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The Historical Development of Reduplication,
With Special Reference to Indo-European

By

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The historical development of reduplication, with special
reference to Indo-European

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Mary Katherine Niepokuj

**The historical development of reduplication, with special reference to
Indo-European**

Mary Katherine Niepokuj

Abstract

This dissertation presents a historical look at reduplication, focussing on Indo-European but first situating it in a crosslinguistic context. Chapter 1 is a typological look at how reduplicative systems develop in a number of unrelated systems; based on the behavior of these systems, I suggest a number of developmental tendencies. The data presented in this chapter suggest that such tendencies are unidirectional. Chapter 2 considers various theoretical approaches to reduplication in light of the historical behavior outlined in Chapter 1; in addition to drawing on diachronic evidence, I also discuss a number of reduplicative systems which have not previously been discussed in the theoretical literature, and argue for a model of reduplication which accounts for both the diachronic behavior and for these reduplicative systems.

Chapters 3, 4, and 5 discuss various reduplicative systems in Indo-European and their likely historical developments. Chapter 3 looks at reduplication in Hittite; I discuss various problems of how to integrate the Hittite data into our understanding of reduplication in Indo-European. Chapter 4 looks at perfect reduplication; based on the developmental tendencies suggested in Chapter 1, I suggest that our understanding of what perfect reduplication looked like in the proto-language needs to be revised. I also make some suggestions concerning what determined whether a given root formed its perfect via reduplication or not. I argue that in Latin and in Old Irish reduplicated perfects were formed based on roots which exhibited invariant vocalism in their present stem if that vocalism was something other than -e-. Chapter 5 looks

at present reduplication in Indo-European. I argue that previous attempts to derive the present reduplication seen in Greek and Sanskrit from a Proto-Indo-European source fail because they make unwarranted assumptions concerning the semantic value that reduplication had in the proto-language. This difficulty is removed if a phonological motivation for reduplication is considered instead.

Jerry B. Holland 10/7/91

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A. General Introduction

This dissertation presents a historical look at reduplication, focussing on Indo-European but first situating it in a crosslinguistic context. Chapter 1 is a typological look at how reduplicative systems develop in a number of unrelated systems; based on the behavior of these systems, I suggest a number of developmental tendencies. The data presented in this chapter suggest that such tendencies are unidirectional. Chapter 2 considers various theoretical approaches to reduplication in light of the historical behavior outlined in Chapter 1; in addition to drawing on diachronic evidence, I also discuss a number of reduplicative systems which have not previously been discussed in the theoretical literature, and argue for a model of reduplication which accounts for both the diachronic behavior and for these reduplicative systems.

Chapters 3, 4, and 5 discuss various reduplicative systems in Indo-European and their likely historical developments. Chapter 3 looks at reduplication in Hittite; I discuss various problems of how to integrate the Hittite data into our understanding of reduplication in Proto-Indo-European. Chapter 4 looks at perfect reduplication; based on the developmental tendencies suggested in Chapter 1, I suggest that our understanding of what perfect reduplication looked like in the proto-language needs to be revised. I also make some suggestions concerning what determined whether a given root formed its perfect via reduplication or not. Chapter 5 looks at present reduplication in Indo-European. I argue that previous attempts to derive the present reduplication seen in Greek and Sanskrit from a Proto-Indo-European source fail because they make unwarranted assumptions concerning the semantic value that reduplication had in the proto-language. This difficulty is removed if a phonological

motivation for reduplication is considered instead.

1. The historical behavior of reduplicative systems cross-linguistically

1.0 Introduction

The purpose of this chapter is to give an overview of the diachronic behavior of reduplicative systems. The first portion of the chapter addresses two basic questions: where do fixed segments in a reduplicative affix come from, and what analogical forces are reduplicative affixes subject to? The second portion of the chapter looks at foot-based affixes and addresses the question of why such systems are common. The third portion of the chapter looks at systems in which the distinction between affix and base is blurred; I argue that such systems often provide a mechanism through which linguistic change can occur.

A few words about methodology are in order. The chapter purports to be "typological"; due to a number of constraints, however, the systems discussed are not a random sample, though I hope that they are a representative sample. One constraint, of course, is the availability of grammars. Another constraint is that I have only included systems which show some evidence of historical development. It is the case that a vast number of the world's languages have reduplicative systems which copy a base or some portion of a base and affix the copy to the base. But unless comparative data from a related language are available which differs from the system in the first language, or unless the language itself varies as to what the affix looks like, I have no evidence of what historical development led to this situation. Since due to limitations of space and time I cannot hope to catalogue every language which shows reduplication of some kind, I have left these languages uncited and undiscussed.

This chapter could be subtitled 'How to make historical inferences in the absence of historical data.' Reduplication has received almost no diachronic

discussion in the literature; as a consequence, I have no previous work to build upon. Furthermore, in most of the language families in which reduplication is prevalent, comparative work is still in its earliest stages, with the basic sound correspondences still undiscovered. As a consequence, most of my diachronic inferences are based on internal reconstruction or common behavior in unrelated languages. Internal reconstruction, of course, can only be performed when the language in question shows variation of some sort. This limitation is obvious; the consequence for this study, and particularly for my discussion of analogical tendencies, however, is to impart a skew to the sample. I will argue in the section on vocalic behavior that languages tend to develop systems with fixed vowels out of systems copying the vowel of the affix from the base, and that little or no tendency exists in the opposite direction; that is, languages do not seem to develop vowel-copying systems out of fixed-vowel systems. It is important to note, however, that if such a tendency did exist, and if it were a strong enough tendency to remove all residue of the preceding system, then I would have no way of identifying it. A reduplicative system which is consistently vowel-copying could conceivably be a later development from a different system, but it would be indistinguishable from a system which simply started out as a vowel-copying system.

On the other hand, if a reduplicative affix contains material not copied from the base, then I assume that this material is due to some historical development of some sort. When I argue for certain developmental tendencies based on common behavior in unrelated languages, I posit a particular model of how reduplication originates: speakers may spontaneously create a reduplicative system, but when they do so they must do so in a very transparent way, copying all of the base or some clearly identifiable part of it. Except in the case of echo-word reduplication (section 1.2), any segmental material not in the base will not be present in the copy, and can only

come about through subsequent development. This model of how reduplication originates and develops is to some extent fictitious; in Niepokuj (1989), I presented data from Nyakyusa, a Bantu language discussed by Bastin (1983), in which an apparent reduplicative system arose from an earlier non-reduplicative suffix. The suffix, reconstructed as **-ide*, came to copy its consonant from the base: examples are *-okikye* from *-okya* and *-tufifye* from *-tufya*, with the suffix serving to express perfectivity. On the other hand, the evidence I will present suggests that the model probably does describe how reduplication originates and develops in a majority of languages. The model I assume ought to be viewed as a working hypothesis, convenient because it provides a starting point in viewing reduplicative systems diachronically, but probably inaccurate in at least some cases. Subsequent research will probably result in more accurate historical descriptions of some of the cases I discuss.

The purpose of this section is to investigate the development and behavior of phonetic material in reduplicative affixes which remains constant regardless of the base from which the affix is copied. I will call such reduplication *fixed-segment reduplication*. An example of fixed-vowel reduplication is Greek perfect reduplication, as in *léloipa* 'I leave'; an example of fixed-consonant reduplication is English *shm-reduplication* as in *linguistics-shminguistics*. The first section of this chapter will examine the historical development of fixed-vowel reduplication. The second section of this chapter will examine the behavior of fixed-consonant reduplication.

My main reason for treating fixed consonants and vowels separately is the fact that, synchronically, their distribution differs; this suggests that their historical developments differ as well. It is quite common to encounter a system in which fixed-vowel reduplication and vowel-copying reduplication are mixed; examples of such systems are Nez Perce distributive adjectives and nouns (section 1.1.4) and

Sanskrit perfect reduplication (chapter 4). These mixed systems suggest that when one sort of system develops into the other sort of system, development proceeds via lexical diffusion, producing mixed systems; often the language will contain remnants of the earlier system even after the newer system is quite well established. On the other hand, mixes of fixed-consonant and consonant-copying reduplication do not exist, suggesting that the historical developments of these systems must differ from that of fixed-vowel reduplication.

1.1 Fixed-vowel reduplication

In this section I will examine the development of vowel quality in reduplicative affixes. Generally speaking, three possibilities exist: the vowel is copied from the root, the vowel is different than that of the root but agrees with the root vowel in some features, or the vowel is fixed. Examples of all three systems are attested: Hittite offers examples of the first type, Tarok, discussed in section 1.1.1, is an example of the second, and Greek perfect reduplication, discussed in chapter 4, is an example of the third. At issue is the question of whether any one of these systems can develop into any one of the other systems. The development of a fixed-vowel system into a vowel-copying system has been posited for Latin perfects (Leumann 1977, for example); the development of a vowel-copying system into a fixed-vowel system has been posited for Comox, a Salishan language (Sapir 1915), and the development of a fixed-vowel system into a system agreeing with the root vowel in some but not all features is seen in Tarok, discussed in section 1.1.1. After a discussion of the theoretical issues evoked in positing such developments, I will argue that a unidirectional tendency exists: vowel-copying systems tend to develop into fixed-vowel systems. The opposite development, from fixed-vowel to copied-vowel, is much less common. After presenting evidence for such a directional tendency, I will

turn in the next chapter to the question of what the original form of the reduplicated perfect affix in Proto-Indo-European looked like. I will argue that the development suggested by Leumann for Latin is unlikely, and will outline a different path of development.

The hypothetical development from a fixed-vowel system into a vowel-copying system has been called an instance of vocalic assimilation (in Latin; Leumann 1977:586). On theoretical grounds alone, however, explaining such a development as an instance of assimilation is doubtful. It is generally accepted in historical linguistics that assimilatory sound changes usually ignore morphological boundaries, resulting in the familiar situation in which morphophonological rules reiterate constraints on morpheme structure; rules which refer to morpheme boundaries in their structural descriptions usually develop when due to subsequent changes in the language the conditioning environment for an assimilatory process is lost. The sorts of assimilation seen in vowel-harmony and umlaut systems are generally quite regular: if a segment occurs in the proper phonetic environments it will undergo assimilation regardless of whether a morpheme boundary intervenes or not. The sort of assimilatory process used to motivate a hypothetical shift from a fixed-vowel reduplicative system to a vowel-copying system, however, must be constrained so that it only applies within a very specific morphological context. Such morphological conditioning in an assimilatory rule is highly unlikely.

An alternative theoretical path has also been invoked to motivate a development from fixed- to copied-vowel. In this scenario, due to assimilation or vocalic merger, the fixed reduplicative vowel acquires the same quality as the root vowel in a given form; speakers then reanalyze the reduplicative system as one which copies the vowel of the root as well as consonantal material, and extend the new copying rule to environments which had not previously been affected. For the sake of

convenience, I will refer to this hypothetical change as reduplicative strengthening. Such a hypothetical development is motivated by the fact that reduplicative systems copying both consonantal and vocalic material are quite common among the world's languages; the frequency with which such systems are found suggests that speakers are predisposed to make the resemblance between root and affix as strong as possible. This innate tendency to strengthen the link between root and affix thus provides the impetus for both the reanalysis and the analogical extension outlined above.

Although such a development has been posited in various languages (and, indeed, sometimes assumed as so obvious that no discussion of the issue is necessary), it is important to note that no clear case of such a development has ever been presented. It remains an open question as to whether speakers really do have an innate tendency to strengthen the resemblance between reduplicative affix and root. Furthermore, even if such a tendency does indeed exist, the issue of the strength of this tendency relative to other established historical trends such as that of levelling remains. It is clear that levelling and reduplicative strengthening would operate at cross-purposes to each other. Levelling functions to make the various instances of a given morpheme as constant as possible; reduplicative strengthening, on the other hand, would result in a morpheme varying as much as possible to reflect the phonetic structure of the root to which it is attached.

Yet another hypothetically possible development is for the reduplicative affix to begin life with a reduced, unstressed vowel rather than the vowel of the base. It has been suggested (Hyman 1972) that such a reduced vowel is then extremely vulnerable to assimilatory processes; in Bamileke, he notes, such a reduced vowel seems more likely to assimilate to adjacent segments than other vowels are. Although the case he discussed involves assimilation of a vowel to a consonant, it could also be conceivable that such a reduced vowel would be more likely to assimilate to

adjacent vowels as well. If such were the case, then this scenario would also provide a plausible route for reduplicative strengthening. The question to be explored in this chapter is whether any of these hypothetical, reduplication-specific developmental tendencies can be attested in any language family.

In this chapter I will discuss numerous cases of fixed-vowel reduplication; for those instances in which reconstruction of the path leading to the reduplicative system is possible, I will outline the historical development. Section 1.1.1 will describe nominal reduplication in Tarok, section 1.1.2 will describe reduplication in the Salishan family, and section 1.1.3 will describe verbal reduplication in the Niger-Congo family. Section 1.1.4 will cite data from Nez Perce, and section 1.1.5 will cite data from a number of languages which show fixed-vowel reduplication but for which reconstruction is not possible.

1.1.1 Tarok nominal reduplication

One instance of fixed-vowel reduplication which offers evidence for the development from vowel-copying to fixed-vowel reduplication is seen in the Benue-Congo language Tarok¹. In Tarok, different kinds of reduplication are used for a number of purposes; by far the most unusual semantically is the use of nominal reduplication to express third person singular possession. When the root is monosyllabic, reduplication is prefixal and partial, as in the following examples²:

¹ I will outline a formal description of Tarok reduplication in chapter 2.

² The various prefixes mark word class and are not relevant to this analysis.

1. Tarok

A. Monosyllabic roots

simple noun	possessive	gloss
ì-cù	ì-cùcu	'his/her voice'
m-byàl	m̀bìbyal	'his/her breast'
a-wó	a-wúwo	'his/her hand'
a-lúr	a-lúlur	'his/her nose'
a-cì	a-cici	'his/her eye'
ì-gyel	ì-gigyel	'his/her chin'

When the nominal root is polysyllabic, on the other hand, reduplication is total or (optionally) partial and suffixal. The following are some examples:

B. Polysyllabic roots

simple noun	possessive	gloss
a-fini	a-finifini	'his/her yarn'
a-górò	a-górògoro	'his/her cola-nut'
ì-gìsàr	ì-gìsàrgisar	'his/her broom'
a-ríjìyá	a-ríjìyárijìya	'his/her spring'
a-dànkálì	a-dànkálìdankali	'his/her potato'

One important point to note is that In the case of monosyllabic roots, the lexical tone is realized on the prefix; the base then receives mid tone. In the case of polysyllabic roots, on the other hand, the lexical tone is realized on the first part of the form; the second half then receives mid tone. The second half of polysyllabic forms thus appears suffixal because it does not exhibit lexical tone; furthermore, when the optional process of truncation applies, it truncates the second half of the form.

The historical source of the monosyllabic forms becomes clearer when these forms are compared with reduplicated verbal forms. When verbal roots are reduplicated to form adjectives, the lexical tone is realized on the second half of the form, and the first half receives a default high tone, as in the following examples:

2. Tarok adjectives

root	gloss	reduplicated form	gloss
pík	'cook'	pík <pík< td=""><td>'cooked'</td></pík<>	'cooked'
vyàp	'spoil'	vyápvyàp	'spoiled'
mwál	'be thick'	mwálmwál	'thick'

Transitive verbal roots are also reduplicated when their object is a third person singular pronoun (realised as a zero morpheme). In such cases, the lexical tone is associated with both parts of the form except when the lexical tone is low, in which case the second half of the form receives the lexical tone and the first half receives a high tone. The following are examples:

3. Tarok transitive roots

šì	'burn'	uzó šíšì	'he burned it'
ya	'see'	uzó yiya	'he saw it'
wá	'drink'	uzó wúwá	'he drank it'

For each of these sets of forms, the data suggest that reduplication is prefixal. In the case of the reduplicated adjectives, the phonemic melody is the same in both halves of the form; the lexical tonal melody, however, is associated with the second half of the form, suggesting that this half is the base. In the case of the reduplicated transitive roots, on the other hand, the phonemic melody of the first half is reduced, suggesting that the second half of the form is the base; since the lexical tone is copied by the prefix, tonal behavior does not contradict this analysis.

In the case of the reduplicated monosyllabic nouns, however, tonal melody and phonemic melody contradict each other. The fact that the lexical tone is realized on the first half of the form suggests that this half ought to be the base; the fact that the first half is phonemically more reduced than the second half, however, offers evidence that the second half ought to be the base. Furthermore, the behavior of the polysyllabic forms differs from that of the monosyllabic forms; it is unlikely that this split was present originally.

The path of development outlined by Newman (1989) for Hausa pluractional verbs suggests a reasonable path of development for the Tarok forms as well. Pluractional verbs, which express a range of values such as multiple, iterative, frequentative, distributive, or extensive action, are formed in Hausa with a prefix which copies the initial CVC- of the root. In some instances the prefix-final consonant assimilates to the initial consonant of the root. Newman demonstrates that historically, however, the reduplicated process must have been suffixal, copying the two rightmost syllables of the verb. He cites frozen forms such as yagal-gàlaa 'tear to shreds' from yagala 'tear.' He argues that the change from suffixal to prefixal reduplication took place first among the bisyllabic verbs, in which reduplication would copy both syllables of the stem followed by syncope of the original stem-final vowel. In this way an original ***buga-bugaa** (base in bold face) would become *bug-bugaa (or bub-bugaa following assimilation) which would be reanalysed as bub-bugaa. Reduplication among the bisyllabic roots would thus create a model which could then be generalised to trisyllabic stems.

In Tarok, reduplication would originally have been suffixal for both monosyllabic and polysyllabic roots. The reduplicative suffix would copy only phonemic material; a mid tone would then be associated with the affix. Eventually, the first half of monosyllabic forms would be subject to phonological erosion similar to that

Newman describes for Hausa. Root-final consonants would be elided, and the root vowel would be reduced to a high vowel, preserving its original values for backness and rounding. No doubt at some stage reanalysis similar to that seen in Hausa would occur so that what was originally the base came to be analyzed as a prefix. The original tonal melody was, however, preserved.

Other possible paths of development in Tarok can be envisioned; they are, however, less plausible than the one outlined above. It is possible, for instance, that reduplicated forms of monosyllables were prefixal (and partial) from the start, and simply acquired a new tonal pattern on analogy with the polysyllabic forms. This hypothetical development, however, leaves unanswered the question of why speakers would create a new grammatical process which treated monosyllabic and polysyllabic forms so differently. The path of development I have argued for, in contrast, does not require speakers to have behaved so inexplicably; furthermore, the tonal behavior of the monosyllabic forms supports my reconstructions. Since the prefix was thus originally the base, it offers one instance of development to a fixed-vowel from an earlier, non-fixed vowel stage.

