examining languages with multiple reduplicants of more than one size and determining whether or not a reduplicant has marked structure or eliminates marked structure. Languages with two reduplicative morphemes will suffice. By examining large vs. small and marked vs. unmarked, there are four possible combinations. If there is no correlation between size and segmentism then all four patterns should be found. However, if there is a correlation, then there should be a gap. As the following tables illustrate, there is. The finding is that the larger size RED allows more marked segments, while the smaller size neutralizes contrasts. It is also possible that both reduplications neutralize a contrast. However, no language has been found which allows marked structure only in the smaller reduplicant, while eliminating it in the larger one.

[5] Over- and under-application patterns maintain identity in several ways, which are not always equated with maintaining marked structure. It would be useful to conduct a further survey and determine whether identity preserving phonology is correlated with large size.

Controlling for syllable-sized reduplicants, the difference between large and small translates into CVC vs. CV.[6] Because it is difficult to find cases which are identical in terms of markedness, the markedness parameter varies across the languages. Thus the variables are: M for having a marked feature and U for being unmarked. Beside the language name, a schema of the markedness pattern is indicated. I have included two tables: one for featural markedness (laryngeal contrasts), the other for segmental markedness (default vowels).

(6) Featural Markedness - laryngeal contrasts

CVC-	CV-	Language	Base	Pattern
M	M	Halq'emeylem	C'VC...	C'VC- C'V-
M	U	Korean	C^hVC...	C^hVC- CV-
U	U	Shuswap	C'VC...	CVC- CV-
U	M	***	C^hVC...	CVC- C^hV-

(7) Segmental Markedness - default vowels

CVC-	CV-	Language		Pattern
M	M	Agta	CVC...	CVC- CV-
M	U	Lushootseed	CəC...	Cə́C- Cí-
U	U	Sawai	CVC...	CεC- Cε-
U	M	***	CVC...	CεC- CV-

Examples of the patterns are provided below in the order of their presentation in the tables. Mneumonics like MM and MU are included by each to facilitate discussion below. The convention used is that the first variable refers to the larger reduplicant. In terms of laryngeal features, Halq'eméylem (Coast Salish) allows ejectives in the onsets in both CVC- and CV- reduplicants. As pointed out by Kim (1996), in Korean, laryngeal neutralization occurs with the -CV reduplicant, but there is no laryngeal neutralization with the larger CVC- (analyzed as a stem by Kim). And in Shuswap (Northern Interior Salish), laryngeal neutralization occurs with both CVC- and CV- reduplicants. Reduplicants are underlined and are consistent with the source analyses.

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[6] In my survey of reduplicative patterns, it was quite difficult to find CVC and CV size differences within one language. However, there are numerous languages in which the larger reduplicant is disyllabic or total and the smaller is CV. This is presumably a consequence of the canonical root shape of a language. Languages which have a disyllabic minimality requirement on roots would not be likely to mandate CVC root reduplication.

(8) Featural markedness - laryngeal contrasts

a. MM Halq'eméylem (Galloway 1993)

CVC	st'í:lə́m	st'əlt'í:lə́m	'song/ songs'
CV	t'í:ləm	t'ít'ələm	'sing/ singing'

b. MU Korean (Kim 1996)

CVC	tʰəlɨm	tʰəltʰəlɨm	'sour/ no gloss'
CV	pʰaŋ	pʰapaŋ	'a bang/ two bangs in one event'

c. UU Shuswap (Thompson and Thompson 1985: 136)

CVC	t'ək?-ém	x-təkt'ək?-éχn	'support, prop up/ crutches'
CV	?s-t'il	tət'il-t	'to stop, quit/ keeping still'

In terms of default segmentism, in Agta (Malayo-Polynesian branch of Austronesian) both CVC- and CV- reduplicants have full vowels. In Lushootseed the default [í] occurs only with the CV reduplicant if the base contains marked structure - in order to avoid having a stressed schwa. This pattern will be analyzed in detail in §4.2 below. Finally, the Austronesian language Sawai has the default vowel in both CVC- and CV- reduplicants (Whisler 1992; Spaelti 1997). Evidence that the vowel is epenthetic comes from Whisler (1992: 25) who observes: '...if the final syllable is other than CV, /ɛ/ is added'. No language was found to have the UM pattern in terms of featural or segmental markedness.

(9) Default segmentism

a. MM Agta (Healey 1966)

CVC	takki	taktakki	'leg/ legs'
CV	dakal	dadakal	'big/ very big'

b. MU Lushootseed (Bates 1986; Urbanczyk 1996; Alderete et. al. 1999)

CVC	ǰə́səd	ǰə́sǰəsəd	'foot/ feet, legs'
CV	ǰə́səd	ǰíǰsəd	'foot/ little foot'

c. UU Sawai (Whisler 1992; Spaelti 1997)

CVC	tolɛn	tɛltolɛn	'to sit/ chair'
CV	dorɛm	dɛdorɛm	'dark/ night time'

Establishing a gap cross-linguistically is difficult, because it requires examining every language in detail. However, combing the literature on reduplication has failed to yield a true UM pattern. It is important to note that apparent UM patterns can be found. Further examination of the phonological systems reveals that they are not true cases of UM. There are (at least) two situations which would yield apparent counter-examples. However, for them to be considered true cases of UM, there must be no higher constraint compelling the pattern.

First, the loss of marked structure in the large reduplicant could be due to normal application. For example, in Salish, Halq'eméylem (Central Salish) and Mainland Comox (Northern Coast Salish) show segmental assymetries between 'plural' CVC- and 'diminutive' CV- reduplicants, where the vowel associated with the CVC reduplicant is schwa (the typical default in Salish) while the CV- redplicant has a full vowel. Vowel reduction is a case of loss of contrasts.

(10) Halq'eméylem (Galloway 1993)

a. CVC- 'plural'

sí:lə	səlsí:lə	'grandparent/ grandparents'
smɛ́:lt	sməlmɛ́:lt	'rock, mountain/ rocks, mountains'

b. CV- 'diminutive'

sí:lə	sísələ	'grandparent/ granny (pet name)'
χá:cɛ	χáχcɛ	'lake/ little lake'

Notice that the CVC- reduplicant is not stressed, while CV- is. Further examination of the phonology of Halq'eméylem reveals that unstressed vowels reduce to schwa (Galloway 1993; Urbanczyk 1999a). Thus the lack of identity is a case of normal application and is not a true TETU effect. Given the stress placement, it would actually go against the regular phonological pattern of the language to have an unstressed full vowel in CVC-. If it did, it would be analyzable as a case of under-application of vowel reduction. Examples of mismatches due to normal application are expected to occur and do not constitute true counter-examples.[7] Further investigations into stress and vowel reduction in Mainland Comox are needed before the pattern can be considered a true counter-example.

A second situation is when a morpheme-specific subcategorization requirement could compel marked structure in the smaller reduplicant. Again, the apparent counter-example comes from Salish. In St'at'imcets (Lillooet - Northern Interior Salish), the 'diminutive' contains stressed schwa (11a), while the plural (11b - cognate with DIST CVC) does not (van Eijk 1997; Shaw 1998).

(11) St'at'imcets (van Eijk 1997; Hewitt and Shaw 1995)

a. Cə́- 'diminutive'

s-yáqcaʔ	sy'ə́y'qcaʔ	'woman/ girl'
kʷtámc	kʷtə́tməc	'husband/ little husband'

[7] The loss of glottalization on ejectives in Shuswap is not a straight-forward TETU effect. Thompson and Thompson (1985) present evidence that there is a Grassman's Law for Salish in Shuswap, where the first of two ejectives in a root loses its glottal articulation. Just as in Sanskrit, the prohibition is actively enforced in reduplication. However, the existence of words like [tə-tə́-t'χ-t] 'taller', with multiple reduplicative morphemes provides support for analyzing it as TETU, because both reduplicants deglottalize the obstruent. If it were a case of normal application, we would expect the second reduplicant to maintain the glottal articulation. See Itô and Mester (1998) who analyze the Sanskrit pattern as an OCP-triggered TETU effect via self-conjoining two markedness constraints. See also MacEachern (1999) for a phonetically-based account of laryngeal dissimilation effects.

This is not a true counter-example, because the 'diminutive' is an infix which must be located at the stressed syllable, a common pattern in the Interior Salish languages (Broselow 1983). Its subcategorization requirement is to be infixed at the position of stress, and this requirement is always satisfied. Loss of featural contrast to schwa is typical of the loss of a contrast. Thus, the St'at'imcets pattern is most likely a case of UU. Stressing the 'diminutive' is a separate subcategorizational requirement that the 'plural' does not have.

In addition to these facts, a short survey of fixed segmentism typology was conducted. Recall that, in addition to default segmentism, melodic over-writing has been proposed to account for fixed segments that are marked e.g. forms like *table-schmable*. An Appendix contains the results of a survey of the literature on fixed segmentism. The type of segmentism is either TETU or MO (melodic over-writing). Size was classified as one of three categories - total, foot, or mono-syllabic. Details regarding the sources of information and how classifications were made are supplied in Appendix A.1. There were two central results, summarized in table format below.

(12) Summary - languages examined in Appendix A.1 (total = 26)

	Total	Foot	Mono-syllabic
TETU	ø	1	11
MO	9	3	2

The first result is that default segments are never found with poly-syllabic reduplicants. The only case of a foot-size reduplication with default segmentism was Bugis. Observe that the reduplicant ends with [k].

(13) Bugis (Uhrbach 1987: 165 - glosses not provided)

arawen	arak-arawen
cabberu	cabbek-cabberu
pattama	pattak-pattama

However, as Urbach (1987: 164) notes, Bugis is simply a case of normal application.

> '... only two consonantal phonemes are permitted in morpheme-final position: *k* and ŋ. Thus it is *k* which appears in final position in the affix, closing the syllable. [...] Thus these are not true cases of segment-changing reduplication per se.'

The second result is that melodic over-writing occured more frequently with total reduplication, but was evenly distributed between foot-size and monosyllabic reduplicants. If the marked segmentism is truly affixal in nature (as proposed by McCarthy and Prince 1990), then there should be no correlation with size. These results on the distribution of fixed segments are consistent with the claims about marked structure being correlated with larger reduplicants.[8]

To summarize the findings, no languages of the type UM have been found. This supports the claim that there is a correlation between size and segmentism. Within a language, larger reduplicants permit more marked structure than smaller reduplicants. It was also found that large and small reduplicants can both permit marked structure or both eliminate marked structure. This implies that segmental quality is not a *function* of size. That is to say, we cannot predict that a large reduplicant will be marked and a small reduplicant will be unmarked. We can only predict that when we examine them both, we will not find an unmarked large reduplicant and a marked small reduplicant. Therefore, the appropriate term to use is correlation.

2.4 Non-Correspondence Models

Most models of reduplication do not posit an explicit relation between segments of the base and those of the reduplicant. Instead, the segmental identity between base and reduplicant is achieved by an explicit 'copy' mechanism (Marantz 1982; McCarthy and Prince 1986, 1991; Clements 1985; Mester 1986; Steriade 1988). It is useful at this point to determine the types of predictions that these models make with respect to size and segmentism correlations. In short, because there is short-lived copy mechanism, the relation between base and reduplicant is non-permanent and specific rules are needed to derive the lack of identity. When both reduplicants have the same phonological pattern, a rule applies equally to both. However, when there is an asymmetry, it will be necessary to posit morpheme-specific rules. Because size is determined independently of segmental quality, there is no link between them and thus no correlation is expected. The problem extends to OT approaches to reduplication in which size is determined by templatic constraints (Downing 1998) and in which there is no correspondence relation (Inkelas and Zoll 1999). However, in order to keep the discussion brief, we only discuss the non-OT approaches. In order to illustrate the conclusion, we present a generic 'copy' analysis of the Lushootseed pattern of default segmentism.

In Lushootseed, schwa vowelled stems preserve schwas in CVC- 'distributive reduplication (DIST), but eliminate them in CV- 'diminutive' reduplication. The following data illustrate the asymmetry.

[8] An interesting pattern described by Uhrbach (1987) was Gayu, which shows variation between total reduplication and partial Cə- reduplication. This type of variation is difficult to capture with templatic models of reduplication. However, if speakers vary in their morphological classification of the reduplicative morpheme, the pattern can be analyzed as total identity preserving root vs. an unmarked minimal affix.

(14) Lushootseed - schwa-vowelled stems (Bates, Hess, and Hilbert 1994)

a. DIST

ǰə́səd	ǰə́sǰəsəd	'foot/ feet, legs'
d^{z}ə́χ	d^{z}ə́χd^{z}əχ	'move/ move household'
sčə́tx^{w}əd	sčə́tčətx^{w}əd	'bear/ bears'
bə́s	bə́sbəs	'thin/ thin (board)'

b. DIM

ǰə́səd	ǰíǰsəd	'foot/ little foot'
g^{w}ədíl	g^{w}íg^{w}ədil	'sit down/ sit down briefly'
təd^{z}íl	títəd^{z}il	'lie in bed/ lie down for a little while'
sqəlík^{w}	sqíqəlik^{w}	'blanket/ small blanket'

As Bates (1986) points out, the occurence of [i] with DIM is phonologically conditioned because it is predictable and does not occur with every stem. Following Urbanczyk (1996, 1999b) and Alderete et. al. (1999), the trigger for the [í] is assumed to be stress on schwa. The following DIM stems with non-initial stress verify this point - they are unstressed and retain schwa.

(15) Diminutives with non-initial stress (Bates, Hess, and Hilbert 1994)

qəqsíʔ	'favorite uncle'
ƛ'əƛ'əládiʔ	'little noise'

In order to obtain the pattern for the 'diminutive', it is necessary to derive an intermediate form like [ǰə́ǰəsəd]. This can be achieved via copying and associating to a template (McCarthy 1981; Marantz 1982; McCarthy and Prince 1986, 1990), paraffixation of a template to a base with subsequent linearization (Clements 1985; Mester 1986), or by copying and trimming (Steriade 1988). We abstract away from the specifics here in order to show how 'copy and associate', 'parafixation', and 'copy and trim' models are equivalent with respect to size-segmentism correlations. Stress is located on the first syllable and then a 'repair' rule applies to change the stressed schwa to [í]. We know that stress must be applied first because the forms above which are unstressed still retain the schwa. Alongside DIM is a DIST stem which is incorrectly repaired as well. This shows that the 'repair' rule must be specific to the DIM stem.

(16)

UR	/CV-ǰəsəd]	[CVC-ǰəsəd]
post-reduplication	ǰəǰəsəd	ǰəsǰəsəd
stress	ǰə́ǰəsəd	ǰə́sǰəsəd
repair ə́ -> í	ǰíǰəsəd	ǰísǰəsəd
syncope	ǰíǰsəd	d.n.a.
SR	[ǰíǰsəd]	*[ǰísǰəsəd]

Once the rule is parochialized, the correlation between size and segmentism is lost. There is no *a priori* reason why the 'repair' is associated with DIM and not DIST. We could just as easily imagine a situation where [i] is found with CVC reduplicants and not CV.