1.1.2 Salish

One language family in which reduplication is very prevalent is the Salish family. Salish uses one kind of reduplication to create plurals and plural action verbs, and another kind to create diminutives. Sapir (1915) argues that both kinds of reduplication were present in the proto-language. Examples 4 through 9 show plural reduplication in various daughter languages:

Salish reduplication

4. Spokane plurals

simplex	reduplicated	gloss
stém	stəntém	‘(they’re) things’
sxált	sxəlxált	‘(they’re) days’
lù?	lù?lu? mǐnten	‘(they’re) spears’
tè?	tè?te? mǐnten	‘(they’re) pounding stones’

5. Shuswap plurals (Kuipers 1974)

simplex	reduplicated	gloss
piq	pəq-píq	‘flour’
mus	t-mús-məs	‘four persons’
kicx	bkəc-kícx	‘group is at home’
s-pul-tn	s-pl-pul-tn	‘lair’

6. Puget Salish plurals (Hess 1976)

simplex	reduplicated	gloss
s-q ^w báy?	sq ^w bq ^w báy?	‘dogs’
s-tiqíw	stiqtiqíw	‘horses’
qəlúb	qəlqəlúb	‘eyes’
s-túbbs ^v	stútubs ^v	‘men’

7. Thompson plurals (Haeberlin 1918)

simplex	reduplicated	gloss
s-qum	s-qumqúm	'mountains'
snikiáp	sniknikiáp	'coyotes'
s-pEzó	spEzpEzó	'animals'

8. Snohomish plurals (Haeberlin 1918)

simplex	reduplicated	gloss
tésid	tétesid	'arrows'
yix ^w Elá	yix ^w yix ^w Elá	'eagles'
cau?	caú?cau?	'bones'

9. Tillamook plurals (Reichardt 1959)

na-	'fetch'	ni-ná-ən	'he will keep coming after'
šæč'-	'cut'	t ší-šæč'-ən	'she is cutting repeatedly'

As the above examples show, the most prevalent pattern is that in which the first two consonants of the root and the root vowel are copied as the reduplicative prefix; in most of the languages, however, if the prefix is not stressed the vowel becomes a schwa, and if the prefix is stressed, the base vowel becomes a schwa. In Tillamook, shown in 9, the vowel is in all cases -i-; this is very clearly the result of a later development.

Examples of diminutive reduplication are seen in 10, 11, and 12:

10. Tillamook diminutives (Reichardt 1959)

simplex	reduplicated	gloss
hanəluin	hu-hanəluin	'little arm'
šæns̥	k-šu-šæns̥	'gravel'
t'iyĩkhu	du-t'iyĩlhu	boy

11. Snohomish (Puget Salish) diminutives (Haeberlin 1918)

simplex	diminutive	gloss
xátcu	xáxtcu	'lake'
sópqs	sósEpqs	'seal'
pótEd	pípotEd	'shirt'
boʔq ^w	bíʔboʔq ^w	'duck'

12. Clallam diminutives (Haeberlin 1918)

stem	diminutive	gloss
teqeú	sta:te:qeú	'horse'
qúni:	qwáquni:	'seagull'
p'au:wi:ʔ	p'áp'a'u:wi:ʔ	'flounder'

The usual pattern of diminutive reduplication involves copying the initial consonant; in some cases, the vowel of the base is also copied, but in most cases the vowel is fixed. In Tillamook, the fixed vowel is -u-; in Snohomish, a dialect of the Puget Salish language, the vowel is in some cases copied from the base but in the majority of cases is an -i-; and in Clallam the vowel is usually -a-.

Since no written history exists for the languages in question, historical reconstruction is extremely difficult. It is, however, possible to demonstrate that the difference between Tillamook and Puget Salish diminutive reduplication is not due

to regular sound change. Due to space limitations and the scantiness of available data, my discussion will be very tentative; enough evidence exists, however, to strongly suggest that Tillamook u and Puget Salish i are unlikely to be reflexes of the same original segment.

The cognate sets under 13 demonstrate that the usual reflex of an original Proto-Salish *u is u in both Tillamook and Puget Salish:

13. Cognate sets (Reichardt 1960, Hess 1976)

‘tail’

Tillamook suhs

Puget Salish -čupč

Coeur d’Alene sčsupsen

‘blow’

Tillamook huš

Coeur d’Alene pux^w

Puget Salish pu?(u)

‘sun, month’

Kalispel sk^w’kulil’

Tillamook tú x̣tən

Snoqualmie-Duwamish (Puget Salish) slúk’al

‘four’

Puget Salish búus

Coeur d’Alene mus

Tillamook wis, wus

These cognates suggest that it is extremely unlikely that an original *u could have developed into i in Puget Salish.

The usual reflex of a Proto-Salish *i in Tillamook is somewhat harder to determine, but seems most frequently (in the absence of other conditioning factors) to be i. The following cognate sets demonstrate some Tillamook forms which probably show reflexes of Proto-Salish *i:

14. Cognate sets (Reichardt 1960)

‘bite’

Coeur d’Alene k^w’i?

Tillamook č’ig

Snoqualmie-Duwamish k^w’a?

‘eat’

Coeur d’Alene iɬn

Tillamook iɬn

Snoqualmie-Duwamish ɬɬd

‘high, up’

Coeur d’Alene gwis

Kalispel n-uis

Tillamook gis, gus

‘be near’

Coeur d’Alene č’itae?

Kalispel č’i?

Tillamook č’it

Snoqualmie-Duwamish č’it

The various cognate sets cited above suggest that it is unlikely that either of the reduplicative vowels seen in Tillamook diminutives and in Puget Salish diminutives

can be a secondary development from the other; no evidence points to either i or u as being primary. It is, of course, possible that each is a development from a third, different fixed vowel; the Proto-Salish vowel inventory, however, is rather small: i, u, a, and schwa (Kuipers 1981). It is unlikely that any of the reconstructed vowels could have been the ancestor of both Tillamook u and Puget Salish i.

Given that the difference in fixed vowel cannot be explained by appeals to regular sound change, the most plausible hypothesis is that diminutive reduplication in Proto-Salish also originally copied the vowel of the root and developed separate fixed-vowel affixes in the languages which show fixed-vowel reduplication. Other paths of development are, of course, imaginable; the virtue of the reconstruction suggested here is that it requires the fewest unmotivated steps to get from the proto-language to the attested forms. Given that historical work in this language family is still in the preliminary stages, my reconstruction is at least a reasonable working hypothesis.

1.1.3 Reduplication in Niger-Congo

In addition to the nominal reduplication seen in Tarok (discussed separately in section 1.1.1), many of the other Niger-Congo languages show fixed-vowel verbal reduplication. Faraclas and Williamson (1984:2) note that Yoruba and Gade show reduplication with a fixed Ci-; Ninzam and Nupe show a partially fixed CV[+high]-; and Bekwarra, Grebo, Akan, Igbo, and Tepo show reduplication with a CV[+high]-prefix in which the high vowel assimilates to the initial consonant. They advance a number of arguments to demonstrate that these fixed-vowel prefixes are the result of reducing more fully reduplicated prefixes. They begin by citing Hyman (1972), who notes that some dialects of Fe'fe' Bamileke show fixed-vowel reduplication while other dialects show vowel-copying reduplication; furthermore, he notes (1972:116)

that some speakers with fixed-vowel reduplication show vowel-copying reduplication in careful speech. Faraclas and Williamson also note that the reduplicative prefixes seen in various languages seem to be reduced from full versions of the stems in other ways as well. For instance, they note that in Ninzam and Tarok the initial consonant is reduced in the prefix or that consonant clusters are simplified; in some languages which have C_1VC_2 roots, such as Bekwarra, the second consonant is simplified or eliminated; and in some languages such as Tarok and Akan, polysyllabic roots reduplicate fully while monosyllabic roots show reduced, fixed-vowel reduplication, suggesting that reduction has taken place first in the monosyllabic roots. All these facts taken together, they suggest, demonstrate that the reduplicative prefix is subject to various forms of reduction from an earlier, fuller form of reduplication. One consequence of this reduction is that the vowel becomes maximally reduced. They introduce the feature 'stricture' to describe the size of the aperture used to produce various segments; the most reduced vowel, they suggest, is one which is high, since a high vowel is the one most closely assimilated to the stricture of the adjacent consonants. In other words, the most reduced vowel is that which is closest to a consonant.

Although none of the arguments advanced by Faraclas and Williamson is individually particularly compelling, the fact that each points to the same conclusion lends the overall argument strength. In the case of languages which treat monosyllabic and polysyllabic roots differently, it makes sense to assume that the reduplicative process was originally unitary; it is then more likely that the reduced version of the affix seen in monosyllabic forms is an innovation and that the full version in the polysyllabic forms is a retention than that the reverse situation is true, since it is hard to see a motivation for polysyllabic stems suddenly developing full reduplication out of partial reduplication. Similarly, languages in which the initial consonant is

simplified in the reduplicative affix suggest that some process of reduction applies to the affix. Cross-linguistic study suggests, however, that explaining the developments solely in phonetic terms is inadequate. As I shall demonstrate elsewhere in this section, fixed vowels are not always high; part of the explanation for the prevalence of fixed vowels must appeal to the status of reduplicative affixes as part of morphology.

1.1.4 Nez Perce (Aoki 1963)

The Sahaptian Penutian language Nez Perce uses partial reduplication to form distributives of nouns and adjectives. Two different forms of reduplication are used. The first form consists of copying the initial consonant and vowel of the stem. This form occurs when the initial consonant is ʔ or h, and, exceptionally, in the distributive formed from miyáʔc ‘child.’ When the initial consonant is ʔ, the reduplicative prefix has h. The following are examples:

15. Nez Perce vowel-copying reduplication

simplex	distributive	gloss
há:ma	háham	‘man, husband’
há:cwal	hahácwal	‘son’
hetéʔw	hehétew	‘lovely’
ʔá:tway	haʔátway	‘old woman’
miyáʔc	mamáyac	‘child’

Aoki notes (1963:43) that this type of reduplication often occurs with a special allomorph of the stem. Note, for example, that the stem seen in the form meaning ‘children’ shows a different vowel and lacks a glottal stop compared to the stem seen in the singular. Similarly, the stem meaning ‘lovely’ loses its glottal stop in the reduplicated form. Although Aoki describes the group as consisting of adjectives and

nouns, in fact most of the forms he cites are nouns.

In other environments the reduplicative prefix is Ci-. The following are examples:

16. Nez Perce fixed-vowel reduplication

simplex	distributive	gloss
pá:yo	pipá:yo	'acute (of pain)'
tīlu	titīlu	'big'
tá?c	titá?c	'good'
kú:het	kikú:het	'long'
qáxt'o	qiqáxt'o	'short'
sáqan	sisáqan	'canyon'

Stems belonging to this class also sometimes occur with special allomorphs of the stem; these allomorphs, however, are more predictable than those seen in the vowel-copying class. Aoki notes (1963:43) that these stem changes can be of three kinds. Stress can shift, as is the case in the stem 'fat,' tisqá?w, titísqá?w (but note that the glottal stop in the form remains). Stress shift can accompany a change in vowel length, as in the form 'smart,' wepcú:x, wiwé:pcux. The third kind of change is the loss of an unstressed stem vowel, as in the form timí:pni?n, titimí:pni?n 'sane.' Aoki notes (1963:43) that most of the members of this class are adjectives, although some nouns are found (to the single noun he cites, 'canyon,' can be added 'mountain,' mé:xsem, mimé:xsem (Aoki p.c.)). In general, the process is productive with adjectives but confined to frozen forms with nouns.

Forms in which the stem vowel and the prefixal vowel are both i are, of course, ambiguous as to whether they are vowel-copying or fixed-vowel reduplication. Aoki classes the following forms as vowel-copying: pit'í?n, pipí?n 'daughter'; misé:mi, mimísemi 'liar.' He classes the forms tisqá?w, titísqá?w 'fat' and mici?c, mimíci?c

'funny' as fixed-vowel reduplication. Although he does not explicitly state his reasons for doing so, they may be deduced from the behavior of the stem and from the general descriptions of each class he gives. Since the fixed-vowel class primarily contains adjectives, he classes 'fat' and 'funny' as fixed-vowel reduplication; since the form for 'daughter' shows loss of a glottal stop in the stem in reduplication, he classes it as vowel-copying.

Comparative evidence from Sahaptin suggests that distributive reduplication was originally possible for both adjectives and nouns. Sahaptin uses two kinds of reduplication to create distributive nouns and verbs. One type, total reduplication, is unrelated to the process seen in Nez Perce. The second type of reduplication, which is no longer productive, involves using initial gemination with certain nouns, adjectives, and pronouns to form distributives. The following are some examples:

17. Sahaptin reduplication

simplex	distributive	gloss
tmái	ttmaí:ma	'unmarried girl'
k'aiwá	kk'aiwá	'short one'
t ɣc	tt ɣc	'willow'

It is reasonable to assume that the process seen in Nez Perce was originally unitary, and that the split system currently attested is a later development. The question to be answered is whether fixed-vowel or vowel-copying reduplication represents the original system. Various aspects of the reduplicative system suggest that the vowel-copying system was older and the fixed-vowel system is younger. The first piece of evidence is the composition of the class. The vowel-copying class is made up primarily of nouns, but is not productive; the fixed-vowel class, on the other hand, consists primarily of adjectives and is productive. The Sahaptin evidence suggests that the process originally must have applied to both adjectives and nouns; the nominal

forms seen are much more likely to be retentions than innovations. It follows that the kind of reduplication exemplified by these forms is also more likely to be a retention than an innovation.

A second piece of evidence suggesting that the vowel-copying class is older than the fixed-vowel class is the behavior of stem. In the case of one form, há:ma, háham 'man,' the stem seen in the plural form is that reconstructed to the proto-language: Aoki (1962:179) cites Northern Sahaptin ám 'husband' and reconstructs *hám. The final -a in the Nez Perce singular is an unexplained later development; it does not seem to be a synchronically productive suffix. The fact that the distributive retains the historically older stem suggests that the form itself is old.

The stem alternation seen in the form 'child,' miyá?c, mamáyac suggests that this particular form is old. Since the alternation is unproductive, it is almost certainly an archaism. The vowel seen in the singular is that seen in the Northern Sahaptin cognate miyánac 'child,' and is the vowel Aoki (1962:178) reconstructs to the proto-language. One could attempt to explain the unusual stem alternation as due to a sound change of some sort affecting the distributive form; the difficulty with this explanation, however, is the fact that the reduplicative prefix copies the vowel of the unexplained stem -máyac, suggesting that the vocalic alternation in the stem was already in existence at the time the reduplicated word was created. The form could possibly represent the residue of an archaic ablaut process; as Silverstein (1979:664) notes, one of the defining characteristics of the Penutian family is the widespread use of ablaut. Too little information about the form is available to determine its origin with certainty, but all the possible explanations point to the form being archaic.

Another piece of evidence suggesting that the vowel-copying group is older than the fixed-vowel group is the behavior of stems beginning with ?. As mentioned

earlier, roots beginning with ʔ reduplicate with an h rather than with a ʔ: ʔá:tway, haʔátway 'old woman'; ʔilé:pqet, heʔlé:pqet 'moccasin.' The explanation of this unusual behavior is not clear; Aoki suggests (p.c.), however, that the likeliest explanation is that some of the words showing initial ʔ may originally have begun with h, which is still preserved in the prefix, although the stem seen in the distributive form has been taken analogically from the simplex. As evidence Aoki cites a dialect split in Nez Perce between the Upriver dialect and the Downriver dialect; in forms such as ʔawá:wa - hawá:wa 'mosquito' (p.c.) and ʔaláxp - haláxp 'day' (Aoki 1979:3) the Downriver dialect shows h while the Upriver dialect shows ʔ. The split between ʔ and h is not entirely clear-cut, however; Aoki notes (1979:3):

Some of the forms cited by Morvillo in his 1895 dictionary indicate that there is a dialect which has a glottal stop for the Upriver h. For example, itémeze 'account' (p.2), presumably ʔité:mece, is hité:mece in the Upriver dialect. Similarly, záya iuéke 'he was absent' (p.1), presumably caʔya ʔiwé:ke, is caʔya hiwé:ke in the Upriver dialect.

In any event, although the split is difficult to characterize accurately, it is at least safe to say that some cases of initial h developed into initial ʔ; in the absence of any better explanation, suggesting that the unusual reduplicative prefix which shows h rather than ʔ can be explained as an archaism from the time when these forms had initial h is reasonable. The prefix might then, however, have spread to all forms with initial glottal stop; I have access to too few examples to know for certain.

Although the scantiness of the data makes all of these reconstructions very tentative, the fact that they lead to the same conclusion is certainly significant. Everything points to the vowel-copying class being older than the fixed-vowel class. One could offer as a counter-argument the suggestion that vocalic assimilation would take place most easily across a non-oral segment such as h or ʔ, suggesting that the

vowel-copying class could be younger than the fixed-vowel class. This analysis is less plausible, however, given that the semantic makeup of the class suggests retention rather than innovation, and given the inclusion in the class of vowel-copying forms with initial segments other than h and ʔ, such as miyáʔc, mamáyac 'child' and pit'í:ʔn, pipít'in 'daughter.' Tentative though the reconstructions may be, their cumulative effect is to make it fairly plausible that the fixed-vowel reduplicating class in Nez Perce is younger than the vowel-copying class.

1.1.5 Other languages with fixed-vowel systems

Numerous languages show fixed-vowel reduplicative systems but do not lend themselves to historical analysis very readily. In this section I will give brief synchronic descriptions of these systems.

1.1.5.1. Malay

An interesting case of fixed-vowel reduplication is found in Standard Malay. The semantic value of this reduplication is unclear; in some cases it seems to mean 'similar to ROOT', but in other cases its meaning can only be described as 'having some relation to ROOT,' and in yet other cases (for example, in animal names), either no simplex root exists in the language or the simplex seems to have the same meaning as the reduplicated form. Gonda (1949) notes that the use of reduplication to express similarity is one of the few uses of reduplication found in the written Malay of the classical texts. To further complicate matters, Omar (1975:190) notes that in 1956 the Malaysian Government's Language Planning Agency seized upon the process, which had dwindled in productivity at that time, and deliberately began to use the process to coin scientific terms based on native vocabulary items in an effort to avoid borrowing foreign terms. The following are some examples of this

process; I will distinguish the naturally occurring forms from those invented by the Language Planning Agency.

18. Malay

A. Naturally-occurring forms

form	gloss	simplex	gloss
lelaki	'male, man'	laki	'husband'
lelangit	'palate'	langit	'sky' (note: Gonda cites Class. lanit-lanit 'palate' from lanit 'sky')
bebawang	'bulbs'	bawang	'onion'
tetangga	'neighbor'	tangga	'stairs'
kekura	'tortoise'	kura	'tortoise'

B. Neologisms

form	gloss	simplex	gloss
sesendi	'rheumatism'	sendi	'joint'
rerambut	'capillary'	rambut	'hair of head'
jejari	'radius'	jari	'finger'
cecair	'a liquid'	cair	'in liquid form'

Even though the process had been of limited productivity until 1956, enough examples exist in the language to treat this instance of fixed-vowel reduplication along with those seen in other languages. Omar (1975:189) notes that the fixed vowel has the value of a schwa.

Some of the vernacular Malay dialects also show fixed-vowel reduplication; in these cases reduplication is used to express an intensive quality. One dialect is Johor Malay:

19. Johor Malay (Kroeger 1989)

stem	intensification	gloss
timbus	t̚timbus	'fill in (hole)'
jual	j̚jual	'sell'
puas	p̚puas	'satisfy'
sapu	s̚sapu	'sweep'
tiap	t̚ʔtiap	'every'
buat	b̚ʔbuat	'do, make'
tutup	t̚ʔtutup	'close'

Kroeger notes that the presence or absence of a glottal stop depends on the final consonant of the stem: if that consonant is a stop, then the prefix has a glottal stop. The vowel remains fixed in all cases.

A similar pattern occurs in Perak Malay:

20. Perak Malay (Kroeger 1989)

stem	gloss	reduplicated	gloss
kaji	'study'	k̚kaji	'study repeatedly'
dulu	'long ago'	d̚dulu	'very long ago'
mude	'young'	m̚mude	'very young'
bud̚ʔ	'child'	b̚ʔbud̚ʔ	'all kinds of kids'
siket	'a little'	s̚ʔsiket	'very little'
jaman	'time'	j̚njamam	'for a long time'

Kroeger notes that the pattern in Perak Malay differs from that in Johor Malay in that the prefix ends in a nasal (which assimilates to the stem-initial consonant) if the stem ends in a nasal, a glottal stop if the stem ends in a stop, and has the shape C̚-otherwise.

1.1.5.2. Javanese

Several other Indonesian languages seem to show a similar fixed-vowel development. The following Javanese forms also show a fixed schwa vowel (here spelled -e-) in the reduplicating syllable:

21. Javanese (Home 1961)

simplex	gloss	reduplicated	gloss
-geni	'fire'	gegeni	'warm oneself by fire'
-lôrô	'sick'	lelôrô	'sickness'
-peḍes	'hot, spicy'	pepeḍes	'spicy food'
-tuku	'buy'	tetuku	'shop around'

Home notes (1961:187) that monosyllabic roots are reduplicated by CV-reduplication rather than by fixed-vowel reduplication: dôdôl 'sell' from dôl 'sell.' Home does not explicitly assign a semantic value to the reduplication but it seems to make substantives out of adjectives, to make distributive verbs, and to make denominative verbs.

1.1.5.3. Georgian (Neisser 1953)

The Caucasian language Georgian exhibits a number of reduplicative processes. One process which is used to form collectives exhibits fixed-vowel reduplication. The following are examples (Neisser 1953:52):

22. Georgian fixed-vowel reduplication

simplex	reduplicated form	gloss
ʒele	ʒele-ʒule	'fissure'
xevi	xev-xuvi	'ravines'
gora	gor-guri	'hilly country'
naqari	naqar-nuqari	'rabble, mob'
ʒagi	ʒag-ʒugi	'shrubbery'
axali	axal-uxali	'young people'

The vocalic alternation which shows up in the second half of the reduplicated forms is specific to reduplication and could not be explained as a more general ablaut process³

The Georgian instance of fixed-vowel reduplication is interesting because the fixed vowel occurs in suffixal rather than prefixal reduplication; all the other cases described so far involve fixed-vowel prefixal reduplication. It is difficult to explain why the distribution of these forms is so skewed. Certainly one factor is the fact that, on the whole, prefixal reduplication is slightly more common than suffixal reduplication; on the other hand, it is unlikely that the skewed distribution can be entirely explained by this slight difference. It is possible that the difference is due to greater perceptual salience of the onset of a syllable at the beginning of a word and to the rhyme of a syllable at the end of the word; as evidence for this difference in perceptual salience consider the behavior of various devices in poetry. Alliteration and end-rhyme are both devices used to establish a link between two words in the poem; alliteration usually involves only the syllable onset while end-rhyme usually involves syllable nucleus and coda⁴. The fact that in initial position the vowel is of

³ Neisser notes (1953:36), however, that some ablaut exists in the language.

⁴ It is, of course, true that cases of alliteration involving vowel-initial forms or cases of allitera-

relatively less importance in establishing a connection between two phonological forms means that the vowel is available to convey morphological regularity; that is, it provides a site which can be used as a consistent phonological representation of a consistent semantic value. At the end of a word, on the other hand, the vowel is crucial in establishing the link between two forms (in the case of end-rhyme, two words; in the case of reduplication, two morphemes). It thus is less available as a way of conveying morphological consistency. This analysis is at the moment nothing more than speculation; further research is needed to explain the pattern observed here.

One general conclusion I draw from this examination of vocalic behavior in reduplication is the fact that a developmental tendency exists in one direction only: toward fixed-vowel reduplication. No evidence points toward a tendency in the other direction, towards vowel-copying reduplication. In all cases examined in which both vowel-copying and fixed-vowel reduplication exist in the same language or in the same language family, the evidence points to the vowel-copying reduplication being older and the fixed-vowel reduplication being younger. The development of reduplication in Indo-European, which has been posited as showing a development from fixed-vowel reduplication to vowel-copying reduplication, has been conspicuously absent from my discussion so far; because the issue of Indo-European reduplication raises complex questions concerning Indo-European verbal morphology in general, I will devote several separate chapters to Indo-European reduplication. I will argue that, rather than providing a counter-example to the conclusion I have drawn in this section, Indo-European on closer examination proves to illustrate

tion involving both the initial consonant and the vowel of a form are attested, as are cases in which only the word-final consonant of a form is referred to as part of a poetic process. Such cases are in the minority, and do not invalidate the observation that most cases of alliteration involve the initial consonant and most cases of end-rhyme involve the nucleus and coda.

the same trend seen in other languages.

The motivations for this developmental tendency are twofold. One motivation, the phonetic drive to have a reduced vowel in the reduplicative affix, is that suggested by Hyman (1972) and Faraclas and Williamson (1984). Their explanation is probably correct so far as it goes, but it is inadequate to explain the development of the fixed, non-reduced vowels seen in languages such as Georgian and Clallam. A second motivation, I argue, is levelling, the drive toward morphological regularity by characterizing a constant semantic value with a constant phonological form. This tendency was posited by van Brock (1964) in her discussion of reduplicated verbs in Anatolian (which I will discuss at length in my treatment of Anatolian reduplication); the evidence presented in this section strongly supports her positing of this tendency. Reduplicated affixes must tread a fine line between expressing a consistent phonetic value and resembling their base as much as possible. Developing a fixed vowel while copying base consonants is one way of balancing these two conflicting goals.

1.2 Initial fixed-consonant reduplication

One source of fixed-consonant reduplication is the process of echo word formation. McCarthy and Prince (1986) suggest that the process is nearly universal; they claim that echo words typically have either a pejorative meaning or a 'loose kind of plurality' (1986:84). An example of echo word formation is the English shm-reduplication used to create such forms as book-shmook, table-shmable, and linguistics-shminguistics. English shm-reduplication clearly conveys some sort of disdain for the word in question, or for the speaker's use of the word, or some such general pejorative sense. McCarthy and Prince note (1986:86) that if the word undergoing the process already starts with the sequence shm- the echo word cannot

simply repeat the sequence; instead, fluent speakers of the shm-dialect substitute the sequence shp-.

It is difficult to envision any kind of gradual historical development that would lead to English shm-reduplication; instead, the process must have spontaneously arisen in a particular English dialect (that which has some degree of bilinguality with Yiddish) and then gradually spread throughout other dialects. Pejorative echo-word formation naturally reminds one of such childish rhymes as ‘Georgie-Porgie’ and ‘Jack Sprat’; if my memory is accurate, echoing someone’s name but altering the initial consonant is a very common form of childish teasing. This innate tendency to mock the sounds of someone’s name is clearly related to the formation of echo words. On the other hand, shm--reduplication differs from such childish behavior in that the substituted sequence is always the same. This constant phonological sequence is what characterizes shm-reduplication as a recognizable morphological process; it is a manifestation of the drive to characterize a constant meaning with a constant phonetic sequence.

Several examples of fixed-consonant reduplication are found in Georgian. One example of such reduplication involves substituting the consonant m for the initial consonant of a stem. The semantic value of the resulting form is difficult to characterize. The following are some examples:

23. Georgian reduplication (Neisser 1953)⁵

žagi	‘bush’	žagmagi	‘thicket’
xili	‘fruit’	xili-mili	‘fruit’
are	‘region’	are-mare	‘surroundings’
axlo		axlo-maxlo	‘near’

⁵ Note that Neisser 1953 does not provide glosses for some of the forms.

An interesting case of reduplication in Georgian involves the consistent absence of a consonant rather than its presence. The forms are created by prefixing a copy of the base and deleting its initial consonant. The following are some examples:

24. Georgian reduplication

dava	'dispute'	ava-dava	
ḱvali	'mark'	ali-ḱvali	'one who makes faces'
ḱriali	'light'	ial-ḱriali ⁶	'single cloud'
totlo	'gelatinous'	otlo-totlo	'soft-boiled egg'

Once again the semantic value of the reduplication is difficult to characterize; it seems to convey some meaning such as 'similar to simplex.'

Another case of fixed-consonant reduplication is seen in Sinhalese. In this language, a labial stop is substituted for the initial consonant of the root. The following are some examples⁷:

⁶ Note that the loss of the -r-R seen in the simplex seems to be a sporadic process of dissimilation which has nothing to do with reduplication.

⁷ Note that the glosses are Hettiaratchi's, and that he does not provide unreduplicated forms of the roots.

25. Sinhalese (Hettiaratchi 1959)

reduplicated form	gloss
as-pas	'arranged, orderly'
at -pat	'hand etc.'
daṅga-paṅga	'mischief, naughty doing'
ivum-pivum	'cooking, etc.'
yakku-bakku	'devils'
kavicci-bavicci	'couches'
usi-busi	'urging on, instigation'
ka:nsi-ba:nsi	'melancholy'
hœtt -bœtt	'skirts etc.'

Hettiaratchi does not explicitly discuss the semantic value of the reduplication; he does, however, use the term 'echo word' in referring to these forms, and seems to follow Emeneau (1938) in ascribing a general meaning of 'some' or 'things like X' to the affix.

A similar formation is also found in Altaic. Ramstedt (1952:250) cites the following forms found in various Altaic languages, with m as the fixed initial consonant:

26. Altaic

simplex	gloss	reduplicated	gloss
temē (Kalmyk)	'camel'	temē memē	'camels, etc.'
adu (Khalkha)	'herd of horses'	adu madu	'horses and livestock'
galči (Kh.)	'fire attendant'	galči malči	'servant'
ger (Kal.)	'house'	ger mer	'house and farm'

The semantic value of this sort of reduplication seems to be the same in Altaic as in the other language families seen so far.

The forms seen in this section highlight some interesting facts concerning the behavior of initial fixed-consonant forms. It is interesting to note that in nearly all the languages described in this section, other segments sometimes served as the initial segment of reduplicated forms as well. For example, in Sinhalese (Hettiaratchi 1959:49), one finds sporadic forms with v, h, and d as the fixed segment; such forms are, however, an extremely small minority. Similarly, in Altaic (Ramstedt 1952:251) one finds sporadic forms with l and s as the fixed segment; again, these forms are an extremely small minority. This suggests that, although these forms can arise ex nihilo, fairly early in their development one particular segment or small class of segments (for example, labial stops) becomes the normal fixed segment. This fixed segment then provides a consistent marker of the class across forms. The spread of this marker is motivated by the same force that produces paradigmatic levelling: the desire to characterize a consistent semantic value with a consistent phonetic sequence. In the case of the last-discussed set of Georgian forms, the affix is marked by the consistent absence of an initial consonant rather than by the presence of a particular consonant, but the result is the same: the affix has a characterization which is consistent across forms.

A second interesting point to note is the fact that the portion of the base which is most liable to replacement by a fixed consonant (or to truncation) is the base-initial consonant. In all the cases discussed so far the fixed sequence has always been base-initial. As mentioned earlier, it is unlikely that such forms arose in any kind of gradual fashion; instead, they seem to have been spontaneously created (though perhaps originally in a restricted context). The restriction on the position in which a fixed consonant could be inserted may be due to the spontaneous origin of such forms; perhaps the initial position is the only slot available to insert a segment which will preserve the identity between base and copy. To put it another way, the most salient portion of an echo is the end of the word; the beginning of the word is the only portion which can be altered.

1.3 Fixed affix-final consonant

One other class of fixed-consonant forms exist. These are forms in which the consonant adjacent to the morpheme boundary is fixed to the extent that it can only be one of a limited set of consonants. This sort of fixed-consonant reduplication was seen in the two Malaysian dialects discussed in the section concerning fixed-vowel reduplication: Johor Malay and Perak Malay. In Johor Malay, if the stem ends in a stop, then the reduplicative prefix has a glottal stop, as the following forms illustrate:

27. Johor Malay (Kroeger 1989)

stem	intensification	gloss
timbus	tətimbus	'fill in (hole)'
jual	jəjual	'sell'
tiap	təʔtiap	'every'
buat	bəʔbuat	'do, make'

In Perak Malay, the prefix ends in a nasal (which assimilates to the stem-initial

consonant) if the stem ends in a nasal, and a glottal stop if the stem ends in a stop, as the following forms illustrate:

28. Perak Malay (Kroeger 1989)

stem	gloss	reduplicated	gloss
kaji	'study'	kəkaji	'study repeatedly'
siket	'a little'	səʔsiket	'very little'
jaman	'time'	jənjamam	'for a long time'

In the context of this study, what is interesting about such behavior is that the fixed segments seen in the reduplicative prefix cannot be explained as the normal development of consonant clusters across morpheme boundaries in these languages; instead, they represent a development peculiar to reduplication.

A similar sort of development is seen in some forms in Hausa, a Chadic language spoken in Nigeria. Newman (1986:118) notes that historically a number of Hausa reduplicated nouns and verbs show coronal liquids, s, and ts turning up as n.⁸ The development is sporadic; not all words show the development, and no conditioning factor can be shown. The following forms are illustrative:

29 A. Hausa nouns

jánjálóo	<*jáljálóo	'pebble'
kùdúndúrĩ	<*kùdúrdúrĩ	'tall grass'
kyànkýásòo	<*kyàskyásòo	'roach'

⁸ Note that a general rule of nasals assimilating in position to a following consonant then applies.

B. Hausa verbs

tsántsaláa	<*tsátsááa	'run off'
kyánkyàsáa	<*kyáskyàsáa	'hatch'
gyángyàdǎa	<*gyádgyàdǎa	'nod'
bàmbàràa	<*barbàràa	'break off'

Yet another example of such a development is found in Turkish. In this language, intensive adjectives (usually color words) are built by copying the initial syllable of the adjective as a prefix and adding a syllable-final labial stop. The following are examples (Ramstedt 1952:250):

30. Turkish

simplex	reduplicated form	gloss
qara	qap qara	'coal black'
qyzyl	qyp qyzyl	'fire red'
sinir	sip sinir	'strongly cinnabar-colored'
aq	ap aq	'snow white'
jany	jap jany	'sparkling'

Ramstedt also cites the cognate process found in Mongolian:

31. Mongolian

simplex	reduplicated form	gloss
qara	qab qara	'coal black'
čagan	čab čagan	'snow white'
ulān	ub ulān	'fire red'
čilger	čib čilger	'very clear'
šara	šab šara	'clear yellow'
šine	šib šine	'very new'

Two interesting examples of this sort of fixed-consonant reduplication are found in Makassarese and Tagalog. In Makassarese, a reduplicative process copies and prefixes two syllables of the stem. If the stem is disyllabic, the entire thing is prefixed; if the stem contains more than three syllables, however, only the first two syllables are copied, and the prefix ends in a glottal stop (realized as [k]). The following are examples:

32. Makassarese (McCarthy and Prince 1986:37)

Bisyllabic words

ballak	ballak-ballak	'house'
golla	golla-golla	'sugar'
tau	tau-tau	'person'

Longer words

kaluarak	kaluk-kaluarak	'ant'
manara	manak-manara	'tower'
balao	balak-balao	'rat'
baine	baik-baine	'woman'

Similar reduplicative behavior is found in Tagalog.

It is clear from the preceding examples that the position immediately adjacent to the morpheme boundary is a prime site for developing fixed-consonant reduplication. It is unclear why this should be the case. One possible explanation is suggested by McCarthy and Prince in their discussion of Makassarese reduplication. They note (1986:37) that in Makassarese, stress assignment proceeds from the right edge of a word to the left; foot assignment thus also proceeds from right to left. In reduplication, however, the first two syllables from left to right are treated as a unit (according to McCarthy and Prince, a minimal word base), so the word must be reparsed from left to right. The affixes with glottal stop result when the disyllabic minimal word derived by reparsing does not exhaust the morpheme. They argue that Makassarese developed the glottal stop precisely because of this conflict between morphology and phonology.

McCarthy and Prince's analysis seems less reasonable in light of the fact that the position immediately adjacent to the morpheme boundary quite often shows a fixed consonant of some sort; it is doubtful that in all cases the consonant develops as a result of the conflict between phonology and morphology. The correct analysis of this developmental tendency is not clear. It is possible that the fixed affix-final consonant serves to delineate the morpheme boundary in some way. One might argue that this sort of fixed-consonant arose from the conjunction of several tendencies. One tendency might be a phonetic trend to simplify consonant clusters. A second tendency is the drive toward paradigmatic levelling already discussed in this chapter. The third tendency might be a need to clearly delineate the morpheme boundary to facilitate morphological parsing. The result of these three tendencies would be that the final slot of the affix would be particularly prone to develop a fixed consonant.

1.4 Affixes with two or more fixed segments

In addition to affixes with a fixed vowel or a fixed consonant there also exist affixes with sequences of fixed segments. The historical source of such affixes is unclear; I will describe a number of such systems and make tentative suggestions concerning their origin.

One example of the route by which affixes with fixed sequences may come about is found by comparing adjectival forms in the Dagur dialect of Mongolian with the Mongolian and Turkish forms cited earlier in the section on fixed-consonant reduplication. The relevant forms (repeated for convenience) are the following:

33. Turkish

simplex	reduplicated form	gloss
qara	qap qara	'coal black'
qyzyl	qyp qyzyl	'fire red'
sinir	sip sinir	'strongly cinnabar-colored'
aq	ap aq	'snow white'
jany	jap jany	'sparkling'

34. Mongolian

simplex	reduplicated form	gloss
qara	qab qara	'coal black'
ᠰᠠᠭᠠᠨ	ᠰᠠᠪ ᠰᠠᠭᠠᠨ	'snow white'
ᠤᠯᠠᠨ	ᠤᠪ ᠤᠯᠠᠨ	'fire red'
ᠴᠢᠯᠭᠡᠷ	ᠴᠢᠪ ᠴᠢᠯᠭᠡᠷ	'very clear'
ᠰᠠᠷᠠ	ᠰᠠᠪ ᠰᠠᠷᠠ	'clear yellow'
ᠰᠢᠨᠡ	ᠰᠢᠪ ᠰᠢᠨᠡ	'very new'

Martin (1961:55) refers to a prefix in Dagur which involves copying the initial

consonant of a base, noting ‘There is one prefix abe-/Cabe- (that is, abe- with an initial consonant the same as the initial of the noun that the prefix attaches to.’ He cites the following examples (1961:110):

35. Dagur intensive reduplication

simplex	reduplicated form	gloss
cigaan	cabe-cagan	‘snow white’
hare	habe-hare	‘jet black’
^v sari	^v sabe- ^v sari	‘vivid yellow’
adili	ab(e)-adili	‘the very same’
amere.han	ab(e)-amere.han	‘most easy’

That these forms are cognate with the Turkish and Mongolian forms cited above is quite apparent. A number of differences must be explained. The first difference is the prefix-final e. Examination of the lexicon shows that the only consonant clusters permitted in Dagur are those with a nasal as the first consonant, suggesting that the e might be epenthetic. The treatment of the place-name Botkha, Batehan, supports this suggestion. The consonant b is clearly a reflex of the affix-final labial seen in Turkish and Mongolian. The other difference is the fixed a in the Dagur prefix; Mongolian and Turkish both copy the vowel of the root. In Dagur, on the other hand, the vowel is constant⁹. The sequence in Dagur can thus be explained as the end product of several routine developments: development of a fixed segment adjacent to the boundary between affix and base, development of a fixed vowel, and epenthesis.