Attempts to derive the default [i] by assuming that schwa is absent from URs fare no better. For example, Bates (1986) assumes that schwa is absent from the input and that [i] is inserted to supply a vocalic nucleus to the DIM reduplicant. The question then is: Why is [i] not inserted for DIST? To derive the asymmetry would require two separate vowel insertion rules - one inserting [i] for DIM and one inserting schwa for DIST. Furthermore, the forms in (15), which are not stressed would incorrectly be supplied with an [i]. That's because in Bates' analysis, [i] insertion is not related to the markedness of stressed schwa. In a similar vein, Czaykowska-Higgins (1993) proposes that schwas resist being stressed in Nxa?amxcin (Moses-Columbia Salish) because they are not present underlyingly. Schwas are only inserted after metrical feet are constructed. If we extend this idea to Lushootseed, we are still faced with the same problem as above and would still require separate rules for DIST and DIM.

This discussion has shown that approaches which have separate mechanisms for determining segmental quality and size require morpheme-specific rules to derive asymmetries. Because morphological rules are assigned on an *ad hoc* basis, the prediction is that there should be languages yielding authentic cases of UM, where the larger reduplicant has unmarked structure and the smaller reduplicant has marked structure. These models over-generate the number of reduplicative systems. In order to capture the correlation, what is needed is a model in which the size and segmental quality are achieved via the same mechanism. McCarthy and Prince's (1995, 1999) Correspondence Model provides such a mechanism. The following section outlines the properties of the model, as well as the predictions it makes.

3. Morphological A-Templatic Reduplication

The model developed here relies entirely on proposals made by McCarthy and Prince (1994a) during their Utrecht talks. At that time, they made three innovative claims, summarized below.

(17)

(17)	RED=MCat	• the shape properties of reduplicative morphemes are derivable from their morphological classification
	Correspondence	• strings are related to each other via a Correspondence Relation
	Rt >> Afx	• roots are more marked than affixes

The combination of these three proposals derives the size-segmentism correlations. The goal of this section is to explicate each of these claims and develop a morphologically informed a-templatic model of reduplication. A final section outlines the predictions of the model.

3.1 Basic Assumptions

We begin by discussing each of the claims in brief, and providing explicit representations below. The first claim is that morphological classification is all that is needed to derive the shape and prosodic properties of reduplicants. For example, the prosodic word status of reduplicants can be derived by the interaction of general constraints on stems if RED is specified as a Stem. Evidence and explication is presented in McCarthy and Prince (1999). The model here differs slightly, where it is proposed that Root be among the class of MCats along with Stem and Affix.[9] A consequence of McCarthy and Prince's proposal is that templates can be dispensed with altogether, and reduplication is a-templatic.[10]

Regarding the second claim, reduplicative morphemes, like all morphemes, achieve their phonological content by a Correspondence relation.

(18) Correspondence (McCarthy and Prince 1995, 1999)
Given two strings, S_1 and S_2, **correspondence** is a relation $\Re$ 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 when $\alpha\Re\beta$.

Pre-specified morphemes achieve their phonological content via an IO-Correspondence relation, while reduplicative morphemes achieve their phonological content via BR-Correspondence. In the first case S_1 is the input and S_2 is the output. In reduplication, S_1 is the base and S_2 is the reduplicant. Faithfulness constraints evaluate various aspects of the correspondence relation to determine identity. Because there are distinct correspondence relations, there are distinct Faithfulness constraints. Thus we have IO-Faith and BR-Faith.

Finally, the well-known observation that roots are more marked than affixes is translated into OT by assuming that correspondence is sensitive to morphological category. The assumption is that there is a correspondence relation specific to roots: Root-Correspondence. This special correspondence relation also has an attendant set of Faithfulness constraints: Root-Faith. Marked structure emerges on roots because Root-Faith is ranked above constraints against marked structure.

At this point we have the basic pieces to the model, and it is important to be more precise about their formal properties. In particular, we need to examine how marked structure emerges on roots and is eliminated from affixes. This is the key to capturing the size-segmentism correlation. As the reader may be anticipating, the larger more marked reduplicants will be analyzed as roots, while the smaller, less marked reduplicants will be analyzed as affixes. Reduplicative morphemes simply mirror what is phonologically possible with pre-specified morphemes. There are

[9] It is not clear whether Stem is derivable by other morphological considerations and can be dispensed with altogether. For example, while all stems are roots, not all roots are stems, so root is in some sense a more basic category than stem. I leave the issue open for further investigation.

[10] There exists a growing body of work supporting a-templaticism including Spaelti (1997), Gafos (1998ab), Walker (1999), and Urbanczyk (1999a).

two basic approaches to achieving the phonological asymmetry, with essentially the same empirical results. The following section outlines both approaches, showing their empirical equivalence. The section ends with a brief discussion of the pros and cons of each opting for the more general positional faithfulness approach of Beckman (1997).

3.2 Root-Faith

Steriade (1995) proposes that roots are just one of several prominent positions which license more contrasts than other non-prominent positions. Translating this insight into Correspondence Theory, Beckman (1997) develops a model with two types of Correspondence relations: general correspondence and special correspondence. The special correspondence refers to positions of prominence, hence the name of the model is positional faithfulness. She subsitutes any one of several prominent positions in the place of special correspondence and derives a wide variety of phonological patterns. The relevant component of the model to the pattern examined here is root-correspondence. Thus, there are Faith and Root-Faith. When roots and affixes have the same phonological patterns, the ranking between Faith and Rt-Faith cannot be determined. However, when roots are marked with respect to some constraint M, then Rt-Faith dominates M. If affixes are less marked, then M dominates Faith. We exemplify the model with a root-affix phonological asymmetry in Lushootseed.

In Lushootseed, schwa can be stressed when it occurs in a root, but not in an affix. An alternation exemplifying the pattern is presented below. The data in (19a) illustrate that schwa can be stressed when it occurs in a root. The data in column I are unreduplicated, morphologically simple stems. When they are reduplicated, stress stays in the initial position, as can be seen in column II. The phonologically similar polymorphic words in (19b) illustrate the same stress pattern, when they are not reduplicated (column I). However, these words differ morphologically because they contain a transitivizing suffix with the form [-əd]. When they are reduplicated, stress shifts to the final syllable (column II). Note that when stress falls on the affix vowel, the quality changes and the affix is realized as [-ád].[11]

(19) Stressed schwa asymmetries in Lushootseed

	I		II	
a.	lə́gʷəb	'young man'	lə́gʷləgʷəb	'youths, young men'
	ǰə́səd	'foot'	ǰə́sǰəsəd	'feet'
	sčə́txʷəd	'bear'	sčə́tčətxʷəd	'bears'

[11] The pattern of allomorphy for transitivizing suffixes is more complex than this. See Urbanczyk (1999c) for further details.

b.	də́šəd	'be on side'	dəšdəšə́d	'set many things on their side'
	gʷə́č'əd	'look for s.t.'	gʷəč'gʷəč'ə́d	'several search for it'
	yə́cəd	'report him, it'	yəcyəcə́d	'always talking about him'

Observe that affix vowels do not permit stressed schwa. In addition to the alternation, a search of the *Lushootseed Dictionary* does not reveal a single case of a stressed affix schwa. Thus there is a phonological asymmetry between roots and affixes, in which stressed schwa is only permitted with roots. The relevant markedness constraint is *ə́, and is informally represented as in (20). There are various proposals for why stressed schwa is marked, but we will not delve into its proper formulation.[12]

(20) *ə́ : stressed schwa is not permitted.

This pattern can be analyzed using Positional Faithfulness, and the constraints Rt-Faith, Faith, and *ə́. Because the language allows stressed schwas on roots, it must be the case that Rt-Faith dominates *ə́ and Faith. The following tableau verifies this. The input is indicated in the top left corner.[13] Root-Faith is violated if there is lack of identity in the root, and Faith is violated if there is a lack of identity anywhere in the word, providing two violations for candidate (b).

(21) Root-Faith >> *ə́ >> Faith

dəšəd	Root-Faith	*ə́	Faith
a. ☞ də́šəd		*	
b. dášəd	*!		*

The following tableau verifies that *ə́ must dominate Faith. This ranking is necessary because it is better to have non-identity in the affix than to have a stressed schwa. We abstract away from how the location of stress is determined and the

[12] The explanation for why stressed schwa is marked has occupied the attention of phonologists and Salishanists for a long time. For various proposals see Anderson (1974), van Oostendoorp (1995), Kenstowicz (1996), Kinkade (1992, 1997), Shaw (1996), Urbanczyk (1996, 1999d).

[13] Notice that the input contains schwas, which is contrary to the usual assumption about schwas in Salish (cf. Czaykowska-Higgins 1993; Kinkade 1997). Having schwas present in the input is consistent with Prince and Smolensky's (1993) principles of Richness of the Base and Lexicon Optimization as well as Inkelas's (1995) Archiphonemic underspecification.

reduplicative mechanism for now.[14] (See section 4.1 for the analysis of shape.)

(22) Root-Faith >> *ə́ >> Faith

DIST-dəšəd	Root-Faith	*ə́	Faith
a. dəšdəšə́d		*!	
b. ☞ dəšdəšád			*

Positional Faithfulness assumes that roots have two correspondence relations, one general and one specific to roots. Thus, a lack of identity in a root violates Faith and Root-Faith. This model differs formally from McCarthy and Prince's proposal, but has the same empirical coverage. McCarthy and Prince (1994a) propose that there is correspondence for roots distinct from correspondence for affixes. They derive the asymmetry by assuming that Root-Faith universally dominates Affix-Faith. A key difference between the models is that the correspondence relations are adjacent to each other, rather than nested (as in Positional Faithfulness). As a result, when a root has a lack of identity, it only violates Root-Faith and does not violate Afx-Faith. Using McCarthy and Prince's model, it is possible to obtain the same results by substituting Afx-Faith for Faith and recalculating the violations.

The following tableaux illustrate that the same candidate is selected as optimal. Notice that in the tableau in (23), candidate (b) only incurs a violation of Root-Faith, it does not violate the lower Afx-Faith.

(23) Root-Faith >> *ə́ >> Afx-Faith

dəšəd	Root-Faith	*ə́	Afx-Faith
a. ☞ də́šəd		*	
b. dášəd	*!		

[14] *It is clear that a full analysis of the pattern above requires understanding why stress shifts and what the UR of the affix is.* While the data has some complexities, it was chosen because it exemplifies an active alternation between unstressed schwa and a full vowel. The resultant ranking must be valid for the language as a whole because stressed schwa is not permitted in affixes at all. Evidence that the affix allomorphy is not a case of unstressed /a/ reduction comes from forms which have an unstressed [a] in the transitivizing affix, such as [tášad] 'massage it'.

(24) Root-Faith >> *ə́ >> Afx-Faith

DIST-dəšəd	Root-Faith	*ə́	Afx-Faith
a. dəšdəšə́d		*!	
b. ☞ dəšdəšád			*

Both approaches derive the asymmetry by interleaving a phonoconstraint between two Faith constraints. Such a ranking is dubbed 'emergence of the unmarked' by McCarthy and Prince. Here the unmarked structure emerges in affixes. Let us refer to the McCarthy and Prince approach as Rt >> Afx. The rankings for affixal TETU effects are repeated below. The asymmetries are in the IO domain, so in actuality, each Faith constraint should be prefaced by IO.

(25) Emergence of the Unmarked (TETU) in affixes
a. Positional Faithfulness: Faith-Rt >> M >> Faith
b. Rt >> Afx: Faith-Rt >> M >> Faith-Afx

Not only are these approaches empirically equivalent when there is a phonological asymmetry, they are equivalent when roots and affixes exhibit the same phonological pattern. If both allow the marked structure, then M is ranked below both Faith constraints. If bo b. CVC- 'plural'

mulx	məlmúlx	'stick/ underbrush'
saqʷ'	səqʷ'sáqʷ'	'to fly/ plural things flying'

th eliminate the marked structure, then M is ranked above both Faith constraints. The sole difference in ranking is that with positional licensing no ranking can be determined for the two Faith constraints, but is fixed as Root >> Affix, for the other approach.

(26) Ranking for SAME phonological patterns
a. Positional Faithfulness: Faith-Rt, Faith >> M
M >> Faith-Rt, Faith
b. Rt >> Afx: Faith-Rt >> Faith-Afx >> M
M >> Faith-Rt >> Faith-Afx

It is now useful to consider whether or not one approach has conceptual advantages, outside of their empirical equivalence. A strength of Positional Faithfulness is that the special faithfulness constraint can be generalized to other prominent positions, such as initial syllable, stressed syllable, and onset. Whether or not this is warranted for reduplication is yet to be explored. A second strength is that Positional Licensing can derive the asymmetry without stipulating the ranking of Root-Faith >> Faith. Because the violations are in a subset relation (violations incurred by Root-Faith are a subset of those incurred by Faith), there will never be evidence for language learners to posit Faith >> Root-Faith. Even if a language learner did posit such a ranking, Faith would mask the effects of Root-Faith, and it would not result in a markedness reversal.[15] With Rt >> Afx, the ranking is proposed to follow from Univeral Grammar. Because Positional Faithfulness has more general applications, and no stipulated rankings, it will be adopted for the remainder of the paper. The following section presents the formal model of redupliation and extends this approach to the BR domain.

3.3 Formal Model - Morphological A-templatic Reduplication

Let us recast McCarthy and Prince's proposals to be consistent with the discussion in the preceding two sections. The model will be refered to as Morphological A-templatic Reduplication (MAR) to distinguish it from the original Generalized Template Theory.

(27) Morphological A-templatic Reduplication (MAR)

a.	Morphological component:	RED = MCat, MCat ∈ {Stem, Rt, Afx}
b.	Correspondence:	BR-Faith-Rt, BR-Faith

By condition (a), each reduplicative morpheme will be specified as Stem, Rt, or Afx. The condition in (b) states that reduplicative morphemes achieve achieve their segmentism and size via BR-Correspondence. A diagram illustrating the structure of reduplicated words is provided below. Note that reduplicative roots will be subject to BR-Root-Correspondence as well as BR-correspondence. Here, as below, the 'diminutive' morpheme is an affix, and the 'distributive' morpheme is a root. The reduplicant is the portion of the word that is underlined, and the base is the string immediately to the right for prefixes and immediately to the left for suffixes (not shown here). Note that when a morpheme has multiple BR-correspondence relations (as with reduplicative roots) such double relations will be indicated with double underlining.

(28) Morphological BR-Correspondence

INPUT	a. / BR-Afx + ǰəsəd /	b. / BR-Rt + ǰəsəd /	
	↕	↕	IO-Corr
OUTPUT	[ǰíǰsəd]	[ǰə́sǰəsəd]	
general BR-Corr	R ↔ B	R ↔ B	
special BR-Corr-Rt		R ↔ B	

The a-templaticism of the model follows because there are no templates necessary to derive the size or segmental properties of reduplicative morphemes. Markedness constraints interacting with Faith constraints are sufficient to derive size and segmentism. The model makes specific predictions, which are a consequence of the types of systems generated by permuting the ranking of constraints. The following section introduces the relevant constraints and how they interact.

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[15] Appendix A.2 illustrates this effect.

3.4 Predictions

Prince and Smolensky (1993) propose that Optimality Theory accounts for language universals by assuming that the set of constraints in Con is shared by all speakers. Individual grammars are determined by discovering the ranking of constraints. It follows then, that the number of possible systems that can be generated is equivalent to the number of possible rankings -- which is the factorial of the number of constraints in Con (n!). Therefore, in order to determine the predictions of the model, we need to first consider what the relevant constraints are. Then we need to determine all possible constraint rankings (the factorial typology) and the reduplicative systems that are generated by each ranking. It is important to note that two different rankings can generate the same system. We begin by introducing the constraints.

There are two types of Faith constraints: those which determine size and those which determine segmental quality. These constraints are Max and Ident[F], respectively.

(29) Faithfulness constraints (McCarthy and Prince 1995, 1999)

Max:	Every segment in S1 has a correspondent in S2.
Ident[F]:	Let α be a segment in S1 and β be any correspondent in S2. If α if [γF], then β is [γF].

Max ensures that there is no deletion in the IO domain, and that reduplication is total in the BR domain. Ident[F] ensures that featural specifications of correspondents are identical.[16]

There are also two types of phono-constraints to consider: those that restrict the size of morphemes and those which penalize segmental markedness. The size restrictors are of two general types. On the one hand, interface constraints, like those generated by McCarthy and Prince's (1994c) Generalized Alignment schema, can be used to restrict the size (see McCarthy and Prince 1994a, 1999; Spaelti 1997). For example, the constraint Align-L(Stem, PrWd) will ensure that reduplicants specified as stems will be initial in the prosodic word. On the other hand, constraints which ban structure altogether, such as Prince and Smolensky's (1993) *Struc can also be used to restrict the size (see Urbanczyk 1999a; Walker 1999). Whenever one of these constraints intervenes between IO-Faith and BR-Faith, the result will be partial reduplication. To make the discussion explicit, consider the constraint *Struc-σ, which is violated by every syllable in the output (discussed further in §4.1). If *Struc-σ intervenes between IO-Max and BR-Max, then reduplicants will be mono-syllabic. The following ranking schema illustrates this ranking. It is another instance of TETU and derives mono-syllabism in reduplication.

[16] This assumes that features are attributes of segments and not entities themselves. See Causely (1996), Walker (1997), Lombardi (1998) and Pulleyblank (1998) for arguments that features are entities. It makes no difference to the analysis here, so for convenience I adopt the Ident[F] approach.

(30) SIZE TETU: Mono-syllabic reduplicants
IO-Max >> *Struc-σ >> BR-Max

The other constraints are general markedness constraints, like *F which penalize marked features. TETU effects can also be obtained if constraints of the form *F intervene between IO-Ident[F] and BR-Ident[F]. The result is the neutralization of a featural contrast in reduplication as in (a). If *F intervenes between IO-Max and BR-Max, the result is a default segment (or reduction in size).[17]

(31) SEGMENTISM TETU
a. FEATURAL TETU: Neutralization of featural contrast in reduplication
IO-Ident[F] >> *F >> BR-Ident[F]
b. DEFAULT SEGMENTISM: Loss of segment in reduplication
IO-Max >> *F >> BR-Max

This brief illustration shows that shape and segmentism can be correlated because the Correspondence relation is effective in deriving the size of reduplicative morphemes as well as their segmental properties. Size is obtained via Max, and segmentism via Max and Ident[F]. We now need to examine the factorial typology by considering the full range of Faith constraints. Recall that the number of possible systems will be the factorial of the number of constraints. Any predictions that the model makes are a result of the factorial typology. Attested systems must be derived by the factorial and gaps must be excluded by the factorial.

There are two basic dimensions in terms of the Faith constraints: Max and Ident[F].[18] In order to keep the discussion to a reasonable situation, we will only consider one markedness constraint per dimension. Because there are two types of Faith per dimension, this means that there are six constraints, resulting in 720 different rankings (6! = 6x5x4x3x2x1 = 720). Fortunately we will not be going through each ranking. Instead, we can investigate each dimension separately because structural and markedness constraints will not conflict and the two different types of Faith constraints will not conflict either. It turns out that each dimension converges on only three possible systems -- precisely the patterns attested in terms

[17] I am grateful to Philip Spaelti for pointing out that reduplicative default segmentism can be obtained without reference to BR-Dep, which penalizes non-correspondent segments in the reduplicant. Having a default in the reduplicant entails that BR-Max is violated, so BR-Dep is superfluous.

[18] A third Faithfulness constraint is not considered here: Dep. Dep is violated when there is material in S2 that is not in S1. It penalizes epenthetic or default segments. I have not included it in the typology because to do so would introduce a pathology in which epenthesis could be used to avoid marked structure in affixes, but not roots. I am grateful to an anonymous reviewer for pointing out the pathologies. See Bernhardt and Stemberger (1998) who point out that Dep and *Struc frequently have similar consequences. Further research may reveal that Dep can be eliminated from Con altogether.

of size-segmentism correlations: MM, UU, MU. Because there are two dimensions, the total number of different systems generated is nine (3x3).

Let us start by keeping the shape constant and confine the factorial typology to Ident[F], Rt-Ident[F], and *F. The result is 6 possible permutations (3!=3x2x1). The following summarizes how the different rankings map onto differences in segmentism patterns for languages which have a root and an affix reduplicant. The following rankings do not have IO or BR prefixes in order to emphasize that there are parallel phonological systems.

(32)	Segmentism	
i.	MM	Ident[F] >> Rt-Ident[F] >> *F
ii.		Rt-Ident[F] >> Ident[F] >> *F
iii.		Ident[F] >> *F >> Rt-Ident[F]
iv.	UU	*F >> Ident[F] >> Rt-Ident[F]
v.		*F >> Rt-Ident[F] >> Ident[F]
vi.	MU	Rt-Ident[F] >> *F >> Ident[F]

Because we have considered all possible rankings, we have shown that no permutation of constraints will derive the UM pattern. See Appendix A.2 for tableaux verifying these results.

We can do the same for the size dimension, including Max, Rt-Max, and *Struc-σ. Because the discussion is confined to the constraint *Struc-σ, the two possible shapes are greater than a syllable (>σ) and less than or equal to a syllable (≤σ). Again we only derive three possible situations.

(33)	Size	
i.	(>σ)(>σ)	Max >> Rt-Max >> *Struc-σ
ii.		Rt-Max >> Max >> *Struc-σ
iii.		Max >> *Struc-σ >> Rt-Max
iv.	(≤σ)(≤σ)	*Struc-σ >> Max >> Rt-Max
v.		*Struc-σ >> Rt-Max >> Max
vi.	(>σ)(≤σ)	Rt-Max >> *Struc-σ >> Max

Because we have considered all possible permutations, we have established that Universal Grammar would never create a mono-syllabic root and poly-syllabic affix. See Appendix A.2 for tableaux verifying these results.

The predictive force of the model is that correspondence is tied to morphological classification and reduplicants can belong to different morphological categories. Therefore it will be impossible to reverse the size and segmentism properties associated with a particular morpheme. It will always be the case that if there is a MU pattern regarding segmental properties, the root will be more marked, *mutatis mutandis* with size. Combining the segmentism and size dimensions we have the following typology of size and segmentism systems.

(34) Possible size-segmentism relationships

	MM	UU	MU
(>σ)(>σ)	(>σ)(>σ) M M	(>σ)(>σ) U U	(>σ)(>σ) M U
(≤σ)(≤σ)	(≤σ)(≤σ) M M	(≤σ)(≤σ) U U	(≤σ)(≤σ) M U
(>σ)(≤σ)	(>σ)(≤σ) M M	(>σ)(≤σ) U U	(>σ)(≤σ) M U

Of course the total number of reduplicative systems is much larger because there are many size restrictors and markedness constraints in Con.

A final question raised by this model regards languages with more than two reduplicative morphemes.[19] The problem arises because if there are two similar reduplicative morphemes (such as two affixes), then one might expect them to be homophonous. There are (at least) two analytic avenues to pursue in these cases.

One avenue is to supply a separate special correspondence relation to the third reduplicative morpheme. For example, if a reduplicative morpheme is always stressed it could achieve its content via a BR relation with the head of the prosodic word. This special correspondence could be ranked separately from the others, providing a unique phonological pattern to all three reduplicative morphemes. I leave this open for further research.

A second avenue is to assume that two reduplicative morphemes have the same morphological classification, but differ in their subcategorizational requirements. This has been suggested for Tagalog by McCarthy and Prince (1994a) to derive the difference between CV and CV: reduplicants, where the only difference is short vs. long vowel. They propose that the difference in vowel length follows from prosodic subcategorization: the short vowel is internal to the prosodic word, while the long vowel is external to the prosodic word. This approach is appealing because it makes use of information that is independently needed for morphemes. The following section pursues this line of explanation in analyzing three reduplicative morphemes in Lushootseed, which have the shapes CVC, CV, and VC. A strong prediction of this approach is that the two smaller reduplicants will exhibit the same phonological patterns. Because all morphemes of a particular MCat are subject to the same Faith constraints, they will exhibit the same phonological patterns. Thus, a detailed study of Lushootseed reduplication would provide strong confirmation of the model presented here.

[19] Languages with only one reduplicative morpheme presumably do not make use of the special corresondence relation. There would only be one type of correspondence. In this case the morpheme could either be classified as an affix or a stem with no pathological consequences.

4. Case Study: Lushootseed

Lushootseed is a Central Coast Salish language, originally spoken in the area around Puget Sound in Washington state. Like other Salish languages, reduplication is used in several word-formation processes (Hess 1966; Hess and Hilbert 1977; Bates, Hess, and Hilbert 1994). The three most common are presented below, where the 'diminutive' morpheme is a CV- prefix (35a), the 'out-of-control' morpheme is a -VC suffix, located after C2 of the root (35b), and the 'distributive' morpheme is a CVC-prefix (35c). Unless otherwise stated, all data are from Bates, Hess, and Hilbert's (1994) *Lushootseed Dictionary*, and are of the Northern Lushootseed dialect group.[20]

(35) Lushootseed Reduplicative Patterns

a. DIM			
ʔálʔal	'house'	ʔá-ʔalʔal	'hut'
ʔuq^{w}'ud	'pull out'	ʔú-ʔuq^{w}'ud	'pull part way out'
hiw-il	'go ahead'	hí-hiw-il	'go on ahead a bit'
q'íx^{w}	'upstream'	q'í-q'ix^{w}	'a little upstream'
b. OC			
ʔáɬ	'fast; quickly'	ʔáɬ-aɬ	'hurry up!'
d^{z}áq'	'fall; topple'	d^{z}áq-aq	'totter; stagger'
čə́x̌	'split'	sčə́x̌-əx̌	'cracked to pieces'
yúb-il	'starve'	yúb-ub-il	'tired out; not feeling well'
c. DIST			
saq^{w}'	'fly'	sáq^{w}'-saq^{w}'	'fly here and there'
gəlk'	'entangle'	ʔəs-gə́l-gəlk'	'all tangled up'
čəg^{w}ás	'wife'	čəg^{w}-čəg^{w}ás	'seeking a woman to marry'
pástəd	'Caucasian'	pás-pastəd	'many white folks'

Observe that all reduplicants are mono-syllabic. However, they differ in their sizes. DIST, being CVC- always adds a coda to the reduplicated word. On the other hand, DIM, having CV- shape, doesn't add a coda. A comparison of [d^{z}áq'] 'fall; topple' with [d^{z}áq-aq] 'totter; stagger' reveals that no additional codas are added in

[20] This study is based on the corpus of reduplicated words contained in the *Lushootseed Dictionary*. There were 247 DIST stems, 270 DIM stems, and 56 OC stems. The lower number of OC stems is most likely due to semantic restrictions, rather than phonological ones. See Kroeber (1988) for discussion that the cognate morpheme only occurs on stative verbs in Mainland Comox. The actual number of reduplicated stems was 612, which is greater than the sum of the three because it includes reduplicative forms that indicate different functions. Thanks to Dawn Bates for providing printouts of the reduplicated material, which greatly assisted in organizing the data.

the OC form. Thus, the crucial difference in size between the morphemes is the addition of a coda consonant. DIST reduplicants add a coda, while DIM and OC reduplicants do not.

The analysis proposes that DIST is a root, while DIM and OC are affixes. The difference between the two affixes is their subcategorization properties, where DIM is a prefix and OC is a suffix. This subcategorization information is formally expressed by McCarthy and Prince's (1994c) Generalized Alignment schema, which allows for the alignment of specific morphemes to morphological categories. Prefixes are aligned at the left edge of a stem, while suffixes are aligned at the right edge of a stem. The lexical information for each reduplicative morpheme is represented below. Notice that only minimal information is included: morphological category, exponence (formally realized as a correspondence relation), subcategorization, and meaning.

(36) Lexical Entries for REDs

	MCat	Corr	SubCat	Align	Meaning
a. DIM	Afx	BR	prefix	≈ Align(DIM, L, Stem, L)	'diminutive'
b. OC	Afx	BR	suffix	≈ Align(OC, R, Stem, R)	'out-of-control'
c. DIST	Rt	BR-Rt	prefix	≈ Align(DIST, L, Stem, L)	'distributed'

While it is uncontroversial to assume that reduplicative morphemes are affixes, specifying them as roots requires independant motivation. There are three pieces of evidence that support analyzing DIST as a root. First, the canonical root shape in Lushootseed (and Salish more generally) is CVC. Snyder (1968) reports that 68% of Southern Lushootseed roots are CVC. Second, like prespecified roots, the DIST morpheme permits stressed schwa. And third, there are two sets of affixes which exhibit root-like properties in Lushootseed. There are nine CVC-shaped prefixes with semantic content. The CV- shaped prefixes encode grammatical functions, not semantic content. There is also a large set of lexical suffixes which are often transparently related to roots. These lexical suffixes have semantic content and more marked segmentism than grammatical affixes (Urbanczyk 1996: 46). The existence of segmentally specified root-prefixes (the CVC- prefixes) and root-suffixes (lexical suffixes) provides support for proposing a reduplicative root-prefix. Finally, there should be further effects of morphological category that are not explicitly discussed here. In fact, the DIST morpheme patterns with other roots in being the base of reduplication for the OC suffix (Urbanczyk 1996: Chapt. 5).