⁹ Assuming Martin’s analysis of the affix is correct; I note that all the examples he cites have a in the root so the vowel could be copied.

A similar kind of affix is found in Dravidian. Emeneau (1938:110-113) describes the phenomenon in Toda:

Nouns make an extended form by partial end reduplication with insertion of an element between the noun and the reduplicating portion ... It may be formulated thus, with accents written:

CVX > 'CVX-,ki-X and CV:X > 'CV:X-,ki:X...

The function of the formation is to refer to a specimen which the speaker does not care to identify from among a hypothesized collection of identical discrete entities of infinite number or from a hypothesized infinite extension of a non-discrete handleable entity.

The following are some of the examples Emeneau cites:

36. Toda

simplex

püsy	püsyxisy	'tiger'
me:ṇ	me:ṇxi:ṇ	'tree'
todzmox	todzmoxidzmox	'woman'
po:t	po:txi:t	'song'

Emeneau then goes on to describe similar affixes in several other Dravidian languages, concluding that the echo-word affix can be reconstructed to the proto-language, with the form *giX. He notes, however, that the ultimate source of this formation is unknown (p.c.).

A similar formation is also found in the Indo-Aryan languages of India; no doubt contact between Indo-Aryan and Dravidian languages plays some role in the prevalence of this sort of formation on the Indian sub-continent. The reduplicative affix found in the Indo-Aryan languages, however, cannot be explained by

borrowing since the fixed phonological sequence is quite different. Apte (1968:24) notes that Marathi has a number of ways of forming echo words; their semantic value is similar to that described by Emeneau for Dravidian. The most common form of echo-word affix, he notes, has the form bi-X, where X represents the material copied from the stem. He cites the following examples (the roots are given in boldface):

37. Marathi

form	gloss
kholi -- bili	'room or some such dwelling'
kagə d-bigəd	'paper or something like that'
bəksis ^v -biksis ^v	'prize or some such reward'
aras-biras	'decoration or something similar'

The forms seen in Marathi bear some resemblance to the forms described earlier found in Sinhalese, which substitute a labial stop for the initial consonant of the root, but copy the vowel unchanged. It is not clear to me which of these two systems is primary. It seems likely that the Marathi forms arose through the reduplicative affix acquiring a fixed vowel, and that the Sinhalese forms preserve an older state of affairs; without more data, however, such a conclusion is premature. Certainly the influence of the neighboring Dravidian languages complicates the picture considerably.

A similar formation is found in Altaic. Ramstedt (1952:251) cites the following forms drawn from several Altaic languages:

38. Altaic

simplex	reduplicated form	gloss
alag (Khalka)	alag bulag	'higgledy-piggledy'
alus (Mongolian)	alus bulus	'one upon the other'
	as ^v -pəs ^v (Chuvash)	'a meat dish'
	ili- büli- (Mongolian)	'flatter and stroke'

Again, the origin of the formation is unclear.

Based on these forms one could make the strong claim that such fixed sequences always arise through the same processes that result in fixed-consonant and fixed-vowel affixes; support for this claim would be the fact that the fixed consonant in such forms is either the initial consonant or the consonant adjacent to the boundary between affix and root. I hesitate to make such a strong claim, since one could envision other paths which would lead to similar circumstances. Consider a hypothetical case in which two identical words are joined by an intervening conjunction; English phrases such as again and again or through and through exemplify this kind of construction. It is possible that the conjunction could be phonologically reduced; again, the form of and usually written 'n' provides a model. One could easily imagine such a form being cliticized to the following word and, eventually, replacing the initial syllable. The result of such a development would be indistinguishable from the forms cited here. For the moment, I will simply note that forms such as those cited here are fairly common.

1.5 The Identity Constraint

One frequently-assumed force in historical change is the desire to increase the resemblance between reduplicative affix and base. Despite the frequency with which such a force is posited, however, no one has ever cited any evidence

demonstrating its existence. I am aware of one synchronic study which purports to show evidence of reduplicative strengthening: Wilbur (1973). Wilbur discusses a number of cases in which phonological rules either fail to apply to reduplicated forms when they should apply, or else overapply to reduplicative affixes. She suggests that the exceptional behavior of reduplicative affixes she describes can be explained as the manifestation of a general constraint she calls the 'Identity Constraint.' She states:

I would like to suggest that if we consider the function which is being served by the failure of a phonological rule to apply when it should and compare it with the function which is being served by the "overapplication" of a phonological rule in these reduplicated examples, we will find that the function is one and the same. In all the cases cited, the result of the "exceptional" behavior of the phonological rules has been to preserve or create the situation in which R_r , which is a copy of R_o , is as nearly identical to R_o as possible. That is, as the output of the Reduplication rule, R_r is identical to R_o . If a phonological rule were to apply to R_o or R_r , but not both, it would create a situation in which R_o or R_r were no longer identical. Thus, the failure of that phonological rule to apply preserves the identity of the two parts. Likewise, if the phonological rule applies to both parts even though one part does not satisfy the structural conditions, then both parts change and the identity of R_r and R_o is preserved (1973:55-6).

Although Wilbur's discussion concerns a synchronic constraint on rule interaction, clearly if the cases she cites are valid, then they represent historical change as well. If a rule which is newly added to the grammar is blocked from applying to an environment in which it should apply, then the information that the rule does not apply to reduplicative forms must be added to the grammar; conversely, if a rule

overapplies in the case of reduplicative affixes, that information must also be entered somewhere. Both of these cases represent a change to the grammar of a language, and hence can also be viewed as historical change. In addition, if any such tendency as the Identity Constraint can be shown to exist, then it would be expected that this tendency would manifest itself in historical development. For this reason, I will discuss the cases Wilbur cites in detail; subsequent research done on these systems has shown that it is unlikely that any such mechanism as the Identity Constraint exists¹⁰.

The first group of cases that Wilbur discusses is that in which a phonological rule fails to apply to a reduplicated form even though its structural description is met. One example of such a case is found in Madurese. Madurese has a general rule of regressive nasal assimilation: nasals assimilate to the place of a following consonant. The rule does not apply, however, if the nasal is the root-final segment in a reduplicated form. Thus, from a root kun 'order' the reduplicated form is kunkun rather than *kunkun; from a root ban 'wing' the reduplicated form is banban rather than *bamban.

As Wilbur herself notes (1973:51), the Madurese data can easily be handled by ordering nasal assimilation before reduplication, so that at the point at which nasal assimilation applies, its structural description is not met. Reduplication then applies, producing the attested form. Wilbur rejects this ordering solution, citing as her

¹⁰ It is possible, however, that something like the Identity Constraint is responsible for determining which part of the base is copied in partial reduplication. In suffixal reduplication, typically the affix reduplicates the final part of the base, that is, the part of the base adjacent to the suffix; the resemblance between affix and base is clearer than if the affix copied material from the beginning of the form. Similarly, prefixal reduplication usually copies the beginning of the base rather than the end. This behavior is captured in theoretical accounts as the direction of the association of the copied material to the affix; formalizing a behavior, however, is not the same thing as explaining it. Something similar to the Identity Constraint could explain the observed pattern: it is easier to recognize the reduplicated structure of a form if the repeated material is immediately adjacent to its source.

reasons the fact that rule ordering cannot handle over-application of rules and the fact that ordering a morphological process after a phonological process is prohibited by current phonological theory. The issue of over-application of rules is a serious one, and I will discuss it at length later. Current cyclic theories of phonology and its interaction with morphology eliminate the theoretical objection to ordering reduplication after the phonological rule of nasal assimilation.

A second case of a rule failing to apply that Wilbur cites is Akan. Akan has a rule palatalizing back consonants before non-low front vowels. Akan forms reduplicate with a fixed high vowel agreeing with the root vowel in backness, roundness, and tenseness. This reduplicative vowel, however, does not palatalize the preceding consonant; however, if the initial consonant of the root was palatalized by the root vowel, then this palatal consonant remains palatalized. The following are some of the forms Wilbur cites:

39. Akan (Wilbur 1973:25)

jʔ	j ^ʷ jʔ	'accompany'
cI	cIcIʔ	'burn'
čə	čIčə	'divide'
kaʔ	kIkaʔ	'bite'
haʔ	hIhaʔ	'trouble'

Again, Wilbur notes that rule ordering could be used to handle this case; simply order the palatalization rule before reduplication. She raises the same objections to this solution as she did for Madurese. Again, in current theories of phonology the difficulties vanish.

The last case she cites of a rule failing to apply is in Luiseño. Luiseño has a rule of de-affrication changing č to s before a non-continuant or in word-final position. Luiseño also has a reduplicative process forming de-intensified adjectives from

deverbal adjectives. The shape of the reduplicated form is $C_1V_1C_2V_2'-C_1C_2V-\check{s}$.

The following are examples:

40. Luiseño

root	gloss	reduplicated form	gloss
máha-	'stop'	mahamhas ^v	'slow'
śáwa-	'wheeze'	śawaśwas ^v	'hoarse'
čára-	'tear'	čaráčras ^v	'torn'
čóka-	'be limp'	čukačkas ^v	'limping'

As the last two examples show, the rule changing $\check{c}$ to $\check{s}$ does not apply to these reduplicated forms, even though its structural description is met. Wilbur again argues that the rule is blocked due to the Identity Constraint. She notes that in this case ordering cannot be invoked to solve the problem because Luiseño has other reduplicative processes which do undergo the de-affrication rule: from the noun čapomkat 'liar' is formed the plural čáspomkat-, with the de-affrication rule changing $\check{c}$ to $\check{s}$.

A cyclic approach to Luiseño involving different levels could handle the data very easily. The reduplicative process used to create plurals applies on the same level as the de-affrication process and precedes it; the process used to create de-intensive adjectives applies on a later level and hence does not undergo de-affrication. On theoretical grounds alone this solution is superior to Wilbur's; an Identity Constraint which can pick and choose when to apply and when not to apply is not a very satisfying theoretical construct to deal with. If the Identity Constraint had any reality, one would expect it to apply consistently in a particular language. One could possibly argue that the Luiseño case shows linguistic change in progress, and that the Identity Constraint is gradually encroaching on the grammar of the language, but since the Identity Constraint has not been amply demonstrated in the first place, there is no reason not to use an ordered approach to these cases and avoid

invoking unproven constraints on rule interaction.

A further complication in these cases is the fact that one would be unable to distinguish those situations in which, due to the relative historical order in which various processes were added to the grammar, an assimilatory process does not apply to reduplicated forms from any cases which actually were due to the effect of an Identity Constraint; that is, in these instances the Identity Constraint is not a testable hypothesis, since any given linguistic situation could be due to other causes. If one found clear evidence that historically a reduplicative process had been re-ordered so that an assimilatory process could not apply to it then the Identity Constraint could be invoked to explain such a development. To my knowledge no such cases exist.

A more interesting set of cases are those Wilbur cites as showing the over-application of a phonological rule: that is, the rule applies to a segment which meets its structural description and also to the same segment related to the initial segment via reduplication. Such cases are of particular interest to this study if a phonological rule which ought to apply only to a reduplicative affix seems to apply to the base as well. Wilbur cites several such cases; I will discuss them, discuss analyses of these cases which have been proposed in the current literature, and finally will discuss the path of development which could lead to such a situation.

One of the languages Wilbur analyzes is Dakota. Wilbur argues that Dakota shows both the over-application of a phonological rule and the under-application of another phonological rule; both of these behaviors, she claims, are due to the constraint posited above. The putative instance of the failure of a rule to apply involves the contraction of a particle ye with reduplicative forms ending in -a. Wilbur notes that under normal circumstances the particle would combine with a final a to produce e; the rule, she claims, is conditioned by a number of adverbial endings such as

sa. (Note that Wilbur does not provide morpheme-by-morpheme glosses.) The following are the examples she cites:

41. Dakota

'ap'á	'to strike'	'ap'ésa (<'ap'a ye sa)	'he struck him, but'
há ska lo	'it is long'	há ska ska ye ló	'they are long'

Wilbur also notes that a phonological rule of palatalization seems to over-apply to reduplicated forms. She notes (1973:31) that the segments k, k', and k' frequently become c, c', and c' after the front vowels e, i, and ə; she further notes that the rule is subject to many exceptions, but concludes, 'The situation is very complex, but nonetheless, one fact is very clear - reduplicated forms where one part undergoes the rule will show the other part undergoing the rule also' (1973:32). She cites the following data:

kága	'to make'	wic'akicahcah'yeya	'quickly he made it for them'
kóza	'to wave'	napé kícoscoza	'he waved his hand to him'

A much more thorough discussion of the Dakota data is found in Sietsema (1988). Sietsema notes first that reduplication in Dakota has to be split into two processes. One process (called REDUP #1) involves suffixation of a copy of the final syllable of a stem. The following are examples:

42. Dakota reduplication

hâska	'is tall'	hâska-ska	'are tall'
niya	'breathe'	niya-ya	'blow out vigorously'
wa-ksa	'cut with a sawing motion'	wa-ksa-ksa	'cut up into pieces'

A number of forms, however, reduplicate by copying the first CVC string of the stem and prefixing it (the process is called REDUP #2). The following are examples:

xapa	'to rustle'	xap-xapa
ceka	'to stagger'	cek-ceka
nupa	'two'	nup-nupa

Sietsema argues fairly convincingly that the second set of forms are underlyingly monosyllables; they lose the final *a* when incorporated into lexical compounds, and they show a different stress pattern from other bisyllabic forms. He notes, however, that the reduplicative rule applying to these forms still cannot be formulated as 'copy and suffix the final syllable' because of the behavior of a number of stems which, based on their stress pattern, must be analyzed as underlyingly bisyllabic; some of these stems are permitted to undergo either of the two reduplicative processes, producing from a stem such as yazâ 'to hurt' the doublets yazâ-zâ and yas-yazâ, and some of these stems can only undergo R2. He accounts for the attested forms with the following reduplicative rule (1988:343):

Copy the stem, licensing the affixation of exactly one syllable as a:

--suffix (REDUP #1)

--prefix (REDUP #2)

Stems would then be lexically marked to undergo either or both of the rules.

Sietsema treats the vocalic behavior discussed by Wilbur not as an instance of contraction, but rather as an instance of ablaut. He notes (1988:346) that stem-final a becomes e in a variety of contexts: in zero-derived nominalizations, in incorporation, and in suffixation of certain clitics. Moreover, he notes that some stems undergo the ablaut and some do not. He cites (1988:347) the following reduplicated forms:

43. Dakota reduplication

ptúza	'to split'	ptu-ptúze+?	'that is split'
		(stem + REDUP #2 + declarative clitic)	
kíza	'to squeak'	ohé-hdi-pi kîs-kîze-?	'the bed squeaks'
apha	'to strike'	apha-pha-Sni	'he did not strike it repeatedly'
		(stem + REDUP #1 + neg. clitic)	

Clearly the data cited above repudiate Wilbur's claim that the reduplicated forms behave exceptionally with respect to ablaut (or vowel contraction); the situation, instead, is that some reduplicated forms undergo ablaut and some do not, just as some stems undergo the process and some do not. This particular instance of the failure of reduplicated forms to undergo some rule is thus invalid.

As mentioned earlier, Dakota also seems to exhibit the over-application of a phonological rule: the rule palatalizing velar consonants after a front vowel. Wilbur points to similar apparent over-application of rules in Tagalog. In Tagalog, verbs reduplicate to show proposed or contemplated aspect¹¹. Verb roots also occur with certain affixes; which of a set of affixes a given root occurs with is determined by its formal class. One class of verbs occurs with a set of prefixes ending in *n*. These prefixes cause roots beginning with certain segments to replace those segments with homorganic nasals: for example, the root biga 'give' co-occurs with the prefix man-, resulting in the form mamigáy. When the root undergoes reduplication, the resulting form shows the nasal consonant both adjacent to the prefix and also as the initial segment of the root: mamimigáy.

¹¹ Wilbur calls this 'future tense'; Schachter and Otones (1972:66-7) make it clear that the distinction is one of aspect rather than tense.

This sort of reduplicative behavior is discussed in some detail in Aronoff (1987). Following Hoeksema (1984), Aronoff appeals to the concept of a 'head operation' to provide a synchronic account of these phenomena. He defines a head operation as a morphological process which looks inside a multi-morphemic word to find the head and then performs some operation on it. The device of a head operation permits an explanation of why bracket erasure seems to not have applied in certain instances. Examples of head operations are the past tense formation of English compounded strong verbs (understand - understood) and the pluralization of compounded nouns based on ablauting nouns (postman - postmen). Permitting a device such as a head operation to operate in the grammar explains how the process of past tense formation can look inside the brackets of the compound and find the head of the form, stand, and identify it as a strong verb. Aronoff (1987) argued that certain instances of reduplication ought also to be viewed as head operations. Aronoff loosely states the Tagalog reduplication process described above as 'Prefix to the head a copy of its first syllable.'

Sietsema discusses the similar behavior in Dakota in detail by appealing to this notion of head operation. Sietsema simply alters the reduplication rule cited above so that it reads:

In a word W with head H ...

Copy H,

licensing the affixation of exactly one syllable as a:

--suffix (REDUP #1)

--prefix (REDUP #2) (1988:346)

Thus, from an underlying [ki+kax], palatalization produces [ki-cax]; next, REDUP #2 applies and gives [ki-cax-cax]; and later rules of final-a epenthesis and voicing give [ki-cax-caga].

The concept of a head operation is clearly necessary to account for such things as the behavior of compounded strong verbs; the consequences of permitting such a device in the grammar, however, have not been fully worked out, nor have the details of the function of the device itself¹².

Several further questions arise when the issue of how head operations interact with historical change is addressed. In the case of the English compounds based on irregularly-pluralizing morphemes, for instance, a historical tendency to replace the irregular forms with regular forms has been observed: Walkmans, not *Walkmen. Does this suggest that head operations are more susceptible to being lost than other morphological operations? A more significant question, at least in the context of this study, is the following: If the Dakota and Tagalog cases discussed above truly are examples of head operations, how did such operations come about?