Based on these morphological classifications, the MAR model of reduplication is able to derive the size and segmental properties of all three morphemes. Recall that there are two key predictions. First, if there are *any* phonological differences, the root (DIST) will be more marked. Second, the two affixes should exhibit the same phonological properties. These predictions are borne out: phonological differences in size and segmentism are both found. Detailed analyses of the size differences is presented in section 4.1, and the segmental differences in section 4.2. A brief excursus into double reduplications in section 4.3 also shows that some surprising identity effects can be explained with no further assumptions or theoretical machinery.

4.1 Shape

Mono-syllabic bases straightforwardly show how size differences between reduplicative morphemes are derived. As noted above, the crucial difference between DIST and DIM/OC is the addition of a coda consonant. This can be achieved by referring to the familiar NoCoda constraint. NoCoda is a typical markedness constraint, where marked structures are penalized. Languages are known to ban codas or to allow codas, but no language is known to require codas of every syllable.

(37) NoCoda : Codas are prohibited.

The difference between DIST and DIM/OC then is that NoCoda is violated for DIST, a root, and obeyed by DIM/OC, which are both affixes. By this reasoning, NoCoda must intervene between BR-Max-Rt and BR-Max. This ranking is the TETU ranking which derives the MU difference between roots and affixes, as proposed in §3.4 above.

(38) TETU Shape Differences: BR-Max-Rt >> NoCoda >> BR-Max

The tableau below verifies this ranking. The optimal (a) candidates for DIM and OC contain only one violation of NoCoda. The closest competitors (b) fare better on reduplicative identity, but at the expense of having an additional coda consonant. Notice that both affixes are derived by the same constraint interaction. Also, NoCoda, being a global constraint on the entire representation, incurs violations equally for both DIM and OC stems, even though the coda is in the base for DIM and in the reduplicant for OC. DIST, on the other hand, being a root allows the marked extra coda consonant, because BR-Max-Rt is ranked higher than NoCoda.

(39) BR-Max-Rt >> NoCoda >> BR-Max

	BR-Max-Rt	NoCoda	BR-Max
DIM- q'ix^{w}			
a. ☞ q'íq'ix^{w}		*	x^{w}
b. q'íx^{w}q'ix^{w}		**!	
ʔał -OC			
a. ☞ ʔáłał		*	ʔ
b. ʔáłʔał		**!	
DIST- pastəd			
a.. sasaq$^{w'}$	q$^{w'}$!	*	q$^{w'}$
b☞ saq$^{w'}$saq$^{w'}$		**	

Because the language allows codas in roots, we also know that IO-Max-Rt dominates NoCoda, as verified in the following tableau.

(40) IO-Max-Rt >> NoCoda

ʔał	IO-Max-Rt	NoCoda
a. ʔa	ł!	
b. ☞ ʔał		*

Monosyllabicity can be observed in polysyllabic bases. Domination of BR-Max-Rt and BR-Max by some higher ranked constraint yields mono-syllabicity. As proposed in section 3.3, the relevant structural constraint is *Struc-σ. Motivation for this constraint comes from languages in which all morphemes are monosyllabic. In fact, many Salish languages prefer to have lengthy strings of consonants rather than canonical CV(C) syllables, suggesting that *Struc-σ is operative elsewhere in the language family.[21]

(41) *Struc-σ Syllable structure is not permitted.

[21] In terms of the patterns within Salish, it may be more accurate to think of this constraint as *V-Feature, which is a more specific version of the *Struc family. Either constraint will serve the same function here.

Because all reduplicants are mono-syllabic, *Struc-σ must dominate BR-Max-Rt and BR-Max. We cannot determine the ranking between the two BR-Max constraints by these data, but recall that the ranking was determined above. The ranking is thus a case of all reduplicants exhibiting unmarked structure (UU) from §3.4 above.

(42) Mono-Syllabicity: *Struc-σ >> BR-Max-Rt >> BR-Max

The following tableau verifies the ranking. For all reduplicative morphemes, the optimal candidate is the one which has the fewest number of syllables. All the (a) candidates below violate *Struc-σ minimally. Even though being disyllabic means that the reduplicant is more faithful, this is sub-optimal because of high-ranking *Struc-σ, as shown by the (b) candidates.[22]

(43) *Struc-σ >> BR-Max-Rt, BR-Max

	*Struc-σ	BR-Max-Rt	BR-Max
DIM- hiw-il			
a. ☞ híhiwil	***		wil
b. híwilhiwil	****!		
yub-il -OC			
a. ☞ yúbubil	***		y
b. yúbilyubil	****!		
DIST- pastəd			
a ☞ páspastəd	***	təd	təd
b. pástədpastəd	****!		

Again, because the language has poly-syllabic roots, we know that IO-Max-Rt must dominate *Struc-σ. The following tableau verifies this.

[22] The question arises as to why the reduplicant must be a syllable at all. As others, I assume that there is a high ranking constraint requiring morphemes to be realized (Rose 1997; Gafos 1998; Walker 1999; Urbanczyk 1999a). The question then is why vowel lengthening cannot be used to express the morpheme. As we will see in section 4.2 below, no reduplicant ever has a long vowel, so this option is also ruled out.

(44) IO-Max-Rt >> *Struc-σ

pastəd	IO-Max-Rt	*Struc-σ
a. pas	t!əd	*
b. ☞ pastəd		**

The two key shape properties of these three reduplicative morphemes are derived by the following constraint heirarchy, thus confirming the prediction that morphologically distinct reduplicants can be derived by a single constraint hierarchy. Of particular significance is the fact that the shape properties of both DIM and OC can be derived in tandem. Thus, no special mechanism is necessary to derive the previously problematic -VC shape reduplicant. Because a strict ranking has been determined, the summary ranking is represented as follows:

(45) IO-Max-Rt >> Struc-σ >> BR-Max-Rt >> NoCoda >> BR-Max

While not crucial to the model and its predictions, a brief digression regarding OC is useful because it will allow a more equitable comparison with previous analyses of Lushootseed. Other approaches have required special mechanisms to achieve the correct shape and position, such as suspending the condition of phoneme-driven association for infixation. Previous analyses of Lushootseed OC include: Broselow and McCarthy (1983), Ter Mors (1984), Clements (1985), Kiparsky (1986), Davis (1988), Kirkham (1992), and Urbanczyk (1993). Because OC has played a role in shaping reduplicative models it is worthwhile to see whether extra mechanisms are needed with this model.

When the stem has initial stress, the OC morpheme is located after the first CVC sequence of the root, regardless of its size, as can be seen in (46a) and (46b). As the data in (46c) and (46d) illustrate, the first CVC does not always correspond to the location of stress, so infixal position is not related to stress (as it frequently is cross-linguistically). However, there are two forms with non-initial stress which are not infixed maximally (46d), showing that there is some uncertainty about whether the infixal position is related to metrical structure. Alternatively, because these forms both begin with [ʔə], it may be the case that speakers are not sure of the morphological boundary. Until further data becomes available, let us assume that OC is infixed after the first CVC of the root.

(46) OC Infixal Status

a. Rt = CVC

ʔáɬ	ʔáɬ-aɬ	'fast; quickly/ hurry up!'
dzáq'	dzáq-aq	'fall; topple/ totter; stagger'
čə́x̌	sčə́x̌-əx̌	'split/ cracked to pieces'
yúb-il	yúb-ub-il	'starve/tired out; not feeling well'

b. Rt > CVC

ʔúluɬ	ʔúl-ul-uɬ	'travel by water/ boat riding'
s-ɬádəyʔ	s-ɬád-ad-əyʔ	'woman/ woman living alone'
ʔíbəš	ʔíb-ib-əš	'walk/ pace back and forth'
x̌ʷúdx̌ʷud	x̌ʷúd-ud-x̌ʷud	'converse/ come to converse'
háʔkʷ	háʔ-aʔ-kʷ	'for a long time/ a little while ago'
kaw'ɬ-əd	káw'-aw'-ɬ-əd	'improvise/ improvise'

c. Non-initial Stress and Maximal Infixation

wəlíʔ	wələl-íʔ-il	'be visible/ become visible'
ʔəx̌íd	ʔu-ʔəx̌-íx̌-əd	'what happened/ What's he done?'

d. Non-initial Stress and Non-Maximal Infixation

dxʷ-ʔəhad	dxʷ-ʔəhád-ad	'talk/ discuss'
ɬu-ʔəkʷyíqʷ	ɬu-ʔəkʷíqʷ-iqʷ-əb	'great-great-grandparent/child/ will have great-great-grandchilren'

A key assumption in analyzing the infixal status is that the base of reduplication is the adjacent string, which is anchored at the tropic edge (i.e. the edge of affixation): left for a prefix and right for a suffix. (For formal details see McCarthy and Prince 1993; Urbanczyk 1996.) As the position of the infix varies, so does the size of the base. In the following forms the base is double-underlined. In case the base is mono-syllabic and ends in a cluster (as in a), infixation has the effect of eliminating a coda consonant, in accordance with NoCoda. In the case of poly-syllabic bases (as in b), infixation results in greater identity between base and reduplicant by minimizing BR-Max violations.

(47) Adjacent String Hypothesis

	Actual form	Competing Candidates
a.	háʔ-aʔ-kʷ	háʔkʷ-aʔkʷ
b.	sɬád-ad-əyʔ	sɬádəyʔ-əyʔ sɬádəy-əy-ʔ

Infixation is compelled by the need to obey markedness and faithfulness constraints. However, it comes at a cost. Following Prince and Smolensky (1993) and McCarthy and Prince (1995; 1999), infixation violates a constraint requiring the affix be edgemost in the stem. Let us adopt the subcategorizational Alignment constraint from above.

(48) Align-R-OC Align(OC, R, Stem, R) The right edge of every OC morpheme coincides with the right edge of the stem.

The following tableau illustrates the effect of having NoCoda and Max dominate Align-R-OC.

(49) NoCoda >> BR-Max >> Align-R-OC

	NoCoda	BR-Max	Align-R-OC
a. ☞ háʔ-aʔ-k^w	*	h	*
b. háʔk^w-aʔk^w	**!	h	
a. ☞ sɬád-ad-əyʔ	*	s	*
b. sɬádəy-əy-ʔ	*	sɬ!ad	*
c. sɬádəyʔ-əyʔ	**!	sɬad	

Maximal infixation does not occur because it would violate a constraint which requires all roots to end in a consonant. A survey of roots contained in the *Lushootseed Dictionary* reveals that less than one percent of native Lushootseed roots end in a vowel, indicating a very strong preference for consonant-finality.[23] The relevant constraint is formulated below. We assume that it is undominated in the grammar, and do not provide a tableau.

(50) C-Final-Root
Align(Root, R, C, R) The right edge of every root coincides with the right edge of a consonant.

This brief digression serves to show that MAR has an edge over other models because no special provisos need be said about the different morphemes. The only lexical information required is morphological category and subcategorization, which are needed in all models of reduplication. The analysis captures differences between DIM and OC as a consequence of subcategorization as prefix or suffix. In MAR, the same ranking (NoCoda >> BR-Max-Afx) that derives a CV- prefix, also derives a -VC suffix. If we compare this to previous analyses of OC reduplication, we find a number of special provisions need to be made. For example, while skeletal theory can straight-forwardly specify the shape of OC as a VC template, there has been much debate as to the nature of the copy mechanism, being either phoneme-driven (stipulating first vowel - Broselow and McCarthy 1983) or template-driven (Clements 1985; internal reduplication only- Davis 1988), as well as whether infixation is best explained in terms of the nature of the base (Ter Mors 1984). Prosodic Circumscription accounts fare no better in terms of explanatory power, where *ad hoc* mechanisms (like circumscribing the onset) are required to explain VC shape (Kirkham 1992; Urbanczyk 1993). While

23 See Urbanczyk (1996: 84-86) for further details. There are a number of recent loans which are vowel-final, like *kəlisi* 'crazy', *santus pli* 'Holy Spirit'. Notice that the latter contains a nasal sound. Because Lushootseed words do not usually contain nasals, the recent loans were excluded from the survey.

the mechanics of each model can derive the correct results, the conceptual downfall comes because the principles for determining shape and segmental content are distinct. Thus, there is no relationship between the position and shape of OC. In MAR, vowel-initiality of OC follows because of C-Final-Rt, which is independently needed in the grammar. The -VC shape (not -VCC) is straightforwardly explained as an affix, obeying NoCoda. By Occam's Razor, this model of reduplication represents an advancement in its simplicity.

To summarize, CV-, -VC, and CVC- shapes can be derived from the following ranking of constraints. Observe that templatic constraints are not needed to derive the correct shape. Indeed, to introduce one would render the following ranking superfluous and would mask the fact that each type of reduplicative morpheme has its own phonological properties.

(51) C-Final-Rt
|
IO-Max-Rt
|
*Struc-σ
|
BR-Max-Rt
|
NoCoda
|
BR-Max
|
Align(OC, R, Stem, R)

4.2 Default Segmentism

A second prediction of MAR is that root reduplicants will be more marked segmentally than affixal reduplicants. To be explicit, a predicted system is one in which affixal reduplicants have phonological defaults, while root reduplicants do not. The presence of a predictable default consonant with DIM was originally proposed by Bates (1986). Bates shows that the choice of Cí- vs. CV- DIM reduplicant is phonologically predictable, based on the shape of the base. Default [i] occurs with schwa-vowelled, cluster-initial, and long-vowelled roots. The data below illustrate the basic pattern analyzed by Bates.

(52) DIM Default Segmentism
a. Schwa-Vowel

tədᶻíl	'lie in bed'	<u>tí</u>-tədᶻil	'lie down for a little while'
bəč	'fall down'	<u>bí</u>-bəč	'drop in from time to time'
s-kʷəbšəd	'animal hide'	s-<u>kʷí</u>-kʷəbšəd	'small hide'

b. CC-Initial Roots

č'ƛ'áʔ	'rock'	č'í-č'ƛ'áʔ	'little rock'
c'kʷ'úsəd	'cane'	c'í-c'kw'usəd	'little walking stick'
ɬčil	'arrive, get there'	ɬí-ɬčil	'arrive occasionally'
qʷɬayʔ	'log'	qʷí-qʷɬayʔ	'stick'

c. Long-Vowel Roots

s-duukʷ	'knife'	s-dí-duukʷ	'small knife'
buus	'four'	bíʔ-buus	'four little items'
luud	'hear s.t.'	líʔ-luud	'hear s.t. a little'

The analysis here builds on Bates (1986) by extending the investigation to the DIST and OC morphemes. Because the data are complex, the section starts by providing an overview of the distribution of the default with all three reduplicative morphemes, under all three conditions. Section 4.2.2 provides the analysis and section 4.2.3 extends the analysis to words with more than one reduplicative morpheme. This last section is relevant because it illustrates that patterns which were previously analyzed with cyclic application of reduplication (Broselow 1983) or morphemic circumscription (Hammond 1992) can be accounted for without further machinery.

4.2.1 Distribution of the default

The key to understanding the occurance of default [i] in these stems is that, with a few exceptions, DIM always receives primary stress. Motivating [i] as a default is important because schwa is the usual default vowel in Salish (Kinkade 1997). However, as mentioned above, stress is the conditioning factor, as the following irregularly stressed DIM stems show. Observe that schwa shows up under lack of stress in the cluster and schwa-initial bases in (a). The (b) examples show other cases of irregularly stressed DIM.[24]

(53) Diminutives with non-initial stress

a.	qsíʔ	'uncle'	qəqsíʔ	'favourite uncle'
	ƛ'ládiʔ	'sound, noise'	ƛ'əƛ'əl=ádiʔ	'little noise'
	t'əqʷ'	'snaps in two'	t'ət'qʷ'=áčiʔ	'hand(s) broken off'
			t'ət'qʷ'=əldíʔ	'ears broken off'
			t'ət'qʷ'=qíd	'head(s) broken off'

[24] Virtually all of the irregularly stressed 'diminutive' forms have [a] as the base vowel. The preference to reduce unstressed low vowels has been investigated further in Urbanczyk (1996). Reduction of the DIM vowel over the root vowel can be analyzed as a case of IO-Ident-Rt dominating BR-Ident. Once again the root prefers to maintain its identity.

b.	gwad	'talk'	gʷəgʷádəd	'reply'
	kʷ'ałəb	'examine'	kʷ'əkʷ'áłəb	'nearsighted'
	táləł	'nephew/niece'	tətáləł	'little nephew/niece'
	tadᶻ	'dance'	tətádᶻəd	'what a mother bird does to attract attention away from her babies'

As predicted by the model, OC also shows the default under the same conditions (54). There is not a great deal of data due to the fewer number of OC stems and the preference for initial stress in Lushootseed. The following are the only stems which have schwa in the base and stress on the OC affix. While the data are not very robust, there are no counter-examples.

(54) Default Segmentism with OC

ʔəx̌íd	'what happened'	ʔəx̌-íx̌-əd	'What's he done?'
kʷ'əq	'fall backwards'	s-kʷ'əq-íq	'robin (tilts head back)'

Also as predicted, the DIST morpheme does not exhibit the default, as the following data show. The one exception is a long-vowelled stem, with two forms: one with a short vowel, and one with a different default. Note that there is a slight difference in meaning. This is significant below where these words are examined more closely.

(55) No Default with DIST

a. Schwa Vowels

ǰə́səd	'foot'	ǰə́s-ǰəsəd	'feet'
dᶻə́x̌	'move'	dᶻə́x̌-dᶻəx̌	'move household'
s-čə́txʷəd	'bear'	s-čə́t-čətxʷəd	'bears'

b. Cluster-Initial Roots

č'ƛ'áʔ	'rock'	č'ƛ'-č'ƛ'áʔ	'rocks'
qʷłayʔ	'log'	qʷł-qʷłayʔ	'logs'

c. Long-Vowel Root (Hess and Hilbert 1977: Vol. 2, p. 163)

s-duukʷ	'knife'	s-dú-duukʷ	'any chance assortment of knives'
		s-dá-duukʷ	'knives'

These data support the claims of MAR where affixes are found with defaults, but roots are not. Further discussion of the data in (55c) will be presented below.

4.2.2 Deriving Default-Segmentism

The analysis focuses on schwa-vowelled roots, because these have the most robust empirical data.[25] Default segments violate Max, which requires every segment of the base to be in the reduplicant. As noted above, the conditioning factor is stress, with default [i] occuring in order to avoid a stressed schwa. As discussed above, the relevant constraint is *ə́.

(56) *ə́ schwa is marked as a metrical peak

*ə́ has the distributional hallmarks of a markedness constraint because there are languages which never stress schwa, languages which avoid stressing schwa, and languages which permit stressed schwa, but no language enforces a stressed schwa. Specific cross-linguistic motivation for this constraint is not hard to find, because many languages resist stressing schwa. Virtually every Salish language shows evidence of this.[26] The widespread emergence of *ə́ in Salish in the IO domain, makes it unremarkable to find it emerging in the BR-domain as well. Recall from §3.3 that Lushootseed does not allow stressed schwas in segmentally specified affixes, but does permit stressed schwa in roots. Finding a parallel in the BR-domain is expected.

Because DIST allows stressed schwa, but DIM and OC do not, we expect *ə́ to intervene between BR-Max-Rt and BR-Max, providing us with the following ranking. The phonological asymmetry is another TETU effect in the reduplicative domain: the MU pattern discussed in section 3.4 above.

(57) TETU: default segment: BR-Max-Rt >> *ə́ >> BR-Max

As the following tableau illustrates, the difference in segmentism follows from the preceding ranking. The DIM and OC morphemes do not allow stressed schwa. The cost of obeying the markedness constraint is lack of segmental identy as can be seen in the first two (a) examples. The DIST morpheme, which is a root, allows stressed schwa.[27]

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[25] Details about deriving the segmental quality of the fixed [i] as well as its occurence with long-vowelled and cluster-initial diminutive stems are presented in Alderete et. al. (1999).

[26] The languages for which this has been explicitly investigated include: Cowichan: Bianco (1996); Lushootseed: Hess (1977), Urbanczyk (1996); Upper Chehalis: Kinkade (1997); Squamish: Bar-El (1997) and Bar-El and Watt (1998); Mainland Comox: Urbanczyk (1999d); St'at'imcets: Roberts (1994), Shaw (1996); Moses-Columbian: Czaykowska-Higgins (1993).

[27] To show the effect of the ranking, the data in the tableau are restricted to forms which retain schwa in the base.

(58) BR-Max-Rt >> *ə́ >> BR-Max

	BR-Max-Rt	*ə́	BR-Max
DIM-təd^{z}il			
a. ☞ tí-təd^{z}il			əd^{z}il
b. tə́-təd^{z}il		*!	d^{z}il
sk^w'əq-OC			
a. ☞ sk^w'əq-íq			sk^w'ə
b. sk^w'əq-ə́q		*!	sk^w'
DIST-ǰəsəd			
a. ǰís-ǰəsəd	əəd !		əəd
b. ☞ ǰə́s-ǰəsəd	əd	*	əd

An alternative explanation for why DIST retains schwa is that inserting material between the consonants of the root may be disallowed by the language on the whole. Insertion or deletion of medial segments violates the faithfulness constraint Contiguity. Thus, perhaps *[ǰís-ǰəsəd] is ill-formed because high-ranking Contiguity forbids insertion. This is an important point to visit, because if the explanation for why DIST retains schwa comes from elsewhere, the entire analysis is undermined. It turns out to be an impossible task to determine the ranking between Contiguity and Max because they do not conflict. However, the following data show that Contiguity can be violated by the DIST morpheme in two ways: having a vowel in DIST that is not in the base (intrusion) and by having a vowel in the base that is not in DIST (skipping).

(59) Contiguity violations

a. Intrusion into DIST

t'əq'əd	t'əq'-t'q'ád	'patch it/ patch it up'
pk^w	ləpək^w-pk^{w}ax^w	'break off a piece/ it flaked off'
χəɬ	χəɬ-χɬil	'sick/ very sick'
ptidg^{w}əs	pət-ptidg^{w}əs	'think about/ thinking'

b. Skipping base material

sax^{w}əb	sáʔ-sx^w-sax^{w}əb	'jump, leap/ hopping'
q'is	q'i-q's-q'isšəd	'expose/ legs partly covered'

The preceding data would provide speakers with positive evidence that Contiguity can be violated. According to theories of learnability in OT, (Tesar and Smolensky 1996; Hayes 1999), language learners start with high-ranking constraints and demote constraints that are violated. Thus Contiguity would be demoted. On the other hand, there are no items in which the DIST has a non-base vowel. The only potential counter-example is *dá-duukʷ* 'knives', which will be discussed below. Thus, an alternative analysis where Contiguity is seen to be the driving constraint behind schwa retention encounters negative evidence, while the BR-Max-Rt constraint does not.[28] The Contiguity analysis also does not offer a cross-linguistic explanation because there are languages like Sawai (discussed in §2.3) which have the default in both CVC and CV shaped reduplicants.

A further question regarding the analysis is whether [i] is truly epenthetic or simply an unfaithful copy. Evidence for the epenthetic nature of [i] comes from long-vowelled DIM stems. Recall that long vowelled stems also have the default. These stems provide the crucial evidence that the default is not a bad copy of the base vowel.

The default occurs in order to avoid a long vowel and to avoid a bad copy. The avoidance of long vowels is well-established cross-linguistically (Selkirk 1984; Rosenthall 1996). So, the relevant phonological constraint is *VV. The interesting feature about Lushootseed is that a shortened version of the long vowel is not found. Following Bates (1986), the failure to copy a long vowel as short is analyzed as an instance of length transfer in reduplication (Levin 1983; Clements 1985), where long vowels are copied as long and short vowels are copied as short. The second interesting feature about Lushootseed, is that these Transfer effects are obeyed by failing to copy at all.[29] A short vowel would be a bad copy of the long vowel and is ruled out. The relevant constraints are presented below.

(60) *VV — No long vowels
Ident-μ — If a segment is dominated by *i* moras in S1, it's correspondent is dominated by *i* moras in S2.

The optimal candidate eliminates a marked long vowel in the base by having an epenthetic vowel in the nucleus (a). A totally faithful candidate is ill-formed

[28] If Contiguity were used to explain why there is no insertion with CVC reduplicants, then one would wonder why more languages do not violate it to avoid marked structure. In addition to the Sawai pattern presented in §2, there seem to be two other situations where Contiguity is violated in achieving shape or segmental invariance. One is onset simplification as exemplified by the Sanskrit perfective [pa-prath-a] 'spread'. The other is discontiguous copying as exemplified by Ulu Muar Malay [bu?-buda?] 'children' (Kroeger 1989). Both situations involve skipping where the reduplicant size/shape is monosyllabic. While Contiguity violations seem to be linked to monosyllabicity, to investigate the phenomenon more fully here would take us too far afield.

[29] This type of transfer effect cannot be obtained in the Full Copy and Trim model of reduplication (Steriade 1988). Because markedness is checked after the copy stage, Full Copy cannot straightforwardly account for this unmarked situation by failing to copy.

because it contains a long vowel (b). Failure to copy the long vowel as short is suboptimal as well, in violation of Ident-μ (c). Notice that if [i] is a bad copy of the base vowel, as indicated by subscripting in candidate (d), then it also violates Ident-μ. It is in fact worse than (c) because it would also violate BR-Ident-VFeature. Candidate (c) harmonically binds (d).

(61) *VV, BR-Ident-μ >> BR-Max

		*VV	BR-Ident-μ	BR-Max
a.	☞ s-$\underline{dí_j}$-duu_ik^w	*		uuk^w
b.	s-$\underline{dúu}$-$duuk^w$	**!		k^w
c.	s-$\underline{dú}$-$duuk^w$	*	*!	k^w
d.	s-$\underline{dí_i}$-duu_ik^w	*	*!	k^w

Having analysed DIM long-vowelled stems and seen that BR-Ident-μ is obeyed, the question arises as to the status of long-vowelled DIST stems. The rarity of long-vowelled stems does not help to establish a robust pattern, as only one DIST long-vowelled stem was found: 'knives'. Interestingly, two forms are attested. In one the vowel is short, in violation of BR-Ident-μ (*$dú_i$-duu_ik^w*), and the other has a different default (*$dá_j$-duu_ik^w*). It is important to point out a meaning difference between the forms. Hess and Hilbert (1977: Vol. 2, p. 163) are careful to point out that the shortened vowel is a 'distributive', while the form with [a] "is used to represent a homogenous collection".

(62) Long-vowel stems (Hess and Hilbert 1977: Vol. 2, p. 163)

s-$duuk^w$	'knife'	s-dú-$duuk^w$	'any chance assortment of knives'
		s-dá-$duuk^w$	'knives'

Evidence that the fixed vowel [a] is not part of the distributive morpheme comes from the following pairs of words, where 'homogenous collection' and DIST can be formed from the same root (Hess and Hilbert 1977: *ibid*).[30]

(63)

Stem	homogenous collection	distributive
$sax^wəb$	sa-$sax^wəb$	$\underline{sax^w}$-$sax^wəb$
'jump, run'	'many run away…'	'running, jumping all over'
saq^w	sa-saq^w	$\underline{saq^w}$-saq^w
'fly'	'flock flies away abruptly'	'flying all over'

Because the [a] seems to be associated with a different meaning, it will not be analyzed as DIST.

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[30] Except for 'knives', in all the data provided by Hess and Hilbert (1977), the root vowel is [a]. Therefore it is difficult to establish a strong generalization that the vowel is a fixed [a].

At first the existence of a short vowel reduplicant seems to be problematic for the analysis. However, it must be the case that *VV is obeyed by all reduplicants. This pattern is expected, given the findings about shape above. All reduplicative morphemes are mono-syllabic. So we can also expect all reduplicants to obey a markedness constraint. Because the language as a whole allows long vowels, *VV must be ranked below IO-Ident-μ-Rt.

(64) IO-Ident-μ-Rt >> *VV, BR-Max-Rt >> BR-Ident-μ

	IO-Ident-μ-Rt	*VV	BR-Max-Rt	BR-Ident-μ
a. ☞ s-dú-duuk^{w}		*	k^{w}	*
b. s-dúu-duuk^{w}		**!	k^{w}	
c. s-dí-duuk^{w}		*	uk^{w}!	
d. s-dú-duk^{w}	*!		k^{w}	

The CV shape is also problematic. While it seems to support the Contiguity approach to the phenomenon, the suboptimal [s-duk^{w}-duuk^{w}] would obey Contiguity because corresponding segments are contiguous in both the reduplicant and base. Until more long-vowelled stems are found, it is not possible to say whether copying C2 is part of the phonology of long-vowelled distributives. Thus the CV shape will not be analyzed.

To summarize, the default vowel has been shown to occur with DIM and OC, but not with DIST. This is consistent with the analysis, because DIM and OC are affixes, while DIST is a root, exhibiting more marked phonological properties characteristic of roots. Of particular interest to the model developed here is that DIM and OC pattern together phonologically. The following lattice illustrates the constraint rankings established thus far.