I can conceive of two possible historical routes which might have lead to the attested situation in Tagalog and Dakota; since the Tagalog data are more accessible than the Dakota case, I will focus my attention on Tagalog. Consider the Tagalog forms with the prefix pan-. Originally, the prefixed reduplicated form might have had only the reduplicative prefix nasalized, giving unattested *pa-mu-puutul. Given, however, that the suffixed unreduplicated form was pa-muutul, speakers could have substituted the initial-nasal variant of the stem for the unnasalized variant seen in the reduplicated form; the motivation for such a substitution would be partially

¹² Hammond (1990:153) notes, correctly, that the notion of 'head' invoked in Aronoff (1988) seems to be synonymous with the notion 'stem'; he notes that according to Hoeksema's definition (1984) of 'head,' on the other hand, category-changing affixes are the heads of their words. Aronoff (1988:3) cites as an example of a head operation a Tagalog form taken from Bloomfield: from a root pu:tul 'cut' and a prefix pan- is formed pamu:tul 'that used for cutting' which, when reduplicated, gives pamumu:tul. The difficulty with calling this a head operation is the fact that the prefix pan-, which creates a nominal form out of a verbal form, is the head of the word, at least according to Hoeksema's definition of head. Such an objection is, however, rather minor; I see no difficulty with restating the concept of a head operation in terms of stems rather than heads.

paradigmatic levelling and, perhaps, partially reduplicative strengthening.

A second possible scenario is that the reduplicative rule for forms with a prefix was always a head operation, or at least was already a head operation at the time when the nasalization took place. In Tagalog, at any rate, this analysis has some plausibility; an examination of reduplication in the language as a whole suggests that the input to the reduplicative rule can be a poly-morphemic word with affixes already attached, and that the rule looks inside the word to perform reduplication.

The first piece of evidence that reduplication may always have been a head operation in Tagalog lies in Carrier-Duncan's observation (1984:280) that Tagalog reduplication very frequently must be accompanied by other affixes and does not seem to have a discernible semantic value of its own. In verbal forms, for instance, the verbal root must always be accompanied by a verbal affix (Schachter & Otnes 1972:283); the affix may be a prefix, an infix, a suffix, or a combination of a prefix and a suffix. The verbal root thus never occurs in a bare form. One might argue that, as a consequence, the reduplication rule must always look inside a multi-morphemic form in order to find and reduplicate the root. Reduplication thus could have been a head operation before the nasalization rule was added to the grammar; when nasalization took place, reduplication would naturally have reduplicated the nasalized segment, resulting in the forms attested today. One consequence of this theoretical course of events is that no form *pa-mu-puutul would ever have been produced.

The second piece of evidence that reduplication routinely looks inside multi-morphemic forms to find its target lies in a historical development in process today, and in traces which point to a similar earlier development. French (1988:51) notes that agent-focus potential verbs, which are formed with the bisyllabic prefix maka-, have two possible reduplicated forms: an archaic form, in which the reduplicative

process reduplicates the first syllable of the stem, and a modern form, in which the process reduplicates the second syllable of the prefix. The following are examples:

44. Tagalog

Archaic	Modern	gloss
maka-ki-kita?	maka-ka-kita?	'see'
maka-pag-ta-trabahoh	maka-ka-pag-trabahoh	'work'

She notes that adjectives prefixed with *naka-* exhibit a similar alternation:

Archaic	Modern	gloss
naka-tu-tuwáh	naka-ka-tuwá	'pleasing'
naka-?i-?inĩs	naka-ka-?inĩs	'irritating'
naka-ta-tawáh	naka-ka-tawáh	'funny'

Clearly, what is happening in these cases is that for some speakers the reduplication rule has been reformulated. Instead of applying reduplication to the root, they simply take the multi-morphemic unreduplicated form of the word and reduplicate the second syllable.

A development similar to the one currently in progress must have taken place in other contexts. For a certain category of verbs, agent-focus verbs with polysyllabic prefixes, the reduplicative process always involves the second syllable of the prefix. The following examples are taken from French (1988:44-5):

45. Tagalog reduplication

stem	gloss	prefix	gloss	proposed aspect
ʔúsap	'converse	maki-	AGT	maki-ki-ʔúsap
trabáhoh	'work	mag-pa-	AGT-CAU	mag-pa-pa-trabáhoh
		maka-pag-	AGT+POT	maka-ka-pag-trabáhoh
		mag-paka-	AGT-INT	mag-pa-paka-trabáhoh
		magsi-pag	MUL-AGT	magsi-si-pag-trabáhoh

French notes in discussing the above forms that Carrier (1979) argues for an approach which treats each syllable of the multi-syllable prefix as a separate morpheme; then the second morpheme in the string of prefixes is the reduplicating morpheme, which copies its material from the morpheme immediately to its right. French argues against this approach, noting that the case for treating each syllable as a separate morpheme is extremely weak; she notes, for instance, that although one could make a case for breaking the prefix maka- into the string ma-ka-, since a prefix ka- exists separately, one cannot therefore assume that a prefix such as magsi- or maki- must be multi-morphemic, since si- and ki- do not exist as separate morphemes. French argues instead for a templatic approach in which the entire multi-morphemic (but unreduplicated) form is mapped onto a syllable template in which the second syllable is marked for reduplication; the result is that if the prefix is monosyllabic, the initial syllable of the root will be copied, but if the prefix is polysyllabic, the second syllable of the prefix will be copied. French's approach is reasonable; it also provides a reasonable explanation for the bi-forms cited earlier. Since, in many cases, the verbal prefix is monosyllabic, a rule of stem-initial-syllable reduplication and a rule of second-syllable reduplication would produce identical results; the two rules would only produce different results with poly-syllabic prefixes. Clearly, in the environment of monosyllabic prefixes speakers must have

reanalyzed the stem-initial-syllable reduplication as second-syllable reduplication and then begun extending the rule to poly-syllabic prefixes, a process which is not yet completed¹³.

The significance of this behavior with respect to the seeming over-application of the nasalization rule discussed earlier lies in the fact that speakers undeniably seem to apply the reduplication rule to the multi-morphemic form of a word, rather than just to the verbal root. If, at the point in the language when the nasalization rule was added, speakers also used the multi-morphemic form of a word as the base for reduplication, then it is not surprising that the nasalized variant of the stem-initial consonant was copied; rather, this is the expected result.

The one difficulty that this second hypothetical sequence of events faces is that it raises a 'chicken-and-egg' question: could the nasalized forms such as pa-mu-muutul be what first caused speakers to start using a multi-morphemic word as the base for reduplication, or did the fact that speakers based reduplication on the multi-morphemic form of the word cause them to copy the nasalized consonant as part of the reduplicative process? At this point I see no way of resolving this question. The lack of attestation of forms such as *pa-mu-puutul might provide evidence that the second sequence of events is the more likely, but arguing from an absence of evidence is an extremely weak position. At this point the second sequence of events seems somewhat more plausible than the first, but both must be viewed as very tentative.

It is not clear whether such an analysis can be applied to Dakota. It is true that Dakota verbs are highly prefixal, using prefixes to express various instrumentals,

¹³ The fact that such reanalysis is possible suggests that this is a possible mechanism by which internal reduplication can arise.

various locative prefixes, subject pronouns, object pronouns, dative pronouns, possessive pronouns, various prefixes referring to motion, and reciprocals; although third person subject and object are both zero morphemes, it seems highly unlikely that a verb stem would ever appear without some prefix. Possibly this suggests that, since reduplication rarely occurs in the absence of prefixes, speakers have always formulated the reduplication rule as a head operation; I know of no evidence, however, that such is the case.

A further complication in the analysis of Dakota verbs is the fact that the verbs are split into two semantic categories, called active and neutral by Boas and Deloria (1941:23); only active verbs are at all affected by the palatalization process described earlier. Neutral verbs with initial velar consonants do not palatalize, and as a consequence do not exhibit seeming over-application of the palatalization rule. At the very least, this split suggests that the palatalization rule is not simply a straightforward phonological process.

The last significant case Wilbur discusses is that of reduplication in Javanese. Javanese has a verbal prefix ŋ; when this is added to a root with an initial voiceless obstruent or w, the initial segment is replaced by a homorganic nasal. When the root begins with a voiced segment, the prefix assimilates in place of articulation but does not replace the segment. When the root begins with a vowel, the prefix is realized as ŋ. The following are examples:

46. Javanese (Wilbur 1973:29-31)

preks	'to inspect'	mreks	'inspects'
tabraq	'to collide'	nabraq	'collides'
sikat	'brush'	ñikat	'to brush'
bayar	'to pay'	mbayar	'pays'
daqw	'to accuse'	ndaqw	'accuses'
eman	'to safeguard'	ñeman	'safeguards'
ajal	'death'	ñajal	'to die'

When the roots are reduplicated to express continuative aspect, an unusual pattern emerges: the consonant-initial stems copy the nasal along with the stems but the vowel-initial stems don't. The following are examples:

lumpat	'to jump'	mlumpat-mlumpat
tabraq	'to collide'	nabraq-nabraq
idaq	'to step'	ñidaq-idaq
oyaq	'to chase'	ñoyaq-oyaq
uson	'to carry'	ñuson-uson

Wilbur concludes from this that the correct analysis of the situation is that the nasal assimilation process is over-applying; the motivation, again, is the desire for the affix and base to resemble each other as much as possible. She feels that the split between vowel-initial and consonant-initial stems lends support to her analysis, since a reduplicative rule which simply copied the nasal as well as the stem would be unable to account for the split.

There are a number of interesting aspects to the Javanese situation. The first question is that of accounting for the pattern seen in synchronic terms. Certainly cases of a prefix or part of a prefix being copied along with a stem are not unknown

(for example, in Kinande a prefix can be copied along with the stem if due to various phonological processes it forms part of the onset of the first syllable of the stem). What is unusual in this case is that the prefix seems to attach to the first syllable of the stem if the stem is consonant-initial but not if it is vowel-initial. Although space does not permit me to discuss the situation in detail, I can suggest a synchronic analysis. Suppose that Javanese has a rule incorporating the nasal prefix into the onset of the following syllable, but only if an onset already exists. Then suppose that reduplication is a head operation, and that it proceeds in a Steriadean way (see chapter 2 for discussion), copying all prosodic information along with the stem. It would naturally copy the nasal along with the stem in the case of consonant-initial forms; since no onset has yet been created in the case of vowel-initial stems, it would copy only the stem and leave the nasal behind. The final step would be a late syllabification rule adjoining the initial nasal to the vowel-initial stem and creating a new onset. The Javanese data may provide support for the Steriadean account of reduplication; a Marantzian approach would require two different reduplicative templates, one for vowel-initial stems and one for consonant-initial stems, as would a parafixing model (see chapter 2 for discussion).

The situation becomes even more interesting when data from Old Javanese are factored into the situation. In Old Javanese, several prefixes ended in ŋ; one is aŋ-, a prefix used to form active voice verbs. In the case of voiceless obstruents and vowels, the prefix behaves as its descendent does in the modern language; p and w also behave the same, and b shows some variation. The following are some examples:

47. Old Javanese (Teselkin 1972:42)

base	affixed form	gloss
an̄ḁḁh	anan̄ḁḁh	'press'
kujiwat	an̄ujiwat	'look, observe'
panas	amanasi	'take'

Teselkin only briefly describes reduplication in Old Javanese; he does not cite any examples involving the prefixes mentioned above. I found a number of instances, however, by looking in Zoetmulder's Old Javanese-English Dictionary (1982). As the form amacḁḁh-macḁḁh 'to make laugh' from the form pacḁḁh 'merry' and the form anapu-napu 'sweep' from the form sapu 'broom' illustrate, the process seems to be the same for voiceless obstruents in Old Javanese. Similarly, in the case of vowel-initial stems, the process is the same, as the forms an̄an̄ḁḁh-an̄ḁḁh 'think' from an̄ḁḁh 'thought' and an̄ucap-ucap 'talk' from ucap 'speech' illustrates. In the case of voiced obstruents, however, the situation is more complex. Due to lack of time, I haven't yet gone through the complete corpus; I have, however, found several forms beginning with d or ḁ. In most cases, the nasal is not copied along with the root, as andoh-dohi 'avoid' from doh 'distance' illustrates. I have found one form, however, which behaves differently: an̄ratu-ḁ̣ratu 'acknowledge as king' from ratu or ḁ̣ratu 'king.' I'm not sure exactly what's going on here: possibly the sound represented by ḁ̣ had assimilated to the initial consonant of the stem but was still written in this position as a velar nasal but in the reduplicative affix as a retroflex nasal. More work needs to be done on this problem.

The data found in Old Javanese enable me to discuss Wilbur's claim that the nasal assimilation was over-applied so that both reduplicative affix and base would look alike. It appears that the split in reduplicative behavior between consonant-initial stems and vowel-initial stems has been in existence for approximately a

thousand years, suggesting a fair degree of stability. In the older language, however, stems with initial voiced consonants behaved like vowel-initial stems: they reduplicated the stem alone without the prefix. At a later stage in the language, these forms also began to reduplicate the prefix along with the stem. This development suggests that, at the very least, other factors must also be invoked to account for the data seen. Nothing about the Identity Constraint can explain why the stems with initial voiced consonant did not continue to reduplicate only the stem. Clearly the reduplicative pattern exhibited by forms with initial voiceless consonants must have become generalized to apply to forms with voiced consonants as well; the motivation is not the Identity Constraint, but rather the well-known process of rule expansion. Although it is still possible that the Identity Constraint was responsible for the creation of the rule in the first place, the data do not provide as strong a support for Wilbur's case as she suggests.

Wilbur's Identity Constraint thus does not seem to have any empirical reality, or at best has a weak reality. In the case of a rule failing to apply to a reduplicated form, I have argued that current conventions of rule ordering can handle the cases easily. The cases of a rule seeming to over-apply can also be handled within current theoretical frameworks by treating reduplication as a head operation in these languages. The notion of a head operation raises interesting questions for diachronic linguistics; I have outlined what those issues are and have briefly discussed the routes by which a head operation could be acquired in a given language. One of those routes, which I briefly outlined in my discussion of Tagalog, may indeed involve a tendency to increase the identity between base and affix: when Tagalog acquired its nasalization rule, forms such as unattested *pa-mu-puutul from the prefix paŋ- and the root puutul might have been created, with the attested form pa-mu-muutul due to both paradigmatic levelling and the drive to have affix and

base resemble one another as much as possible. If such a tendency exists at all, however, it is extremely weak; in the absence of a form pa-muutul to contribute to the process of paradigmatic levelling, it is unlikely that pa-mu-muutul would have come about. Furthermore, since such examples of paradigmatic levelling are common in non-reduplicated forms, invoking a historical tendency such as the Identity Constraint in these cases is superfluous. I conclude that the existence of an analogical tendency to increase the resemblance between affix and base remains unproven.

1.6 Ambiguous forms

One interesting topic which has not received much discussion is the analysis of reduplicative systems in which the distinction between affix and base has been obscured in some way due to further changes in the language. In at least one case (Newman 1989), such a state of ambiguity is hypothesized to explain a switch from suffixal to prefixal reduplication. It follows logically that if positing such hypothetical systems at some point in the pre-history of a language is reasonable, then some synchronic cases of ambiguity ought to exist among the world's languages. In this section I will present data from a number of attested systems in which the distinction between affix and base has been blurred; I will then discuss the further developments such ambiguity may permit, and will argue that the fact that such systems exist suggests that the distinction between affix and base may in some cases be more an artifact of a given linguistic theory than a real distinction in natural languages. Such systems are by no means uncommon; by and large, however, they have been neglected in the current scholarly discussion concerning theoretical approaches to reduplication.

One language already discussed in which reduplication is in some ways ambiguous as to whether it is prefixal or suffixal is Tarok (section 1.1.1). As mentioned

earlier, in the case of monosyllables, Tarok nominal possessive reduplication is ambiguous as to whether it is prefixal or suffixal. The segmental material in forms such as m-byàl, m̀b̀byal ‘his/her breast’ and a-lúr, a-lúur ‘his/her nose’ suggests that reduplication is prefixal; the behavior of tonal material, on the other hand, suggests that reduplication is suffixal.

Another language in which various processes have obscured the distinction between copy and base is Tangale. In this language, one reduplicative process may be applied to adjectives to form intensives; some of the intensives are also used as adverbs. The following are some examples (Kidda 1985:43):

48. Tangale

simplex	reduplicated form	gloss
san	sàn-zàn	‘very bright’
sìlip	sìlip-zìlip	‘very expensive’
kɔŋ	kòŋ-òŋ	‘very good’
dasa	das-dasa	‘badly’

Kidda notes (1985:43) that a process of voicing assimilation accounts for the voicing of the underlying voiceless segment seen in tài-dài and sàn-zàn. She cites the intriguing form sìlip-zìlip twice, but does not address the question of where the voicing of the s to z comes from. It is possible that the rule of voicing assimilation she cites has started to spread to other reduplicated affixes for which voicing is not phonetically motivated. Kidda notes elsewhere (1985:30), however, that voiced stops and fricatives are never found word-initially; historically the voicing distinction was lost at the beginning of a word (though it is preserved elsewhere). It is thus possible that the second half of sìlip-zìlip preserves the original voicing quality of the segment and the first half shows the effect of devoicing. In a situation such as this, in which the simplex shows a voiceless initial consonant but the reduplicative affix shows a

voiced segment, it would not be surprising to find speakers using voicing as a way of marking the reduplicative affix. In other forms, the sequence ŋk is simplified to ŋ, as in the form kòŋ-òŋ. These two processes cause the reduplication to appear, at least on the surface, suffixal. On the other hand, the loss of the stem-final vowel in the form das-dasa causes the reduplicative process to appear prefixal.

Reduplication is also used in Tangale to form adverbial expressions meaning ‘noun by noun.’ The following are some examples:

49. Tangale reduplication

simplex	reduplicated form	gloss
mīye	mī-mīyè	‘people by people’
paka	pàk-pàkà	‘hand by hand’
pandī	pan-bandi	‘stone by stone’
dodok	dodok-dodok	‘one by one’
kunūŋ	kunūŋ-unūŋ	‘three by three’

In this case forms such as pan-bandi and pàk-pàkà suggest that the reduplicative process is prefixal; on the other hand, the ŋk cluster simplification process described earlier and the voicing behavior of the second half of the form make reduplication look suffixal.

An important point to note in this discussion is that the ambiguity I am describing is surface ambiguity only. It is probably the case that at an underlying level the situation is less ambiguous; the Tangale case, for example, could easily be handled by treating the reduplication as prefixal and positing a rule deleting k after the velar nasal ŋ. It is important to remember that historical change through reanalysis is triggered by surface forms, not by underlying derivations; the fact that an unambiguous derivation is responsible for ambiguous surface forms is no guarantee that speakers will not reanalyze the system anyway.

A further case of ambiguity is seen in the Salishan language Shuswap, mentioned in the section on fixed-vowel reduplication. Shuswap reduplicated forms may be stressed either on the first half of the form or on the second half; the unstressed half of the form will then show a schwa instead of a full vowel. The following are some examples:

50. Shuswap plurals (Kuipers 1974)

simplex	reduplicated	gloss
piq	pəq-píq	'flour'
mus	t-mús-məs	'four persons'
kícx	bkəc-kícx	'group is at home'
s-pul-tn	s-pl-pul-tn	'lairs'

It is apparent that, on the surface, some of the above forms look prefixal and some look suffixal. Again, the forms are straightforward to derive, and only appear ambiguous on the surface. This surface ambiguity, however, is an important step in linguistic change.