(65)

```
        C-Final-Rt
            |
        IO-Max-Rt
            |                 IO-Ident-μ-Rt
        *Struc-σ                   |
            |                      |
        BR-Max-Rt                 *VV
         /  |  \                   /
   NoCoda  *ə́  BR-Ident-μ
         \  |  /
         BR-Max
            |
   Align(OC, R, Stem, R)
```

The next section shows how this analysis extends straightforwardly to double reduplications.

4.2.3 Double Reduplications and Default Segmentism

Doubly reduplicated stems provide further support for this analysis. First, they are relevant in establishing that BR-Max-Rt is the relevant constraint in maintaining vocalic identity in DIST stems. Second, what seems like exceptional phonological behaviour can be derived with the rankings established thus far.

As first pointed out by Broselow (1983), Lushootseed has an interesting pattern of double reduplications, where in DIM-DIST stems, the reduplicative patterning is as expected (66), but in DIST-DIM stems, two unexpected properties are noticeable. First, DIST has CV shape, rather than CVC. Second, DIST has the default, unexpectedly, and DIM has the default without the trigger. Default segmentism in (67b) over-applies, forcing 'back-copying' onto the adjacent base. We restrict our discussion to segmental identity here.[31]

(66) DIM-DIST

bədaʔ	'child'	bí-bəd-bədaʔ	'dolls; litter [of animals]'
sáxʷəb	'jump, run'	sá-ʔ-sxʷ-saxʷəb	'hopping'
qis	'expose'	qí-qs-qisšəd	'legs partly uncovered'

(67) DIST-DIM stems

a. Full-vowelled Stems

pástəd	'Caucasian'	pá-pa-pstəd	'many white children'
píšpiš	'cat'	pí-pi-pšpš	'kittens'
yúb-il	'starve'	yú-yu-yəbil	'children are starving'

b. 'Default' Stems

bədaʔ	'child'	bí-bi-bədaʔ	'small children'
s-dúukʷ	'knife'	s-dí-di-duukʷ	'small knives'
čƛ'aʔ	'rock'	č'í-č'i-čƛ'aʔ	'gravel'

These forms are relevant because the identity effects in the DIST-DIM stems can be captured as a consequence of high-ranking BR-Max-Rt. Secondly, these data have been used to provide evidence for the cycle and subjacency in reduplication (Broselow 1983), and so provide a good test for the approach to domains presented here.

The first point to make is that these forms establish that the base of

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[31] See Urbanczyk (1999b) for a detailed analysis of double reduplications. The CV- shape of the DIST is analyzed as a consequence of the OCP (contra Broselow 1983), where evidence for an OCP-type degemination strategy is based on a more recent and expanded corpus of stems.

reduplication must be the string immediately adjacent to the reduplicant.[32] The following representation makes the assumptions about the base clear, where the DIM reduplicant-base relation is indicated by subscripting letters and the DIST reduplicant-base relation is indicated by subscripting numbers.

(68)	a. [bí-bi-bəda?] DIST-DIM			b.[bí-bəd-bəda?] DIM-DIST	
	reduplicant	base		reduplicant	base
DIST	b$_1$í$_2$-	b$_1$i$_2$b$_3$ə$_4$d$_5$a$_6$?$_7$	DIM	b$_a$í-	b$_a$ə$_b$d$_c$b$_d$ə$_e$d$_f$a$_g$?$_h$
DIM	b$_a$i-	b$_a$ə$_b$d$_c$a$_d$?$_e$	DIST	b$_1$ə$_2$d$_3$-	b$_1$ə$_2$d$_3$a$_4$?$_5$

The second point is that DIST maintains identity between base and reduplicant vowels, while DIM does not. This is consistent with the patterns examined thus far, where DIST is always identity-enforcing while DIM is not. In fact, in DIST-DIM stems, the outermost DIST forces the default in the DIM even under the lack of a trigger. Thus the exceptional occurence of [i] without a trigger is an example of over-application. Given that DIST-DIM stems are those that seem exceptional, and that these are the ones where identity is actively enforced, the analysis will focus on these.

By varying the two reduplicants (DIST and DIM) and two possible vowels ([i] and [ə]), there are four candidates of interest to the analysis. The following tableau shows that the overapplication facts can be derived with the same ranking that derives the difference between the reduplicants. DIST maintains identity with its neighbouring base, so having a default in the DIM is more optimal than not, as can be seen in candidate (a). Because BR-Max is low-ranking, a default in DIM (which is the DIST base) is better than no default, even though this results in lack of identity for the DIM reduplicant-base relation. Violations for individual morphemes are indicated here for ease of exposition.

[32] See Rose (to appear) and Buckley (1997) for analyses of double reduplications where the base of both reduplicants is the innermost stem, not the adjacent string.

(69) BR-Max-Rt >> *ə́ >> BR-Max

DIST-DIM-bəda?	BR-Max-Rt	*ə́	BR-Max
a. ☞ bí-bi-bəda?	bəda?		DIST bəda? DIM əda?
b. bí-bə-bəda?	əbəda?!		DIST əbəda? DIM da?
c. bə́-bi-bəda?	ibəda?!	*	DIST ibəda? DIM əda?
d. bə́-bə-bəda?	bəda?	*!	DIST bəda? DIM da?

These double reduplications provide further support that Contiguity is not the relevant constraint in eliminating a stressed schwa from the DIST in simple reduplications. Contiguity would not be violated by the default here because the DIST has CV-shape. Selection of the optimal candidate falls to BR-Max-Rt.

4.4 Summary

This analysis of Lushootseed supports the two central predictions of the MAR model of reduplication. The first prediction regards the root-affix asymmetry. The larger DIST reduplicant exhibits marked phonological patterns, characteristic of roots. Permitting marked structure is achieved by preserving reduplicative identity. This is manifest in both the size and segmental content. DIST retains stressed schwa and adds a coda consonant to the reduplicated word. By having CVC shape and maintaining stressed schwa it exhibits canonical root phonology. Stressed schwa is eliminated in the DIST reduplicant only in DIST-DIM double reduplications. When the base is an adjacent reduplicant, identity can be enforced by over-application of the fixed vowel [i]. The second set of predictions pertain to the patterning of the affixal reduplicant phonology. The smaller DIM and OC reduplicants eliminate marked phonological structure, by having a default vowel. They also exhibit canonical affixal phonology by being smaller and not permitting stressed schwa. A significant result of this study is that both the shape and segmental properties of DIM and OC can be determined by the same constraint ranking. The fact that these reduplicative morphemes have the same phonology is captured by the model. The only assumption needed to derive the range of phonological patterns in Lushootseed reduplication is that DIST is classified as a root, while DIM and OC are affixes.

5. Conclusion

This study has pointed out a new observation about reduplicative phonology: that there is a correlation between size and segmental content. Larger reduplicants tend to have more marked structure, while smaller reduplicants tend to have less marked structure. This correlation is claimed to be analagous to the root-affix asymmetry observed in pre-specified morphemes. In order to derive this pattern, a model was developed, based on McCarthy and Prince's Generalized Template Theory (1994a, 1999). The key to capturing the correlation is the proposal that reduplicative morphemes can be specified as root and affix. The same general mechanism that explains the root-affix asymmetry for pre-specified morphemes can also capture the pattern in the reduplicative domain. By permuting all the rankings of the relevant constraints, it was shown that no ranking will derive a pattern where a large reduplicant has less marked structure than a small reduplicant. Because each ranking of constraints is a different grammar in OT, this model is shown to only generate the attested pattern and does not over-generate the unattested pattern. Therefore, the correlation is explained by the model.

A second point worth emphasizing is that the relationship between size and segmentism is described as a correlation, not a function. In other words, if there is a large reduplicant, we cannot predict that it will have marked segmental content. Likewise, with smaller reduplicants, we cannot predict that they will be composed of unmarked segments. However, in languages with more than one reduplicative morpheme, the prediction is that no genuine case will be found in which the smaller reduplicant is more marked than the larger reduplicant. Apparent counter-examples to this claim were discussed in section 2.2 in order to be more explicit about the properties of a true counter-example.

In terms of empirical adequacy, this model of reduplication can straightforwardly derive both size and segmental content of a range of reduplicative patterns in Lushootseed. Many aspects of Lushootseed reduplication have been proposed to offer evidence for additional theoretical machinery in the literature on reduplication. Therefore the corpus of data analyzed here is a good test case for any model of reduplication. Considering that the goal of any linguistic model is to derive a linguistic system, the fact that virtually the entire set of reduplicated stems has been analyzed implies that the model developed here comes close to modeling a speakers linguistic competence.

Finally, in terms of simplicity, the model developed here does not propose to offer any new theoretical machinery. On the contrary, it extends proposals that are independently needed to derive the phonological patterns of pre-specified roots and affixes to the reduplicative domain. By Occam's Razor, the minimal amount of information that a lexical entry for a morpheme must contain includes: morphological classification, subcategorization, meaning, and a means by which it achieves its phonological exponence. This model of reduplication claims that reduplicative morphemes are specified as roots and affixes, they can be either prefixes or suffixes, internal or external to the prosodic word, they have their own meaning, and they achieve their exponence by a BR-Correspondence relation. The only difference between prespecified and reduplicative morphemes is which string can can occupy the position of S1 - the input or the base. There are no templates necessary to derive the shape, nor are there templatic constraints. Introducing templatic constraints to the grammar here would result in over-generation of reduplicative systems, because shape could be determined independently of morphological category. Therefore, the morphological a-templatic model developed here brings phonological theory one step closer to the goal of deriving a complex range of patterns by using the simplest mechanisms possible.

Appendix A.1 Informal Survey of Fixed Melodic Material

Sources checked: Alderete *et. al.* (1999); Uhrbach (1987); Yip (1992)

There were two types of segmentism:
TETU = unmarked structure in RED,
MO = marked affixal segmental material in RED

If a language is known to have mono-syllabic roots, the decision was made to classify the reduplicant size as total. In these cases, the size of the root is indicated to the right. Also, the quality of the fixed segment is indicated to the right of the classification. In all cases, choice of TETU or MO is consistent with the source analyses.

#	Language	Size	Type of Segmentism	
1.	Acehnese	CV-	TETU	[i]
2.	Balinese	CV	TETU	[ə]
3.	Besemah	CV	TETU	[ə]
4.	Bolaang Mongondow	CV-	MO	[-o]
5.	Bugis	Ft	TETU	[-k]
6.	Cebuano	Ft	MO	[-ulu], if Base >Foot; ø, if Base = Foot
7.	English	Total	MO	[schm-]
8.	Gayu	CV ~ total	TETU	[ə] ~ No TETU
9.	Hindi	total	MO	[w-]
10.	Igbo	CV-	TETU	[high] & labial attraction
11.	Javanese	CV-	TETU	[ə]
12.	Kamrupi	total	MO	[s-]
13.	Kannada	total	MO	[gi-]
14.	Kolami	total	MO	[gi-]
15.	Lushootseed	CV-	TETU	[i]
16.	Nancowry	CV(C)-	TETU	[ʔ]
17.	Nias	Foot	MO	[voice] if base is trisyllabic
18.	Palauan	CV-	MO	[e]
19.	Sasak	CV	TETU	[ə]
20.	Teluggu	Foot	MO	[-ṭṭa]
21.	Thai	total	MO	[schwa replaces final vowel - long or short]

22.	Tübatulabal	CV(C)-	TETU	[?]
23.	Tzeltal	total (-CVC)	MO	[-n]
24.	Vietnamese	total (C)	MO	[-aŋ]
25.		total (CVC)	MO	[-a-]
26.	Yoruba	CV-	TETU	[i]

Appendix A.2 Verification of Segmentism and Size Factorials

In order to verify the results of the rankings, we use the hypothetical root [p'atad] which is polysyllabic and contains a marked segment initially. We only consider candidates which obey IO-Faith. In each tableau, the root is derived first, and the affix second. Affix reduplicants are underlined and root reduplicants are double underlined.

1. Segmentism systems: F=[constricted glottis]

1.1 MM : both reduplicants allow the marked structure

a) Ident[F] >> Rt-Ident[F] >> *F

p'atad	Ident[F]	Rt-Ident[F]	*F
a. ☞ p'a-p'atad			**
b. pa-p'atad	*!	*!	*
a. ☞ p'a-p'atad			**
b. pa-p'atad	*!		*

b) Rt-Ident[F] >> Ident[F] >> *F

p'atad	Rt-Ident[F]	Ident[F]	*F
a. ☞ p'a-p'atad			**
b. pa-p'atad	*!	*!	*
a. ☞ p'a-p'atad			**
b. pa-p'atad		*!	*

c) Ident[F] >> *F >> Rt-Ident[F]

p'atad	Ident[F]	*F	Rt-Ident[F]
a. ☞ p'a-p'atad		**	
b. pa-p'atad	*!	*	*
a. ☞ p'a-p'atad		**	
b. pa-p'atad	*!	*	

1.2 UU : both reduplicants eliminate marked structure

a) *F >> Ident[F] >> Rt-Ident[F]

p'atad	*F	Ident[F]	Rt-Ident[F]
a. p'a-p'atad	**!		
b. ☞ pa-p'atad	*	*	*
a. p'a-p'atad	**!		
b. ☞ pa-p'atad	*	*	

b) *F >> Rt-Ident[F] >> Ident[F]

p'atad	*F	Rt-Ident[F]	Ident[F]
a. p'a-p'atad	**!		
b. ☞ pa-p'atad	*	*	*
a. p'a-p'atad	**!		
b. ☞ pa-p'atad	*		*

1.3 MU ˋ : the affix eliminates marked structure while the root retains it

a) Rt-Ident[F] >> *F >> Ident[F]

p'atad	Rt-Ident[F]	*F	Ident[F]
a. ☞ p'a-p'atad		**	
b. pa-p'atad	*!	*	*
a. p'a-p'atad		**!	
b. ☞ pa-p'atad		*	*

2. Size systems

Max and Rt-Max violations are indicated with each segment that is not in the reduplicant.