One kind of historical change which is facilitated by a situation such as those described in this section is a change from prefixal to suffixal or from suffixal to prefixal reduplication. The nominal reduplication seen in Tarok must originally have been suffixal; nevertheless, the segmental behavior in the monosyllabic forms looks prefixal (though the tonal behavior conflicts with this). The apparent prefixal reduplication developed when the half of the form which was originally the base was reduced phonologically; speakers were then free to reanalyze the forms. Newman's discussion (1989) of the change from prefixal to suffixal reduplication plausibly invokes a scenario such as those described in this section, showing a similar development working in the opposite direction.

Another development which may be permitted by such ambiguity is a change from affixal to infixal reduplication. Consider the forms cited in Tangale. The form pan-bandĩ 'stone by stone' from pandĩ shows truncation of the second syllable of the stem. The form kunun-unun 'three by three' from kunun shows loss of the initial k after a homorganic nasal. If the process of second-syllable truncation were extended to this form the output would be *kun-unun. Similarly, if the rule which deleted the stem-initial k were generalized to a general rule of initial segment loss, then the form pan-bandĩ would become *pan-andĩ. I do not mean to imply that I predict that Tangale will develop infixal reduplication; I do mean to suggest, however, that this sort of surface ambiguity must have played an important role in the development of infixal reduplication in those languages which have such reduplication.

1.7 Foot-based reduplication

One quite strong tendency which has been noticed cross-linguistically is the fact that a large number of languages have reduplicated affixes which are the size of a foot. I will cite a number of such instances then will discuss the truncation processes which result in such affixes; I will conclude by discussing some explanations of why the foot-based reduplication should be so common. In chapter 2, I will return to these languages to discuss the best way to theoretically characterize reduplication.

One example is found in Diyari, an Australian language (data from McCarthy and Prince 1986). Diyari shows a reduplicated prefix which is exactly two syllables (one trochaic foot) long. Given that the minimum word in Diyari is also two syllables long, McCarthy and Prince argue, it makes sense to analyze the prefix as the minimal phonological word. The following are some examples:

51. Diyari

reduplicated form	stem	gloss
wila	wilawila	'woman'
kanku	kankukanku	'boy'
napiri	napinapiri	'father'
tilparku	tilpatilparku	'type of bird'
nankanti	nankanankanti	'catfish'

McCarthy and Prince note that the language requires the second syllable to be open; this can be explained, they suggest, by the constraint that the syllable adjacent to a phonological word juncture must be open. They note as well that each half of the reduplicated form is stressed as a separate word domain; they suggest that reduplicated forms are word-level compounds with the first element truncated to a single foot.

A second instance McCarthy and Prince (1986:32) describe comes from the Australian language Lardil. Lardil manifests a minimum word requirement of a bimoraic foot in a number of ways (only vowels count as morae, and a long vowel counts as two morae). One manifestation is that words which are underlyingly shorter than a foot take an -a augment when they occur in uninflected form:

52. Lardil

Underlying	Uninflected	Accusative	
/peer/	peer	peerin	'kind of tree'
/kela/	kela	kela	'beach'
/wik/	wika	wikin	'shade'
/wun/	wunta	wunin	'rain'

Another manifestation of the constraint is that words which are three or more morae

long undergo a rule of final-vowel deletion; the rule cannot apply to forms shorter than three morae because the result would violate the minimum word requirement. Lardil iterative verbal reduplication is also foot-based, as the following forms illustrate:

Underlying	Simple	Reduplicated	
/keleth/	kele	kelekele	'cut'
/kelith/	keli	kelikeli	'jump'
/parelith/	pareli	parelpareli	'gather'
/lath/	latha	laala	'spear'
/neth/	netha	neene	'strike'
/naalith/	naali	naalnaali	'thirst'

A number of points are worth noting. The underlying forms of all verb roots end in the marker -th; this marker is truncated in forms of two or more morae, but remains in roots which require the augment -a, such as latha and netha. The second point to note is that the reduplicated prefix is precisely two morae long in all cases; the condition is satisfied either by copying two syllables or a long vowel of forms which are underlyingly bimoraic, or by lengthening the vowel of monomoraic forms.

Another example of foot-based reduplication is seen in the Australian language Yidin^y. In this language, a reduplicated prefix a foot (two syllables) long is attached to the word; interesting to note is the fact that the second syllable may end in a consonant if that consonant is the coda to the second syllable in the base form. The following are examples:

53. Yidin^y

base	reduplicated form	gloss
mulari	mulamulari	'initiated man'
kintalpa	kintalkintalpa	'kind of lizard'
kalamparaa	kalakalamparra	'March fly'

A further example of foot-based reduplication is seen in Makassarese, discussed earlier in this chapter. In this language, words longer than two syllables are truncated to form a two-syllable prefix; this shortened form of the stem adds a glottal stop at the end of the affix.

54. Makassarese

Bisyllabic words

ballak	ballak-ballak	'house'
golla	golla-golla	'sugar'
tau	tau-tau	'person'

Longer words

kaluarak	kaluk-kaluarak	'ant'
manara	manak-manara	'tower'
balao	balak-balao	'rat'
baine	baik-baine	'woman'

Clearly the glottal stop serves to indicate that the form has been shortened. McCarthy and Prince claim that the stop insertion is a sign that the word in Makassarese had to be reparsed; since stress assignment counts from the right edge of the word, the base had to be reparsed from the left in order to create a foot which could then remain after the rest of the copied base had been truncated. They make the extremely strong claim that the segmental insertion in Makassarese and a similar

situation in Tagalog result from the reparsing of the base, and serves to mark a mismatch between the morphological and phonological edge; they suggest that other languages which require reparsing would do something similar. As I note earlier in this chapter, developing a fixed consonant (or limited set of consonants) at the boundary between affix and base is common; it is unlikely that the Makassarese pattern can be explained by reparsing.

Another case of foot-based reduplication cited in McCarthy and Prince is seen in Manam, an Austronesian language. In this language, the foot is bimoraic; a mora is equivalent to either a vowel or a syllable-final nasal consonant. The reduplicative process suffixes a bimoraic foot:

55. Manam

salaga	salaga-laga	'long'
moita	moita-ita	'knife'
?arai	?arai-rai	'ginger'
la?o	la?o-la?o	'go'
malabon	malabom-bon	'flying fox'
?ulan	?ulan-lan	'desire'

An interesting example of truncation leaving a bisyllabic affix behind is seen in Tarok reduplication, other aspects of which are discussed in section 1.1. Tarok polysyllabic stems reduplicate fully to form third person singular possessive forms. The following are some representative examples:

were possible. I suggest that since the erosion model of the development of bisyllabic partial reduplication such as this is untenable, the only other model which adequately reflects the diachronic development to such affixes is that exemplified by Tarok: the language acquires an optional truncation rule constrained to leave two syllables behind, which gradually becomes obligatory.

Two aspects of bisyllabic partial reduplication remain to be explored: why should so many languages acquire a truncation rule of this sort, and why the rules should consistently leave a foot-sized (or minimal word-sized; see discussion below) affix behind. In order to address the first question, I will discuss examples of truncation rules affecting domains other than reduplication.

A number of examples of truncation rules are presented in McCarthy and Prince (1986). I will cite all the instances they mention in order to illustrate the realms in which truncation rules typically apply.

57. Zuni (McCarthy & Prince (1986:61-2))

a. Compounds

tukni	tu-mok ^w k ^w 'anne	'toe-shoe = stocking'
melika	me-k ^w 'isso ^{vv}	'Anglo-negro = black man'
pa ^v cu	pa-lokk'a-ak ^w e	'Navajo-be:gray = Ramah Navajo'

b. Hypocoristics

base	familiar	
k ^w 'alasi	k ^w 'a-mme	'Crow'
suski	su-mme	'coyote'
kuku	ku-mme	'father's sister'

58. Madurese compounds (1986:62)

usap	sap-lati	'wipe-lip = handkerchief'
urin	rin-tua	'person-old = parents'

59. Yapese vocatives (1986:57)

full noun	vocative
lu?ag	lu?
bayaad	bay
maneefeel	man

60. Central Alaskan Yup'ik Eskimo (1986:57)

full noun	vocative
Anukagnaq	An - Anuk
Nupigak	Nup - Nupix/Nupik
Kalixtuq	Kal - Kalik
Qakfalgia	Qak - Qak f

61. Japanese hypocoristics (Poser 1984)

hanako	hana-tyaN
akira	aki-tyaN
taroo	taro-tyaN
syuusuke	syuu-tyaN
ti	tii-tyaN

62. Japanese Student Argot (McCarthy & Prince 1986:57)

iN kuri	'Introduction to Christianity'
zyene edo	'General Education'
iN liN	'Introduction to Linguistics'
iN toro	'introduction'

63. Japanese abbreviations¹⁵ (McCarthy & Prince 1986:58)

full form	abbrev.	English
passonaru koNpyuutaa	paso koN	'personal computer'
waado purosessaa	waa puro	'word processor'
paNtii sutokkiNgu	paN suto	'panty stocking'

64. French hypocoristics (Steriade 1988:75)

name	syllabification	hypocoristics
Isabelle	i.za.bel	iza, zabel, zabe
Dominique	do.mi.nik	domi, minik, mini
Marie-Claude	ma.ri.klod	mako
Marie-Alice	ma.ri.a.lis	mali, malis
Laure-Lise	lor.liz	loli

65. English 'stump-words' (McCarthy & Prince 1986:60)

rugby	rugger
pregnant	preggers
Bolshevik	Bolshy

¹⁵ Note that in the above Japanese abbreviations, the English equivalents are my guesses; McCarthy & Prince don't cite glosses.

McCarthy and Prince argue that the truncation effects seen above can be explained as templatic requirements which are filled by the phonological melody of the individual lexical items; that is, they analyze forms such as the Yapese vocatives as being produced through association of the segmental melody of a form to a CVC template rather than via clipping of the base to produce the right-sized piece. The dimensions of the template, they argue, are determined by prosodic well-formedness requirements in the language in question; the smallest independent word in Yapese is a CVC syllable, so the template for the vocatives is also a CVC syllable. In the case of the Yup'ik vocatives, they argue that the template, a quantity-sensitive iambic foot, is determined by the demands of the Yup'ik stress system: it must contain at least two morae, it must end in a consonant, it must be either monosyllabic or bisyllabic, and only the rightmost syllable may be bimoraic. In the case of the English stump-words, they note that the base of the form is invariably a single stressed syllable; they relate this syllable to the English minimal word requirement. The truncated forms seen in Zuni compounds, they suggest, correspond to the minimal root. The Madurese forms do not seem to correspond to the Madurese minimal word requirement.

An issue which McCarthy and Prince do not address is why truncation rules are constrained by templatic well-formedness requirements related to minimal-word or minimal-root size in so many of the languages in question. In cases such as vocative formation, one could argue that the minimum word requirements of the language must be respected to produce a usable form. In cases such as compounding and reduplication, however, the motivation for such a requirement is less clear. After all, affixes are usually not required to conform to any sort of template; the question is why reduced forms of stems should be. A further question to be addressed is what role minimal word restrictions play in the phonology of a language, and why they

are allowed to vary from one language to another. I will discuss these issues at greater length later in this section to shed some light on the relationship between truncation, templatic requirements, and reduplication.

All the truncation rules outlined above have one striking thing in common: they all apply to stems rather than to affixes. Since the only other realm in which truncation rules routinely apply is in forming reduplicated constructions, these reduplicated forms must have something in common with the other forms which undergo truncation. This patterning of reduplicated forms with hypocoristic (or vocative) forms and with compounds suggests that at least some reduplicated forms should underlyingly be analyzed as the conjunction of two stems rather than of a stem and an affix; just as the compounds from Zuni and Madurese permit truncation of one of the conjoined stems, so some reduplicated forms also permit truncation of one of the stems. Clearly in the case of compounding identifying one of the stems as a base and one as an affix is a bit artificial, although it is true that heads of compounds are more 'stem-like' than non-heads are; since compounds are treated as the conjunction of two stems, even when one of the stems has been truncated, instances of reduplication such as these also are best analyzed as two conjoined stems. It is possible that all forms in which the reduplicated morpheme is bisyllabic or bimoraic are best analyzed as the conjunction of two stems rather than as a stem plus an affix; certainly any case in which the morpheme is subject to minimal-word constraints ought to be analyzed in this way, since the reduplicated morpheme is patterning with the stems of the language rather than with the affixes.

Hypocoristics, vocatives, compounds, and reduplicated words form an interesting class in another way: the reduced stem occurs in a context which helps with the interpretation of the form. For example, hypocoristics are used among people who know each other, generally in situations which make it clear who is being referred

to; since vocatives are used as a form of address, context supplies sufficient clues concerning the identity of the addressee to make the interpretation of the truncated form easy. In the case of compounds, the meaning of the second element makes the interpretation of the first element easier; for instance, if I mentioned picking snargle-berries over the weekend, the fact that 'berry' defines a frame of reference and the existence of words like 'boysenberry, ollalieberry, huckleberry,' and so on assists the hearer in the interpretation of 'snargleberry.' In the case of reduplicated forms, the presence of one copy of the stem makes the interpretation of the second copy easier; enough of the truncated copy remains to establish its identity with the base, and to permit the hearer to retrieve the underlying structure of two conjoined stems. These three similar cases, in which context is rich in clues to help in the interpretation of a form, explains why truncation is so commonly used in these realms; words get reduced precisely because speakers can get away with such reduction when context makes the referent clear.

The usual pattern of foot-based truncation seen with reduplicated forms suggests that in the vast majority of cases, the truncation is also constrained to leave behind the piece of the copied stem which corresponds to the piece of the base adjacent to it; that is, if the stem being reduced is a prefix, the truncating rule will leave behind the first foot, and if the stem is a suffix, the rule will leave behind the final foot. In synchronic descriptions such as Marantz (1982) and McCarthy and Prince (1986) this pattern is expressed as a constraint on association to a template: prefixes usually associate from left to right, and suffixes usually associate from right to left. Considering the behavior of these forms from a diachronic perspective rather than from a synchronic perspective suggests a more functionally oriented interpretation of this association convention. Constraining truncation rules so that they result in the immediate repetition of a segmental sequence reinforces the identity between copy

and base, making it easier for speakers to recover the underlying structure of two conjoined stems. If the repeated section of the stem is separated by several syllables from its corresponding section in the other stem, then hearers will have slightly more difficulty in recognizing that the two sequences are identical. For any speech community beginning to acquire a truncation rule, clearly at all times the forms produced must be comprehensible to the members of the community; when the rule first enters the language, its output must remain comprehensible to those who hear the form. A constraint which heightens the identity between the truncated morpheme and the base helps ensure comprehensibility.

The next question to consider is why prosodic structure should be important in creating these reduplicated affixes. Given that it is possible to have reduplicated CV affixes, why should some languages enforce a constraint requiring minimal-word sized or foot-sized reduplicated affixes? One partial explanation which I will discuss later is that not all cases of reduplication are affixal; although some cases clearly are affixal, some are better analyzed as the conjunction of two stems, with one or both reduced. Another part of the explanation may come from considering the role a prosodic unit such as the foot plays in other parts of the language.

One role played by prosodic units may have to do with lexical retrieval. One study of children's use of reduplication, Schwartz, Leonard, Wilcox, and Folger (1980), showed that although children vary a great deal as to how much they used reduplication, cases in which they did reduplicate were strongly correlated with lexical items in adult language which were polysyllabic. The generalization seemed to be that the children would try to match the number of syllables in the adult word, but could only do so by repeating the same monosyllable. This study suggests that at an extremely early stage in language acquisition children show an awareness of how many syllables a lexical item has in adult speech and frequently reduplicate a single

syllable to produce a form corresponding in length to the adult form. Although it is unclear whether children are aware of organization among the syllables into feet, at the very least for a given lexical item they store the number of syllables and the form's meaning even before they have stored the complete segmental melody of the form. The importance of prosody at such an early stage may indicate that one of the organizing principles of the lexicon is prosody.

Another indication that prosodic information plays a role in organizing the lexicon is found in Fay and Cutler (1977), who discuss inadvertent malapropisms and the structure of the mental lexicon. Fay and Cutler are specifically interested in the speech substitution errors called malapropisms - that is, errors in which one word is substituted for another word on the basis of phonological similarity. As an example they cite the television character Archie Bunker's statement, 'We need a few laughs to break up the monogamy,' although in their analysis they of course limit themselves to naturally occurring instances. Such malapropisms are to be separated from spoonerisms and other such errors where the phonological elements of an utterance get scrambled, and from semantic substitutions such as 'He got hot under the belt' for 'He got hot under the collar.' Fay and Cutler theorize that such errors occur when a speaker attempting to retrieve one item from the mental lexicon inadvertently retrieves a phonologically similar item; one can envision a speaker doing the mental equivalent of stabbing a pin into a dictionary and inadvertently impaling equivalent instead of equivocal. Working with a corpus of 183 naturally occurring instances, they notice a number of interesting correlations. One correlation is that the error and the target word fall into the same grammatical category in 99% of the cases. Another correlation they cite is that 87% of the pairs have the same number of syllables; of these pairs, when the monosyllables are eliminated, 98% show the same stress pattern. They then compare the number of different phonological

features comparing the forms from left to right; that is, a word such as *cat* would differ in one feature from a word such as *cad* (voicing of the final segment) but would differ in a large number of features from *tack* (which has the same phonemes as *cat* but in a different order). Their findings show a correlation between the number of differing features and the likelihood that a malapropism would occur; that is, a much smaller percentage of the cases differed by six or more features than differed by six or fewer features. Fay and Cutler conclude that this correlation suggests that the lexicon is organized alphabetically from left to right. A later work, Hurford (1981), looks at the data corpus cited in Fay and Cutler (1977), and finds that a similar correlation can be found by matching segments from right to left; he notes that words with derivational endings such as *-ion* show the same kind of correlation at the end of the form as is shown by the ends of underived words (and that both show a significant degree of correlation), and concludes that both derived and underived ends of words must play a role in the organization of the lexicon.

The point of significance for this study is the high correlation shown in the data corpus between the prosodic structures of the target word and the error word. As mentioned above, Fay and Cutler found that 87% of the forms had the same number of syllables and 98% of these forms (excluding monosyllables) had the same stress pattern; these figures indicate that prosodic structure also must play a role in lexical retrieval. Fay and Cutler list their entire data corpus in an appendix to the study; an examination of the forms they cite which have different numbers of syllables suggests that if one compares forms with the same number of feet though not necessarily the same number of syllables, the percentage with similar stress patterns is even higher. The following are some pairs in which the number of syllables differ but the stress patterns correspond:

66. Malapropisms

Error	Target
discovering	describing
tactical	tactful
risk	resist
accident	accent
edification	medication
company	country
certainly	shortly
easily	early
comment	compliment
technology	terminology

The conclusion I draw from Fay and Cutler's corpus of malapropisms is that prosodic structure is one significant organizing principle of the lexicon; another principle is grammatical class, and another is the segmental melody at both the beginnings and the ends of words. The more points at which two forms correspond, the likelier it is that one word will be substituted for another. This evidence that prosodic structure is an organizing principle in the mental lexicon correlates with the conclusion suggested by the fact that children show an awareness of the number of syllables in a form before they can produce the entire phonological melody.