2.1 (>σ)(>σ) : both reduplicants are polysyllabic

a) Max >> Rt-Max >> *Struc-σ

p'atad	Max	Rt-Max	*Struc-σ
a. ☞ p'atad-p'atad			****
b. p'a-p'atad	t!ad	t!ad	***
a. ☞ p'atad-p'atad			****
b. p'a-p'atad	t!ad		***

b) Rt-Max >> Max >> *Struc-σ

p'atad	Rt-Max	Max	*Struc-σ
a. ☞ p'atad-p'atad			****
b. p'a-p'atad	t!ad	t!ad	***
a. ☞ p'atad-p'atad			****
b. p'a-p'atad		t!ad	***

c) Max >> *Struc-σ >> Rt-Max

p'atad	Max	*Struc-σ	Rt-Max
a. ☞ p'atad-p'atad		****	
b. p'a-p'atad	t!ad	***	tad
a. ☞ p'atad-p'atad		****	
b. p'a-p'atad	t!ad	***	

2.2 (≤σ)(≤σ) : both reduplicants are monosyllabic

a) *Struc-σ >> Max >> Rt-Max

p'atad	*Struc-σ	Max	Rt-Max
a. p'atad-p'atad	****!		
b. ☞ p'a-p'atad	***	tad	tad
a. p'atad-p'atad	****!		
b. ☞ p'a-p'atad	***	tad	

b) *Struc-σ >> Rt-Max >> Max

p'atad	*Struc-σ	Rt-Max	Max
a. p'atad-p'atad	****!		
b. ☞ p'a-p'atad	***	tad	tad
a. p'atad-p'atad	****!		
b. ☞ p'a-p'atad	***		tad

2.3 (>σ)(≤σ) : root reduplicant is polysyllabic and affix is monosyllabic

a) Rt-Max >> *Struc-σ >> Max

p'atad	Rt-Max	*Struc-σ	Max
a. ☞ p'atad-p'atad		****	
b. p'a-p'atad	t!ad	***	tad
a. p'atad-p'atad		****!	
b. ☞ p'a-p'atad		***	tad

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Head in Yorùbá Derived Nouns

L O Adéwọlé
Ọbáfẹmi Awólọ́wọ̀ University

1 Introduction

Studies on Yorùbá have typically ignored or undervalued the place of word structure within a generative grammar. This neglect has a far reaching effect on the study of the language first, because words are the basic units in the description of any language and second, because the Yorùbá word structure offers a microcosm of some of the descriptive problems of sentences in the language. In this paper, therefore, we shall take a critical look at the notion, head, in the Yorùbá morphology within a variant of the Generalised Phrase Structure Grammar (GPSG henceforth) developed by Cann (1986).

2 Theoretical Preliminaries

Cann (1986) rejects a bar level approach to phrase structure as exemplified, for example, in Jackendoff (1977) and proposes a two feature approach that defines phrases in terms of the primitive syntactic notions of 'constituent incompleteness' and 'lexicality' as in (1).

(1)	(a)	<MAXIMAL, ->:	constituent incompleteness
	(b)	<LEXICAL, +>:	lexicality

In line with the categories/features in Gazdar et al (1985), the two features in (1) define the four possible categories in (2).

(2)	(a)	{}	(complete, non-lexical)
	(b)	{<MAXIMAL, ->}	(incomplete, lexical)
	(c)	{<LEXICAL, +>}	(compete, lexical)
	(d)	{<MAXIMAL, ->, <LEXICAL, +>}	(incomplete, lexical)

According to Cann (1986: 107), constituent incompleteness 'denotes incompleteness in terms of the structure in which an expression is found. It does not provide a ones and for all definition of the status of a particular string of words but its status within a larger string'.

Thus, we may analyse the string in (3a) as in (3b-e). Category abbreviations are given in brackets.

(3) (a) Aṣọ funfun tí mo rà 'The white cloth that I bought': 'non-lexical, complete' (NP)

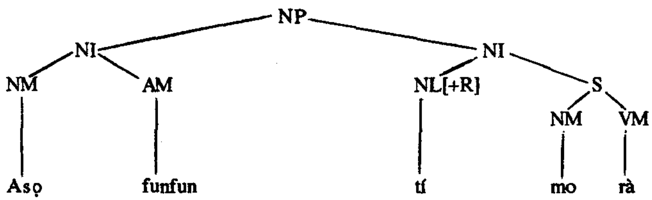
(b) Aṣọ funfun 'The white cloth': 'non-lexical, incomplete' (NI)

(c) mo 'I': 'lexical, complete' (NM); 'rà' 'buy': lexical, complete' (VM)

(d) tí 'that': 'lexical, incomplete' (NL)

The structure of (3a) is shown in (4).

(4)



'The white cloth that I bought'

3 The Structure of Words

Syntactic categories, as described above, are defined according to whether they analyse complete or incomplete expressions while the domain of syntactic processes is determined by the instantiation of the feature, LEXICAL. For words, however, lexicality is fixed and defines the domain of lexical rather than syntactic processes. Here, the notion, 'word,' is taken as primitive and defined as X[+LEX] which means a lexical category that is neither a stem nor an affix. Lexical categories are also defined parallel to the syntax with the uses of two single-valued features denoting non-word (ie stem) and affix. LEX is a set of lexical features. These lexical features appear with their own lexical entries which means that they do not appear through the operation of word formation rules. (5c-f) give us the four categories that (5a-b) define.

(5) (a) <WORD, ->

(b) <AFFIX, +>

(c) {}: Word (W)

(d) {<WORD, ->}: Stem (S)

(e) {<AFFIX, +>, <WORD, +>}: Clitic (C)

(f) {<AFFIX, +>, <WORD, ->}: Affix (A)

(g) Feature Cooccurence Restriction: [F] ---> [+LEX], F ε LEX

(5c) is the category 'word', (5d), the category 'stem' (non-affixal, non-word), (5e) is a clitic (affixal, word) and (5f) is the category 'affix' (affixal, non-word). It should be noted, however, that given the definition of a stem as 'that which is left of a word when all inflectional affixes have been removed' (Hartman and Stork 1976: 219) and as there is no inflectional affixes in the language, it would not be accurate to say that the stem is a lexical category in Yorùbá. Thus, if 'àìlọ' (the act of not going) is taken as a word, then, 'àì' (a derivational morpheme) (see Owólabí 1995: 108 note 3) will be an affix and 'lọ' (to go), a word. Items such as 'mo' (I), 'o' (you) which have been described as clitics by Pulleyblank (1986) do not take part in the derivation of new words in the language. Given (6), we can exemplify (5) as (7).

(6) Mo jó ijó fújì 'I dance to fújì music'

(7) (a) {} (W): jó 'to dance, ijó 'dance', fújì 'fújì music'

(b) {<AFFIX, +> <WORD, +>}(C): mo 'I'

(c) {<AFFIX, +> <WORD, ->} (A): i 'the derivational morpheme in ijó 'to dance'

There is also a restrictive feature instantiation principle operating within lexical structure called the Lexical Feature Principle. The principle states that the LEX feature set of a daughter must be an extension of that of the mother. For Yorùbá, as we cannot say that there is the category, stem, and as clitics do not take part in the derivation of new words, this principle will allow only the relations between mother and daughter in the lexical trees in (8).

(8) (a)

{}
|
{}

(b)

{}
|
{<AFFIX, +> <WORD, ->}

(8) (c)

{<AFFIX, +> <WORD,->}
|
{<AFFIX, +> <WORD,->}

4 The Notion 'Head' in Morphology

Recent generative work has given much space to the discussion of the head of a word in morphological processes. Lieber (1981: 55) says that

> in syntax, the head of a phrase is the element in the phrase that has the same distribution and belongs to the same category as the phrase itself. The definition of morphological head is meant to be analogous. The head of a word is the element that has the same category and notion of morphological head and the Right Hand Head Rule, in fact, serves to define the allowable routes among which features can percolate up nodes of a lexical tree

Williams (1981: 13) also states that the category of the derived word is always non-distinct from the category of its head, in English, usually the rightmost constituent.

It is easy to recognise the notion head in syntax. In fact, head has been used to divide the languages of the world into two. A language is either a head first or a head last language. For instance, while Yorùbá and English are head-first languages, Japanese is a head-last language. (9) shows these clearly.

(9) (a) English

(i) NP: Students of English (ii) VP: bought a ball (iii) PP: in the house

Yorùbá

(i) NP: Aṣọ dúdú 'cloth black' (A black cloth)

(ii) VP: ra bàtà 'buy shoe' (buy shoes) (iii) PP: ní ilé 'in house' (in the house)

Japanese

(i) VP: Watashi wa nihonj in dasu 'I Japanese am' (I am Japanese)

(ii) PP: Nihon ni 'Japan in' (in Japan) (Cook 1988:8).

As mentioned above, in much current generative work, 'head' in morphology is seen as analogous to 'head' in syntax. This analogy comes from the assumption that if a (morphologically) complex word manifests a certain grammatical category, then, that category is carried onto one of its constituents (a morpheme) which is to be considered as the head of that word. The reverse is also referred to as valid, the categorial feature of the head is percolated to the whole word.

If we assume, following Aronoff (1976), that all lexical structure are binary branching, then, we can reduce word formation process to the general rule in (10) which simply says that a lexical category may immediately dominate a lexical head (H) and some other lexical category, Y.

(10) X[+LEX} ---> H, Y

If (10) is the Immediate Dominance Rule (IDR) for Yorùbá, the question is, what will be the Linear Precedence Statement (LPS) for the language? In other word, is the head going to be at the left hand or right hand? To answer this question, we have to look at how new words are derived in the language.

Owólabí (1995: 92) recognises two classes of Yorùbá prefixes. The first class, listed in (11a), attach to Verbs/VPs to form nouns while the class 2, listed in (11b), attach to Nouns/NPs to form nouns.

(11a) à-, è-, ẹ̀-, ì-, ò-, ọ̀-, ù-

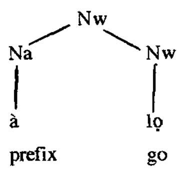
a-, e-, ẹ-, i-, o-, ọ-

àì-, òǹ-, oń-, àti-

(11b) oní-, oni-

Owólabí (1995) classifies the class 1 prefixes as heads because they are category-changing prefixes as in 'à+lọ' (prefix + go) ---> 'àlọ' (going) which has the structure in (12a) where we abbreviate affix as 'a' and word as 'w'.

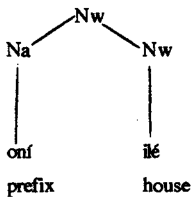
(12a)



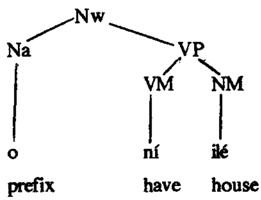
'going'

He does not recognise the class 2 prefixes as head because, according to him, they are not category changing. What he fails to realise is that even within a category, there can still be some subcategorisation and it is the head that determines such subcategorisation. For example, in English, both man and manhood are nouns but the abstractness of manhood is caused by the addition of the hood hence, hood is the head of the derived word. In the same manner, whether we recognise oní/oni as the derivational morpheme used to derived the agentive or emphatic form of the noun base (see Owólabí 1995: 108 footnote 4) or that o is the agentive morpheme (Awóbùlúyì 1978: 87) in such words as 'onílé' (the owner of a house), the fact is that the derived word owes its new subcategorisation to the affix, hence the affix is the head. The structure of onílé (the owner of the house) could be either (12b) or (12c).

(12b)



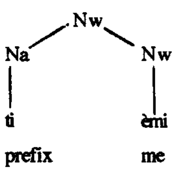
(12c)



'owner of a house'

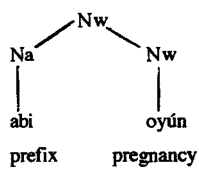
Here, we can also discuss such derived words as tèmi (mine) and aboyún (a pregnant woman) which Oyèláran (1987) says are derived from the combination of the derivational morphemes, ti and abi with the base nouns, èmi and oyún respectively. Their structures are shown in (13a) and (13b).

(13a)



'mine'

(13b)



'a pregnant woman'

As in the derivation of onílé (the owner of the house) in (12), it is the morphemes, ti and abi that change the subcategorisation of tèmi (mine) and aboyún (a pregnant woman) respectively, hence, they are the heads.

Apart from the derivations discussed above, from Owólabí (1984 and 1985) and Oyèláran (1987), the Yorùbá derived nouns can be classified as follows.

(14) (i) Partial reduplication of Verbs/VPs as in lílọ 'going' from lọ 'go' and '*lìlọ̀' as in 'ọ̀lìlọ̀' (grinder) from 'lọ̀' (grind) (Owólabí 1995: 109 footnote 5)

(ii) The combination of a noun and a derived adjective as in akọjá (a male dog) from akọ and já. Já is derived from ajá through the deletion of the initial vowel, 'a'. Ogbèyèkú 'an Ifá verse' is also derived from Ogbè 'an Ifá verse' and Òyẹ̀kú 'an Ifá verse' through the same process.

(iii) Full reduplication of Nouns/NPs as in (a) kọ́bọ̀ kọ́bọ̀ (one kọbọ̀ each), náírà náírà (one naira each) (b) ilédélé (from house to house), ọ̀pọ̀lọ́pọ̀ (many), ọmọkọ́mọ (any child), (c) bàtà oníbàtà (somebody's shoes), iṣẹ́ oníṣẹ́ (somebody's work), (d) ojoojúmọ́ (everyday) and oṣooṣù (every month)

(iv) Sentence words such as Olúwáfẹ́mi (a name) and Adéwọ̀lé (a name)

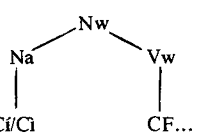
(v) Full reduplication of VP as in jagunjagun (soldier) and pẹjapẹja (fisherman)

(vi) Full or partial reduplication of conjunctions/conjunction phrase as in (a) tàbí-tàbí or (b) tàbí-ṣùgbọ́n as in the sentence, 'kò sí tàbí ṣùgbọ́n/kò sí tàbí tàbí' (There is no doubt about it) and (c) àti òjò àti ẹ̀ẹ̀rùn (both in rain and in sunshine, ie 'all the time').

We shall discuss (14 i-vi) one by one.

The case of the head resulting from regressive partial reduplication of the verb/VP base is straightforward. The prefix which results from the regressive partial reduplication of the verb/VP is category-changing (ie lọ (go) ---> lílọ (going). It changes the verb/VP to a noun, hence, it is the head of the derived word.

(15)



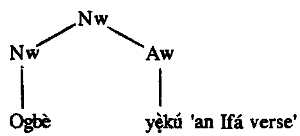
(15) says that if a verb-word consists of at least a consonant and a vowel, the consonant can be reduplicated regressively and the vowel 'ì/í' inserted between the resulting reduplicated

consonant and the verb. Examples are lílọ (going) from lọ (go) and *lìlọ̀ in ọlìlọ̀ (grinder) from lọ̀ (grind).

The derivation of such words as ọlìlọ̀ (grinder) from *lìlọ̀ and àyìyè (ie ààyè) (being alive, surviving, living) from *yìyè (Owólabí 1995: 109 footnote 5) shows that, in support of Cann (1986), we are rejecting 'Aronoff's (1976) word based approach to word formation and take up a position more like that of Halle (1973) where affixes, stems and words are all stored in the lexicon and are input to word formation rules, irrespective of whether the output of these are actually attested words' (Cann 1986: 111).

Oyèláran (1987) also discusses the case of a derived noun where a derived adjective is combined with a noun. According to him, in the derivation of such words as Ogbèyẹ̀kú (an Ifá verse) and akọjá (a male dog), the initial vowels of the nouns Ọ̀yẹ̀kú (an Ifá verse) and ajá (a dog) are elided and the derived adjectives, yẹ̀kú and já are combined with the nouns Ogbè (an Ifá verse) and akọ (a male) to form Ogbèyẹ̀kú and akọjá respectively. The structure of Ogbèyẹ̀kú which is representative of such derivation is (16)

(16)



Owólabí (1985) recognises five types of nouns derived through full reduplication. They can be represented by (17).

(17) (a) oṣooṣù (monthly) from oṣù (a month)

(b) kọ́bọ̀kọ́bọ̀ (one kọbọ̀ each) from kọ́bọ̀ (one kọbọ̀)

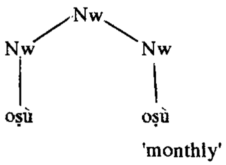
(c) bàtà oníbàtà (somebody's shoes) from bàtà (shoes)

(d) (i) ilédélé (from house to house) from ilé (a house) (ii) ọ̀pọ̀lọ́pọ̀ (many) from ọ̀pọ̀ (many) and (iii) ọmọkọ́mọ (any child/a bad child) from ọmọ (a child).

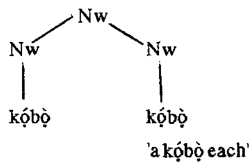
(e) ilé ńlá ńlá (big houses) from ilé ńlá (a big house)

As in compound sentences in syntax, both oṣooṣù (monthly) derived from oṣù (a month) and kọ́bọ̀kọ́bọ̀ (a kọ́bọ̀ each) derived from kọ́bọ̀ (one kọbọ̀) are double headed and their derivation can be diagrammed as (18). We ignore the phonological processes involved in their derivation here.

(18a)

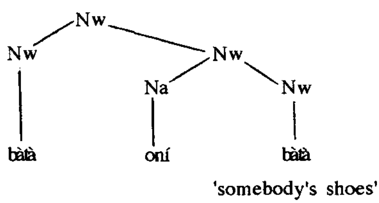


(18b)



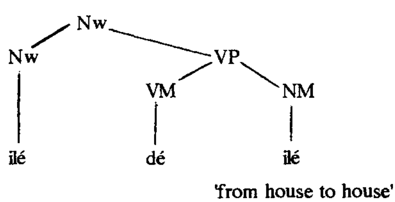
As for bàtà oníbàtà (somebody's shoes), oníbàtà (the owner of shoes) is derived first before the addition of bàtà (shoes) to form bàtà oníbàtà (somebody's shoes) with bàtà (shoes) as head. The structure is shown in (19).

(19)



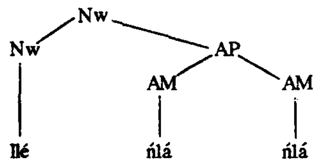
Ilédélé (from house to house), which is representative of (17d), is derived from the combination of a verb phrase and a noun as in (20) with ilé (a house) as head.

(20)



Ilé ńlá ńlá (big houses) which Owólabí (1985) regards as a derived word can be treated as (21) with ilé (a house) as head.

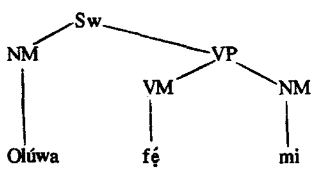
(21)



'big houses'

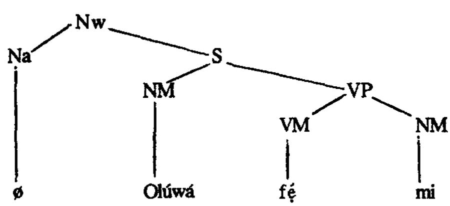
We can treat Olúwáfẹ́mi (a name) and Adéwọlé (a name) in (14iv) as Sentence words, in which case we may not need to account for their heads within morphology. Alternatively, we can treat then as noun words in which case their heads will be affixes which are realised as zero morphemes. The structures of both derivations are shown in (22).

(22a)



'a name'

(22b)



'a name'

The derivation of (22b) can be compared with that of the verb, 'bomb', from the noun, 'bomb', whose derivation is often said to be unmarked but which, in actual fact, has a derivational morpheme which is realised as zero. We can explain the non-realisation of this derivational morpheme by making use of what Zwicky (1985: 432) calls the rules of allomorphy which can be stated informally as follows:

(23) (a) A given bundle of features can have several different formatives as its exponent in different contexts. An example of this is the Yorùbá

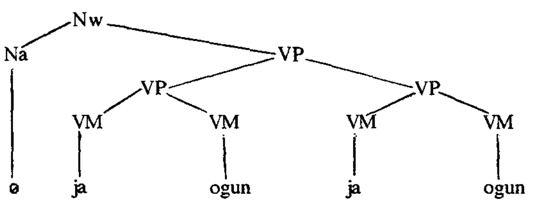
progressive marker which is realise as ń in a statement and máa in an imperative.

(b) A given formative can serve as the exponent of several different feature bundles in different contexts This can be exemplified by the use of máa as the future and habitual markers in 'Olú máa máa lọ' (Olú will continue to go).

(c) A formative serving as the exponent for bundles of morphosyntactic features may be absent. An example of this is the non-occurrence of the HTS after the subject pronoun as in 'Mo lọ' (I went) when compared with 'Dàda álọ' (Dàda HTS go 'Dàda went').

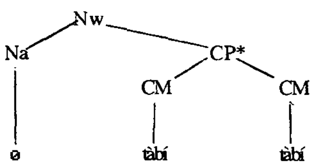
It is (23c) that we shall use to account for the non-realisation of the derivational morpheme in Olúwáfémi (a name) in (22b). We shall also use the same rule to derive (14 v-vi), the structures of which can be shown as follows:

(24a)



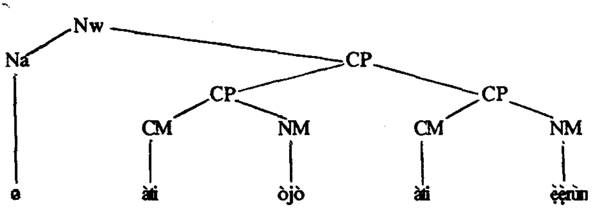
'a soldier'

(24b)



'but but'

(24c)



'in rain and sunshine (ie all the time)'

Again, the question can be asked as to what the linear precedence rule should be for the Yorùbá derived nouns. From the analysis above, the linear precedence rule should be (25) which shows that Yorùbá still maintains its head first rule of syntax in morphology, at least in the derivation of nouns.

(25) H < Y

5 Conclusion

Although left-hand Heads are said to be exceptional in languages, our analysis have shown that, apart from compounding or full reduplication which are double headed, as in syntax, Yorùbá is a language with a left-hand Head in morphology. By this we mean that it is through the leftmost constituent that 'features are percolated up nodes of a lexical tree' (Lieber 1981: 55).

Note

* CP stands for Conjunction Phrase.

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Lawrence Olúfẹ́mi Adéwọlé
Department of African Languages and Literatures
Ọbáfẹ́mi Awólọ́wọ̀ University
Ọ̀ṣun State, Nigeria.

GREAT MOMENTS IN SECOND LANGUAGE TEACHING

extracted from the travel/linguistic volume by
Davidson, J. (Colonel) 1901. *Notes on the Bashgali Language*.

Shtal latta wōs bā padrē ū prett tū nashtontī mrlosh.	'If you have had diarrhoea many days you wll surely die.'
Tū chi sē biss gur bītī?	'How long have you had a goitre?'
Tū tōtt baglo piltiā.	'They father fell into the river.'
I non angur ai; tū tā duts angur ai.	'I have nine fingers; you have ten.'
Or manchī aiyo; buri aīsh kutt.	'A dwarf has come to ask for food.'
Iā chitt bitto tū jārlom.	'I have an intention to kill you.'
Tū bilugh lē bidiwā manchī assish.	'You are a very kindhearted man.'
Zhī marē badist tā wō ayō kikkok damītī gwā.	'A lammergeier came down from the sky and took off my cock.'
Tū kai dugā iā ushpē vich: tū pā vilom.	'Why did you kick my horse? I will kick you.'

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CWPL STYLE SHEET

Documents should be submitted as camera ready hardcopies in accordance with the requirements outlined below. A copy should also be submitted on disk. **The editors reserve the right to return any submissions which do not adhere to the style sheet herein.**

1.0 Manuscripts on disk
Manuscripts should be produced on a Macintosh computer in the following format using Microsoft Word for text and Superpaint or Macdraw for tables, graphs, etc. Disk format required is 3.5 inch and high density. If this is not possible, please contact the editors regarding alternate arrangements. If the disk is to be returned a self addressed envelope should be sent also.

2.0 Manuscript Conventions

2.1 All material, including extended quotes, footnotes, references, etc. should be single spaced except for indented quotes and examples, (see section 3 below).

2.2 Each article should begin with the title, name of the author, and institutional affiliation or place of residence, all typed on separate lines with no spacing between these lines. Titles should be short, descriptive, and straightforward.

2.3 All footnotes, references, tables, diagrams, maps, etc. should NOT be on separate sheets but should be placed in their appropriate locations.

2.4 Section headings are required. Main headings should be bolded and underlined but not all-caps: e.g. **Introduction**. Section sub-headings are optional, but no more than one level of sub-headings should be used. Sub-headings should not be all-caps but should be bolded, e.g. **Sentence Types.** There should be no spaces between section headings and text.

2.5 **All text should be fully justified** including abstracts, text body, footnotes, references, etc

3.0 Text Conventions

3.1 Linguistic forms cited within a sentence in the text should be set apart from the text. Recommended conventions are as follows.

Forms cited in phonetic transcription should be enclosed between square brackets.
Forms cited in phonemic transcription should be between slant lines.
Other cited forms (e.g. underlying forms) should be underlined.
Authors may specify other transcriptional devices such as vertical lines, curly brackets, obliques, etc.

3.2 Glosses of linguistic forms should be enclosed between single quotation marks, which are not otherwise used: e.g. /amihkw/ 'beaver'. Double quotation marks should be used only for short quotations, reported conversation and the like.

3.3 The abstract and extended quotations of more than three typed lines should be set apart from the main text by double spacing both before and after the quotation, should be single spaced, and with both the left and right margins indented five spaces. No quotation marks of any sort should be used.

3.4 Sets of examples or example sentences should be numbered serially with Arabic numerals closed in parentheses. If several such examples are grouped together, the entire group is identified by an Arabic numeral, and the individual sentences by lower case letters, e.g.:

(5) a. John loves Mary.
b. Mary is loved by John.

Rules set off from the text should be similarly numbered, e.g.:

(3) C --> [-vce]/______#

4.0 Table/Figure Conventions

4.1 Number figures and tables consecutively (figures separately from tables) with Arabic numerals. All figures and tables should be placed in their respective places within the text.

4.2 A brief title for each table/figure that makes the data intelligible without reference to the text may be used. Longer explanatory material should be typed as a footnote to the table, not as part of the title.

4.3 Column heads should be short, so as to stand clearly above the columns.

5.0 Footnote Conventions

5.1 Footnotes should be located at the bottom of the page. They should be typed beginning with a raised number with double spacing between each note.

5.2 Footnotes are not used for bibliographical reference. They should be brief, ancillary comments on the main text and not extended discussions.

5.3 Footnotes should be numbered consecutively throughout the text. A footnote number in the main text is to be typed as a raised number immediately following the material to which it refers, e.g.:

...the extended linkage[3] which is...

Footnotes at the end of a sentence should follow the final punctuation:

...as evidenced in Gothic.[3]

5.4 Acknowledgements should be placed immediately after the text but immediately before the references.

6.0 Reference Conventions

6.1 Complete bibliographical information is not cited in the text or as a footnote. Within the text, the author's name, the date of the work referred to, and the page number(s) (if appropriate) are sufficient. The reference should be between parentheses, e.g.:

...it has been suggested (Johnson, 1959:32) that...

If the author's name is part of the sentence, only the numbers are between parentheses, e.g.:

...Johnson (1959:32) has suggested that...

If the author's name is part of a parenthetical comment, the parentheses are omitted from the numbers, e.g.:

...some have suggested (including Johnson, 1959:32 and Smith, 1963) that...

6.2 Do not use the terms "ibid." and "op.cit." Where necessary to avoid ambiguity, repeat the full reference. Do not use authors' initials when citing references in the text unless necessary to distinguish two authors of the same surname.

6.3 Full bibliographical information for the references cited in the text should be located within the section entitled REFERENCES at the end of the paper. Entries should be single-spaced both within and between references. Works are listed alphabetically by author's last name, and chronologically when two or more works by the same author are listed, distinguished by lower case letters in the case of works published in the same year. Each entry has four elements: the author's name, the year published, the title, and the source or place of publication. Each line following the first line of an entry is indented eight spaces. Titles of books should be in italics. Titles of both books and articles should follow the convention where only the first word of the title is capitalised. All other words, with the exception of proper nouns, should be in lower case. The following patterns should be used:

Single author:

Sapir, Edward. 1921. *Language.* New York: Harcourt, Brace.

Single Editor:

Fishman, Joshua A., ed. 1968. *Readings in the sociology of language.* The Hague: Mouton.

Multiple authors:

Chomsky, Noam & Halle, Morris. 1968. *The sound pattern of English.* New York: Harper and Row.

Articles:

Jasanoff, Jay. 1978. 'Observations on the Germanic Verschärfung.' *Münchener Studien zur Sprachwissenschaft.* 37: 77-90.

7.0 Hardcopy Manuscripts

Hardcopy format, i.e., on paper, is the same as disk format .

Manuscripts of articles submitted should be printed using laser quality print to ensure best quality for copying. These copies will not be returned. Authors should retain the original manuscripts in their own files.

Manuscripts should be printed on 8-1/2 x 11" paper on one side of the page only. All material, including extended quotes, footnotes, references, etc., should be single spaced, with double spacing at major divisions.

Papers should not include page numbering. Authors are, however, asked to lightly write the page numbers on the back of the pages in pencil

Left, right, top and bottom **margins** should be not less than **1.5"**.

All text should be composed using **Times, IPA Times or IPA Extended Times** font. The size of the font should be 12 point for the text, 10 point for the footnotes and 7 point footnote numbers.

8.0 Abstracts
Authors are asked to include an abstract of their paper under the title, their name and their institution. The title **Abstract** should be centred and bolded above the abstract. The first line of the abstract should not be indented like a normal paragraph. The entire body of the abstract should be indented as indicated in Section 3.3. **A separate copy of the abstract should also be submitted with the paper to be sent to a publisher of Working Paper Abstracts.**

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Example:
John Smith
Department of Linguistics
University of Zodiak
123 Wherever Street
Somewhere, Milkyway, PLACE
Z1A 5L2
smith@netway.zodiak.un