A further piece of evidence concerning the role of feet in recoverability may be found in the English rule of expletive insertion seen in forms like abso-bloomin-lutely. Attested examples McCarthy cites, as well as ungrammatical forms, are seen below.

67. Expletive Infixation

amalga-bloody-mated

emanci-motherfuckin-pator

Su-fuckin-matra

e-bloody-nough

*fanta-fuckin-stic

*ca-fuckin-terwaul

As McCarthy (1982) noted, the constrain on Expletive Infixation may be stated as follows: the expletive may be inserted between feet, but not inside of a foot. McCarthy explained the constraint as the result of the autosegmental principle that association lines may not cross; the diagram below shows the prosodic structure of an ungrammatical example.



A more functionally-oriented explanation is that the maintenance of foot structure makes the recovery of the underlying lexical item easier. The expletive inserted into the form has its own foot structure, making it easy for the hearer to remove the expletive and recover the lexical item into which it has been infixed; if the form produced by infixation had been refooted as a result of the process, it would be considerably more difficult to comprehend the utterance. Note that monosyllabic expletives such as damn cannot be infixed to produce forms like *fan-damn-tastic; I argue that the main reason monosyllabic expletives cannot undergo infixation is that

they would require refooting of the output.

With respect to the frequency of foot-sized reduplicative affixes, I suggest that the role of prosodic structure in lexical retrieval plays a similar role. I argued earlier that one constraint on how truncation works cross-linguistically is the ease with which the underlying item can be retrieved; in the case of reduplicated forms, the hearer can readily recover the underlying structure of two conjoined stems. Maintaining foot structure helps ensure this ease of recoverability. Since the affix is independently footed, as a consequence it does not result in refooting of the base. The hearer can easily recover the underlying structure of two conjoined stems.

In a large number of languages, of course, the reduplicative affix is smaller than a foot; I suggest that in these cases the reduplicated element is more clearly affixal than in the foot-based reduplicative systems, which are more compound-like. The fact that these two different kinds of systems exist does not in any way suggest that one system could not develop into the other; indeed, although compounded stems may often develop into affixes (a ready example is the development of *-less* in English), linguists have still found it useful to maintain the theoretical distinction between compounded stems and grammatical affixes.

2. A theoretical approach to reduplication

How enjoyable, how very enjoyable and luxurious it is, suddenly to emerge from the stern labyrinth of fact onto these dawn-lit uplands of surmise! Movement is free and the air is supernaturally bracing.

-Patrick Leigh Fermor, *Mani*

2.1. Previous theoretical approaches to reduplication

The purpose of this chapter is to discuss the theoretical implications of the historical tendencies described in Chapter 1. I will begin with a brief overview of the various approaches to reduplication that have been proposed recently. I will then describe cases which pose difficulties for the various theories; none of these approaches is without problems. Using the historical evidence to provide clues about the best way to treat reduplication theoretically, I will suggest a model of reduplication that both is capable of handling the various problematic cases described in this chapter and is also capable of capturing the historical generalizations described in Chapter 1.

2.1.1 The copy-and-association model

The first significant theoretical discussion of reduplication was Marantz (1982). In this article Marantz proposes adopting the approach of autosegmental morphology as outlined in McCarthy (1981) to provide a formal approach to reduplication. Marantz suggests that reduplication can be analyzed as the affixation of a skeletal morpheme (either a CV-skeleton, a syllabic skeleton, or a skeleton of morpheme symbols) to the root, complete copying of the phonemic melody of the root, and then

association of the melodic segments to the skeleton according to a number of general principles. The shape of the reduplicated skeleton accounts for the general shape of the reduplicated affix (e.g., whether reduplication is whole or partial; if partial, how much of the root it copies), since the copying of the phonemic melody is invariant.

Marantz proposes four general conditions to govern the way the melody links to the skeleton. The first condition is that feature complexes containing the feature [-syllabic] can only link to C slots in the skeleton, and complexes containing the feature [+syllabic] can only link to V slots. The second condition is that after as many phonemes as possible are linked to CV slots one-to-one, any stray phonemes or CV slots are discarded, so that there is no multiple attachment of phonemes to CV slots or of CV slots to phonemes. The third condition is that the slots in a CV skeleton may be preattached to distinctive features, which take precedence over features of any phonemes from the phonemic melody. The fourth condition has two parts: first, that linking either begins from the leftmost phoneme of the melody and proceeds from left to right or that it begins from the rightmost phoneme and proceeds from right to left, with the unmarked cases being prefixes which associate from left to right and suffixes which associate from right to left; second, that the association of phonemes and slots is 'phoneme-driven,' that is, that for each phoneme encountered moving from right to left or from left to right, the association procedure scans along the skeleton to find a slot eligible for association with the phoneme. In addition to these conditions, Marantz also adopts the standard autosegmental morphology principle that association lines don't cross. Marantz goes on to argue that apparent ordering paradoxes involving reduplication (for example, that in some instances the output of a phonological rule serves as the input to a morphological rule) can be resolved if reduplication is treated as a normal affixation process within a theory of cyclic phonology.

The paper has numerous strengths and weaknesses. Its major strength is the insight that autosegmental morphology provides a reasonable means of formalizing reduplication processes in a large number of languages. Within the autosegmental framework Marantz adopts, weaknesses are his use of both the feature [syllabic] and of the distinct slots C and V in the skeleton, and his use of the feature [long] to characterize vowel length.

A later article, McCarthy and Prince (1986), agrees with Marantz in its treatment of reduplication as affixation of underspecified material to a base followed by copying of the phonological melody and association of that melody to the underspecified affix. McCarthy and Prince differ, however, in their treatment of the underspecified affix: they argue that such affixes are organized in prosodic terms rather than in segmental terms, with basic facts about prosody placing constraints on the sort of templates allowed. As evidence for the importance of prosodic categories, they note that although many languages have counting rules which refer to prosodic categories such as syllables or feet, no language seems to have a rule which refers to the number of segments in a form. They further contrast prosodic morphology with segmental morphology by noting that many segmental rules (particularly reduplication rules) can only characterize the data in a given language by spelling out the longest possible template and then permitting some slots to go unfilled; a prosodic approach would simply specify a unit such as a syllable which could then be filled out in various ways. They make use of the prosodic categories 'prosodic word,' 'foot,' 'syllable,' 'light (monomoraic) syllable,' 'heavy (bimoraic) syllable,' and 'core syllable.' They then discuss a large number of cases of reduplication which can most readily be formulated in terms of prosodic units.

McCarthy and Prince have more points in common with Marantz than they have differences. Both approaches are alike in that they treat the reduplicative affix

as something which exists independent of the bases it is attached to; they are also alike in their treatment of copying and association. Because of these similarities, their overall approach has been called the 'copy-and-association' model. In contrast to this approach are two distinct models: the 'parafixation' approach seen in Clements (1985) and the 'complete copying approach' proposed by Steriade (1988).

2.1.2. Parafixing

Clements suggests that numerous inconsistencies in the Marantzian approach to reduplication would be resolved if reduplication is analyzed as a non-concatenative process rather than a concatenative one; that is, he suggests that reduplication involves adjoining an affix in parallel to the base rather than concatenating an affix as Marantz does. He compares this to McCarthy's use of separate tiers for different morphemes in his analysis of Arabic verbs, or to the parallel morphological affixation of tone seen in numerous African languages. Under Clements' approach, reduplication first: (1), adds an affix in parallel to the CV tier of the base; (2), associates Cs to Cs and Vs to Vs on adjacent tiers; (3) transfers the melody of the base to the associated portion of the affix; (4) sequences the skeleton to the base as either a prefix, an infix, or a suffix. The rules of association governing step (2) are the following: (a), link Vs to Vs pairwise in the direction of mapping, skipping no eligible V (with the condition that if V_j, V_k are adjacent elements of the affix, their associates a(V_j), a(V_k) are also adjacent elements; (b), link Cs to Cs pairwise in the direction of mapping, skipping no eligible Cs.

Clements notes that this analysis of reduplication allows him to operate without the need for the features [syllabic] and [long]. It also provides a formal way of describing reduplicative infixes. Furthermore, when higher-level units such as syllables or morphemes are affixed on the reduplicative tier, his analysis claims that

these units also transfer their lower-level structure from the base. This lets him avoid the problem of needing a theoretically unmotivated specification in, for example, Yidin^y, that open syllables in the base are copied as open syllables and closed syllables as closed syllables in the reduplicated affix; a flaw in Marantz's analysis was that he had no principled way to account for this generalization. Clements notes that, in general, his principle of melodic transfer rather than melodic copying allows him to account for a number of problems in the theory of reduplication which otherwise require separate and unmotivated mechanisms in the Marantzian approach.

Clements' approach has a number of problems; many of these have been discussed in Steriade (1988) and McCarthy and Prince (1986). One problem Steriade points to is the fact that Clements has no principled way to deal with discontinuous reduplication; that is, within the framework of his theory there is no way to explain why in Ilokano CVC-reduplication the base da.it shows the reduplicated form da-da.it rather than the form *dat-da.it, thus avoiding discontinuous association, while in Sanskrit the reduplicated form kan-krand- from the base krand- is possible, thus permitting discontinuous association. Steriade's framework explains the difference between the two languages by treating reduplication as full copying of the base followed by various conditions on the syllabic shape of the affix: thus the Sanskrit affix is created by not permitting complex syllable onsets and codas. The form *dat-da.it is thus impossible because the final -t is not part of the same syllable as the initial da-. Steriade notes that any approach to reduplication which treats the reduplicative affix as a sequence of slots to be filled is unable to predict the difference between the two languages.

McCarthy and Prince (1986:101) note that a second objection to Clements' theory lies in the fact that association and linearization are separate processes. The direction of association must be stipulated; at a later stage, the affix must be

linearized. As McCarthy and Prince note, if association and linearization are separated by other rules (as Clements allows), then something other than direction of association has to function to turn the parafix into a prefix or a suffix.

A further objection to the parafixing approach to reduplication is that it introduces a theoretical device which is without parallel elsewhere in the grammar. Clements tries to counter this objection by classing together African tonal affixes, Arabic verbal morphology, and reduplicative affixes as parafixes; he argues that they all share the property of being adjoined to the stem in parallel with it, rather than preceding it or following it. The flaw in his argument, however, is the fact that the first two examples of parafixes remain "parallel" to the stem on the surface as well as in the underlying representation; tonal affixes are realized simultaneously with the stem, and Arabic stems and affixes are "interwoven" to form an Arabic verb. Reduplicative systems, however, generally result in a prefix or suffix; in some cases they result in an infix, but the infix is always a continuous form. Even when the reduplicative affix is an infix, it is not "interwoven" with the stem the way Arabic consonantal stems and vocalic affixes are. The parafixing approach thus requires a theoretical device that is not used elsewhere in the grammar. Of course, this objection would not matter if it were impossible to account for reduplication in any other way; since various theoretical approaches have been proposed, however, it makes sense to prefer those that minimally complicate the grammar. Because of these and other objections to the parafixing approach, I will concentrate instead on the copy-and-association model of reduplication and the complete-copy model proposed by Steriade (1988).

2.1.3 Full copying and truncation

The approach outlined by Steriade (1988) differs sharply from the copy-and-association model. Steriade begins with the hypothesis that the transformations introduced by modified reduplication (that is, partial reduplication and reduplication with segmental change) stem from operations encountered in non-reduplicative morphology as well. She also hypothesizes that prespecified and partial reduplication are independent types. She cites cases of truncation in various languages in non-reduplicative contexts to support the claim that partial reduplication is essentially truncated full reduplication. She further claims that modified reduplication can in all cases be analyzed as the joint occurrence of base copying and one or both of truncation and segmental insertion; furthermore, she argues that base copying is always entire base copying. Separating the processes of copying and truncation and segment insertion permits other rules to be ordered between the different processes if the language requires it.

Steriade further claims that in the general case the syllabic position of a base segment is matched by that of the corresponding copy. She also argues that reduplicative templates should be analyzed as the combination of a weight condition (e.g., one light syllable) and a syllable markedness condition (e.g., no complex onsets). With these basic hypotheses she presents an analysis of Sanskrit intensive reduplication. The hypothesis that syllabic position of segments is maintained accounts for forms such as /kan-i-krand/, where both the onset and the rhyme of the base /krand/ are simplified; under standard left-to-right association models, it is difficult to account for the fact that the second segment of the base, /-r-/, is not attached to the next available C-slot, which is instead occupied by /-n-/. Under Steriade's analysis, the segments must maintain their syllabic position; to match the phonological melody to the base, both the onset and the rhyme of the base are simplified

according to certain principles. She analyzes Sanskrit perfect reduplication along similar lines; she does not discuss present reduplication, stating in a foot-note that present reduplication could be analyzed according to a spreading rule (!) rather than according to base copying.

A number of objections can be raised to Steriade's account of reduplication. One problem is that the mechanisms of truncation and insertion are inadequate to characterize reduplicative systems in which more than a segment or two are pre-specified; several such systems will be discussed in the following chapter. Similarly, systems in which the reduplicative affix maintains a certain fixed size (e.g., a heavy syllable or a bisyllabic foot) regardless of the shape of the base also present a problem; languages such as Mokilese, in which the requirement of a heavy syllable as prefix sometimes results in lengthening a copied short vowel, or Kinande, in which monosyllabic words are copied twice to make up the bisyllabic affix, can only be accounted for in an ad hoc fashion in Steriade's framework.

The differences between the full-copy model and the copy-and-association model have implications for the theory of morphology beyond the question of whether they can adequately characterize all systems of reduplication or not. In the copy-and-association model, the reduplicative affix has an existence independent of any of the bases to which it is affixed; this affix then initiates the process of reduplication when it is attached to a stem. The affix can be conceived of as a trigger¹⁶ for reduplication. In Steriade's framework, on the other hand, the reduplicative affix does not exist independent of the base; instead, a series of rules and parametric settings apply to the base to produce the affix. The affix can be conceived of as a target of reduplication. A consequence of this distinction is that it conceives of the way

¹⁶ The terms "trigger" and "target" were suggested by Mutaka and Hyman (1989).

speakers enter an item into the lexicon differently. In the copy-and-association model, the affix is a unitary entity in the same way that a root is an entity or that more garden-variety affixes are entities; the theory assumes that the native speaker of the language has a list of such entities¹⁷. In the complete-copy model, on the other hand, the reduplicative affix only exists as the result of applying a set of rules and parametric settings. These various mechanisms must somehow be marked as applying as a set; although, as Steriade (1988:76) notes in her discussion of Kaingang plural formation, in some cases segmental insertion rules apply to both reduplicative and non-reduplicative forms, it is also the case that in many languages (perhaps most), any segmental insertion rules required for reduplication will be required only for reduplication. If more than a single segment is prespecified, then a rule is required to insert each segment. As I shall argue in section 2.4.1, although such insertion rules are reasonable when only one or two are required, when several insertion rules are required to insert several segments into the reduplicative affix then the theoretical approach becomes unwieldy.

2.2. Problematic cases

In recent years, various researchers have pointed to a number of cases which present a problem for one theoretical approach or another. I will begin by describing a number of problematic cases which have been discussed in the literature. Next, I will describe a number of cases which have not previously been discussed. I will then relate these problematic cases to the historical tendencies outlined in Chapter 2 before suggesting a framework which will both encompass the problematic cases and also incorporate the historical data.

¹⁷ Different theories of morphology differ in the details of what an entry in such a list would be like; such differences are not important to this discussion, and so will be glossed over.

2.2.1. Cases which are problematic for the template-target approach.

2.2.1.1. Mokilese (Steriade 1988, Kiyomi and Davis 1991)

Mokilese uses reduplication to form the progressive verb. Examples are given below:

68. Mokilese (Steriade 1988, Kiyomi and Davis 1991)

simplex	reduplicated form	gloss
kas	kas-kaso	'throw'
wadek	wad-wadek	'read'
poki	pok-poki	'beat'
pa	paa-pa	'weave'
caak	caa-caak	'bend'
wia	wii-wia	'do'

As the data show, the reduplicative prefix is a heavy (or bimoraic) syllable. These forms can be very easily described in a copy-and-association framework, as the following derivation shows:

Derivation: copy-and-association model

Base: k a s o

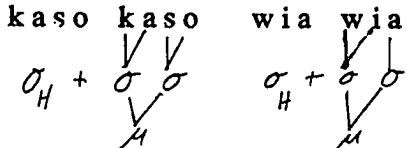


w i a

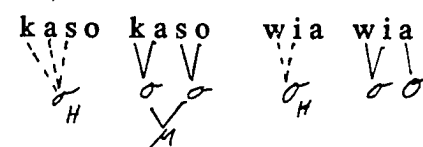


Affix: (heavy) σ_H

Affixation, copying melody: k a s o k a s o w i a w i a



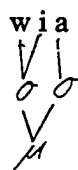
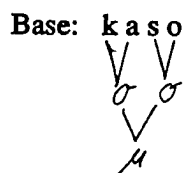
Association, deletion: k a s o k a s o w i a w i a



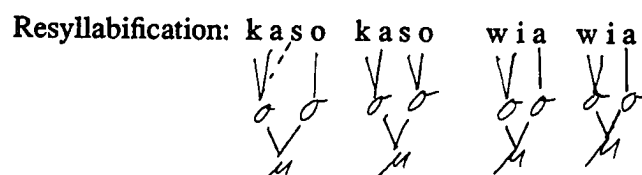
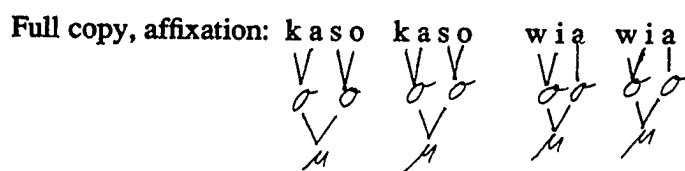
Output: k a s - k a s o w i i - w i a

The forms can also be handled in a full-copy framework. The following is a sample derivation:

Derivation: full-copy model

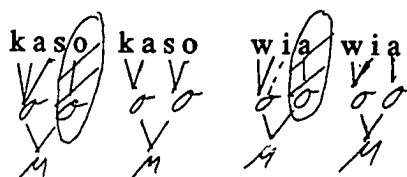


Affix: heavy syllable, left-to-right



Reassociation or

vowel lengthening, deletion:



Output: k a s - k a s o w i i - w i a

As the above derivation shows, in order to handle forms like *kas-kaso* in the full-copy model, a separate step of resyllabification has to be added to the derivation to account for the fact that the medial *-s-* is a syllable onset in the base but a syllable coda in the prefix; no such step is necessary in the copy-and-association model. As Kiyomi and Davis (1991:4) point out, there is no independent motivation for such a resyllabification; furthermore, the rule undoes the transfer effects which are central

to Steriade's theory.

2.2.1.2 Swati (Kiyomi and Davis 1991)

A second problematic case is found in Swati, a Bantu language. Swati uses reduplication with verbs to form a diminutive meaning 'to V a little.' The following are some forms:

69. Swati verbal reduplication

simplex	reduplicated	gloss
dlala	dlala-dlala	'play'
goba	goba-goba	'bend'
khuluma	khulu-khuluma	'talk'
lingisa	lingi-lingisa	'resemble'
akha	akha-y-akha	'build'
dla	dlayi-dla	'eat'
ma	mayi-ma	'stand'
mba	mbayi-mba	'dig'

Within the copy-and-association framework, these forms can be handled quite readily. The template is a bisyllabic prefix, and association proceeds from left to right. When the stem is monosyllabic, the process results in the second syllable being left unfilled, and the segment i and y are inserted, as in the forms mayi-ma and mbayi-mba; Kiyomi and Davis argue (1991:7) that these segments are the default consonant and vowel in the language, taking part in other phonological processes in Swati as well. Within the full-copy model, however, these forms present a slight problem. The reduplicated form based on a monosyllable would involve complete copying of the base, followed by i-insertion and y-insertion rules as part of the template matching procedure. The problem with this analysis is that it does not predict

which syllable of the affix will undergo the insertion rules: the form *yima-ma is theoretically possible as well. Note that relating the form mayi-ma to the direction of truncation seen in a form such as khulu-khuluma from khuluma 'talk' is impossible; although Steriade notes that the direction in which truncation proceeds must be specified for each language, such a rule cannot explain why a form which does not undergo truncation fills the syllable that it does.

2.2.1.3 Kinande (Mutaka and Hyman 1989)

The preceding two cases present data which can be handled in both frameworks but require additional stipulations which are not otherwise motivated. A more serious difficulty arises in Kinande (as Mutaka and Hyman note (1989:42), certain aspects of Kinande reduplication pose problems for the copy-and-association target; I will return to these aspects in the discussion of cases which are a problem for the copy-and-association model). Kinande exhibits both verbal and nominal reduplication. The reduplicative template is bisyllabic in both cases; with nouns, reduplication is suffixal, and with verbs it is prefixal. The following are some examples:

70 A. Reduplicated Kinande nouns

o.ku-gulu	'leg'	o.ku-gulu.gulu
o.mu-góngò	'back'	o.mu-góngo.góngò
a.ká-húkà	'insect'	a.ká-húkà.húkà

B. Reduplicated Kinande verbs

e-ri.hum-a	'to beat'	e-ri.hum-a.hum-a
e-ri.rim-a	'to cultivate'	e-ri.rim-a.lim-a
a-rĩ.tum-a	'to send'	e-rĩ.tum-a.tum-a

With nouns, reduplication adds the meaning 'a real X,' for example, 'a real leg.'

With verbs, it adds the meaning ‘quickly’ or ‘here and there,’ for example, ‘cultivate here and there.’

What is of particular interest for this discussion is the question of how the bisyllabic template is satisfied if the base¹⁸ is monosyllabic. The following are some examples of reduplicated monosyllabic nouns:

71 A. Reduplicated monosyllabic nouns

e.n-daa	‘belly’	e.n-da.n-da.n-daa
e.n-dee	‘cow’	e.n-de.n-de.n-dee
é.m-bwa	‘dog’	é.m-bwá.m-bwá.m-bwa
e.n-dwa	‘wedding’	e.n-dwa.n-dwa.n-dwa

The following reduplicated verbs are similar:

B. Reduplicated monosyllabic verbs

e-ri.sw-a	‘to grind’	e-ri.sw-a.sw-a.sw-a
e-rĩ.tw-a	‘to cut’	e-rĩ.tw-a.tw-a.tw-a
e-ri.ya-a	‘to go’	e-ri.ya-a.ya-a.ya-a

A prose description of the principle governing these forms is quite straightforward: if the base is monosyllabic, copy it twice to make up the bisyllabic affix.

The above forms can be handled quite easily in a copy-and-association model: after the initial copying and association, a syllable will still be left unspecified for phonological melody, and hence will trigger copying and association again. Mutaka and Hyman do not feel that these data present a problem for Steriade’s framework.

¹⁸ For nouns, the base includes the noun stem and prefix; if the prefix is simply a nasal consonant, it assimilates to the initial consonant of the stem and becomes part of the onset. For verbs, the base consists only of the stem (which in turn is comprised of the root plus, potentially, two suffixes and the final vowel morpheme).

Although they do not discuss the matter at length, they do assert,

It also appears that the two approaches are equally satisfactory in accounting for double reduplication of monosyllabic verb stems... In the template-[target] approach, as noted in (78b.ii), the first occurrence of the stem must be a foot of two syllables. Again, the melodic material of the monosyllabic stem fills both syllables. In either approach it will sometimes be necessary to stipulate the means by which a language will satisfy minimal length requirements such as this one, e.g. copying, spreading, default spelling and so forth. We thus conclude that double reduplication provides no argument for one approach over the other (1989:33).

Mutaka and Hyman thus feel that triggering a second reduplication to fill the bisyllabic template ought to pose no problem in either theory.

The difficulty, however, lies in the fact that Steriade insists that reduplication is completely separate from any matching procedures. She states,

It bears repeating that both the parameter settings listed above and the matching procedures associated with them are not specific to the reduplicative morphology and have no direct connection to it. Reduplication proper is just making a full copy of the base. Modified reduplication is full copy plus certain independent stem modifications, found in non-reduplicative morphologies as well (1988:84).

Within this framework, then, reduplication ought to be independent of any process of matching the form to the template, and matching procedures are supposed to be independent of reduplication. Treating reduplication as a matching procedure on a par with spreading or default spelling ought not to be a possibility in Steriade's framework. A case such as that seen here, in which reduplication is triggered by the matching process, presents a paradox. On theoretical grounds, whether a form is

copied once or twice ought to have nothing to do with how well the form fits the template. Clearly, however, the second process of reduplication is entirely determined by whether or not the form fits the template.

There are a number of possible ways of getting around this paradox. One is to state that certain monosyllabic stems are marked in the lexicon according to whether they are reduplicated once or twice. The problem with such an analysis, of course, is that it fails to capture the generalization that the reason some forms are reduplicated twice is so that they can make up a bisyllabic affix. A second way around the problem is to suggest that these doubly-reduplicated forms actually exhibit two different processes of reduplication. One process is morphological; it is responsible for initiating the process of reduplication in general. The second process is strictly phonological; it is responsible for satisfying minimal-length requirements, and is not governed by the same theoretical constraints that morphological reduplication is. Thus the second kind of reduplication could be triggered by the needs of the template even though the first kind cannot.

The second possible solution has a number of problems. The first problem is that the distinction Steriade draws between reduplication and matching procedures is fairly important to her theory; weakening it in the way suggested here sounds a little like suggesting that reduplication and matching procedures are entirely separate, except when they're not. The second problem lies in the assertion that processes are governed by different constraints depending on whether they're phonological or morphological; unless other processes which can be both phonological and morphological, such as gemination or vocalic alternation, can be shown to vary in a similar way, weakening the theory to handle such reduplicative cases is disturbingly ad hoc. Contrary to what Mutaka and Hyman state, the Kinande data present a real difficulty for Steriade's theory.

2.2.1.4 Bahnar (Banker 1964)

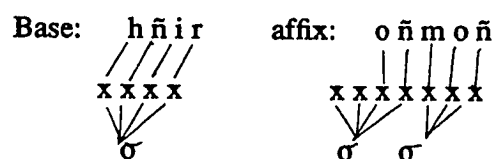
Languages in which the reduplicative affix contains a significant amount of prespecified material pose a problem for the full-copy model of reduplication. One such language is Bahnar, a Mon-Khmer language. Bahnar exhibits a number of reduplicative processes. One of the most intriguing of such processes is used to form distributives. The following are some examples:

72. Bahnar distributives

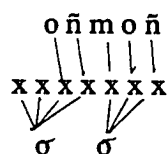
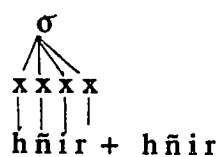
root	gloss	form	gloss
həñir	'to be sweaty'	həñir-həñoñ-moñ	'of each of many people to be sweaty'
təbul	'to sleep curled up'	təbul-təboñ-moñ	'each of many people to sleep curled up'
bəbrak	'noise of people talking'	bəbrak-bəbroñ-moñ	'noise of each group of many people talking'
bəb'lo	'to describe lazy person'	'bə'blo-'bə'bloñ-moñ	'to describe each of many lazy people'
səlu	'to describe evil-looking face'	səlu -səluoñ-moñ	'to describe each evil-looking face of many'

Within the copy--and-association model, these forms can be derived very easily. The affix is bisyllabic, association proceeds from left to right, and all but the onset position is prespecified. The following is a sample derivation¹⁹:

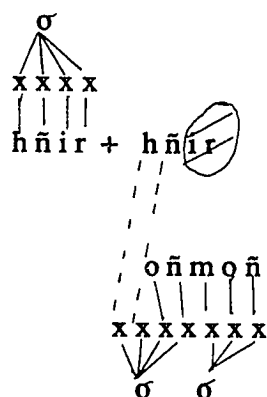
¹⁹ Since the internal structure of the syllable is not important to this discussion, I have simplified the representation so that the syllable structure is flat.



Affixation, melody copying:



Association, deletion:



Output: $h \tilde{n} i r - h \tilde{n} o \tilde{n} m o \tilde{n}$

Schwa insertion: $h \tilde{a} \tilde{n} i r - h \tilde{a} \tilde{n} o \tilde{n} m o \tilde{n}$

Now consider the problem involved in deriving such a form in the full-copy model. Reduplication must always proceed via complete copying; any prespecified segments must be inserted via rule. In the case of the Bahnar forms, the insertion rules run into a snag: the reduplicative affix has two syllables but the base only has one. Steriade specifically prohibits (1988:78) any insertion rule which would result in the generation of a new syllable, so inserting the entire affix into the copied base is impossible on theory-internal grounds as well as being intuitively unsatisfying. The most reasonable alternative would be to treat the final syllable -moñ as a separate affix which obligatorily co-occurs with this kind of reduplication. Then a syllable such as -hñoñ- could be generated via complete copy and insertion. The problem with such an analysis is that it is motivated by nothing other than theory-internal concerns. The syllable -moñ- always occurs with this particular kind of reduplication, and nowhere else in the language; no motivation exists for treating it as a separate affix.

2.2.1.5. Agta (Healey 1960)

The Phillipine language Agta is well-known in the literature on reduplication because of its famous plurals taktakki 'legs' and uffuffu 'thighs.' The language exhibits another reduplicative process which is used to form diminutives. Diminutive formation involves prefixing Cala- to the base; that is, the initial consonant is copied and prefixed along with the sequence -ala-. The following are some examples:

73. Agta (Healey (1960:6))

simplex	gloss	reduplicated form	gloss
wer	'creek'	wala-wer	'small creek'
talobag	'beetle'	tala-tálobag	'lady-bird'
bág	'G-string'	bala-bág	'small g-string'
pirák	'money'	pala-pirák	'a little money'

This reduplicative process in Agta, though less dramatic than the Bahnar process discussed in the preceding section, presents the same problems for the full-copy theory. The forms wer 'creek' and bág 'g-string,' though monosyllabic, nevertheless take the bisyllabic prefixes wala- and bala-. The prefixes simply cannot be derived by inserting segments into the existing root wer and bág, nor is there any motivation for treating the sequence -ala- as anything other than part of the reduplicative prefix. Once again, the quantity of prespecified material is such that the system can only be handled in the copy-and-association model.

2.2.2. Cases which are problematic for the copy-and-association model

In the preceding section I discussed a number of cases which pose problems for the complete-copy approach to reduplication. In this section I will describe a number of cases which present problems for the copy-and-association model.

2.2.2.1 Sanskrit intensive reduplication (Steriade 1988, Kiyomi and Davis 1991)

Steriade analyzes Sanskrit intensive reduplication as involving a heavy monosyllabic prefix; in addition to this weight parameter, various syllable markedness parameters apply to simplify any initial clusters and to remove any non-sonorant codas. These parameters, when applied to a root such as krand-, result in the intensive form /kan-krand/ (ultimately kan-i-krand-).

As Steriade notes (1988:84-5), the existence of an affix of the form CVX (a heavy monosyllable with a simple onset) is predictable in the framework of her theory: it results from the intersection of the parameter governing weight and the parameter governing onsets. Steriade's theory thus allows a larger class of reduplicative templates, since the set will be created by combining the various parameters in all possible ways. She contrasts this with the set of templates allowed by McCarthy and Prince (1986). As she notes, since McCarthy and Prince view templates as atomic entities, the list of allowable templates can be expanded or contracted at will; no principles govern the shape of the possible templates. In Steriade's framework, on the other hand, templates will always be the result of applying the various parametric settings to a complete copy of the base.

If Steriade's theory genuinely can predict the shape of all possible reduplicative templates, then in this respect the theory is preferable to the copy-and-association model. On the other hand, it remains an empirical question whether or not the results predicted by her theory correspond with the attested data. At this point her claims have not been subjected to a thorough, rigorous test against real-world data. Although the full-copy model potentially is superior to the copy-and-association model in this particular respect, its superiority has not been conclusively demonstrated yet.

2.2.2.2 Chinese fanqie languages²¹ (Bao 1990, Yip 1982)

As Yip (1982) first pointed out, many of the Chinese secret language games known as fanqie language can be neatly handled if they are viewed as a kind of reduplication. Bao (1990) describes a number of such games; he finds that certain

²¹ Note that since tones are irrelevant to this analysis, they are not marked.

aspects of the game are difficult to describe in the copy-and-association model but can be handled quite readily in the full-copy model. One such game is known as the May-ka game²². The rules of the game are very simple: (1), reduplicate the syllable; (2), replace the rhyme of the first syllable with -ay; (3), replace the initial onset of the second syllable with k-. The following are some sample forms:

74. May-ka forms

morpheme	game form	gloss
ma	may-ka	'mother'
pən	pay-kən	'book'
taw	tay-kaw	'path'

As Bao notes, the above forms can be generated quite readily in either the copy-and-association model or the complete-copy model. In the copy-and-association model, the first syllable of a May-ka form is a template with the rhyme prespecified as -ay, and the second syllable is a template with the onset prespecified as k-. The melody is copied twice and then associated with the templates. In the full-copy model, on the other hand, the entire syllable is copied; subsequently, the segments ay are inserted into the first syllable and the segment k is inserted into the second syllable. Both models work equally well.

A problem arises, however, in cases where the syllable-initial segment is a glide. One might predict two possibilities: either the initial k- of the second syllable will replace the initial glide, or the glide plus the k will form a complex onset; note that the initial clusters ky- and kw- are both common in other forms. In fact, with the glide y the second possibility is realized, and with the glide w the first possibility.

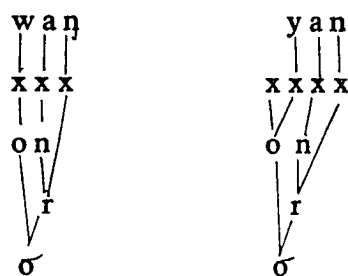
²² The various versions of the game are named according to their treatment of the syllable ma. Thus, the May-ka game turns ma into may-ka.

The following are examples:

75. May-ka forms

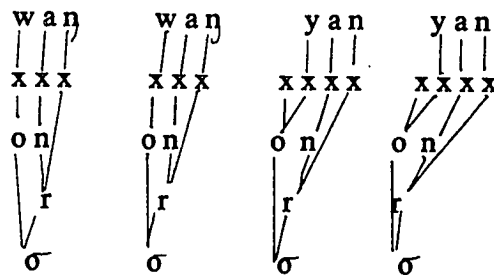
morpheme	game form	gloss
yan	yay-kyan	'sun' NOT yay-kan
waŋ	way-kaŋ	'curved' NOT way-kwaŋ

Bao suggests that these forms can be accounted for if we assume that syllables with initial *y* actually have the initial onset position unfilled, with the segment *y* associated with the second slot. Syllables with initial *w*, on the other hand, have the *w* associated with the initial onset position. The following are the structures he proposes for the above morphemes:

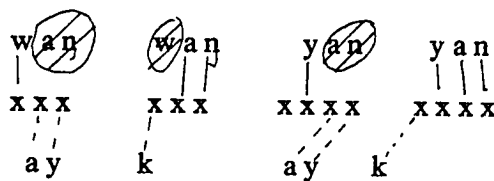


Bao cites a number of points as evidence for the initial unfilled onset slot for syllables beginning with y. For example, a glottal stop can freely precede initial y but not initial w; Bao argues from this observation that w is itself an initial consonant but y is not.

The next step is complete copying:



Next, insertion rules apply. In the case of the syllable with initial y, when the segment k is inserted it fills the empty initial slot; in the case of the syllable with initial w, however, the insertion rule results in the w being disassociated from the syllable, as the following diagrams show:

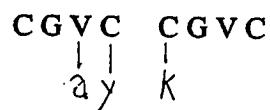


Output: way-kan

yay-kyan

Thus, in the full-copy model the differing behaviors of initial y and initial w stem from the syllable structure of the morphemes involved.

In the copy-and-association model, on the other hand, the above forms present a problem. As the form yay-kyan shows, the skeleton for the May-ka game must have the following structure:



When the glide position in the syllable onset is unfilled, it simply is deleted: hence forms such as tay-kaw from taw 'path.' The problem with this analysis is explaining why the form *way-kwan is impossible. If only the melody of a form such as

waŋ is copied, then the w ought to be able to associated with the glide position of the second template, just as the glide y can. Bao concludes that the full-copy model of reduplication is preferable because it is able to capture the difference between yay-kyan and way-kaŋ.

2.2.2.3. Kinande (Mutaka and Hyman 1989)

I discussed Kinande reduplication in the last section because it offered data which was problematic in the full-copy model of reduplication. Different aspects of the same reduplicative processes present problems for the copy-and-association model as well.

The main difficulty lies in the reduplicative behavior of verb stems. Early in the paper, Mutaka and Hyman propose that a constraint called the Morpheme Integrity Constraint must be operating in Kinande. This constraint asserts that '[m]apping of a melody to a reduplicative template takes place by morpheme. If the whole of a morpheme cannot be successfully mapped into the bisyllabic template, then none of the morpheme can be mapped' (1987:12). The effect of this constraint is to prevent noun stems of more than two syllables from reduplicating. With verb stems, however, reduplication and the Morpheme Integrity Constraint interact in a more complex way. For some verbs with polysyllabic stems, such as e-rĩ.bugul-a 'to find' and e-ri.huhuman-a 'to be sad,' reduplication is simply blocked: the stems bugul-a and huhuman-a are simply too long to be reduplicated and mapped to a bisyllabic template. If, however, the polysyllabic stem can be analyzed as having accessible morpheme breaks within the complex root, then reduplication can occur: examples are e-rĩ.lender-a, e-rĩ.lend-a.lender-a 'to walk' and e-rĩ.banguk-a, e-rĩbang-a.banguk-a 'to jump about.' Mutaka and Hyman suggest (1989:37) that these roots can be analyzed as -bang-uk- and -lend-er-, even though the simplex

-bang- and -lend- do not occur. Since reduplication thus successfully maps all of the putative morphemes -bang- and -land- to the reduplicative template, morpheme integrity is not violated.

The real difficulty stems from the behavior of certain other polysyllabic stems. Mutaka and Hyman note that forms such as e-ri.binul-a 'to change' and e-ri.guluk-a 'to fly' do not reduplicate with a bisyllabic template, but instead exhibit total reduplication: e-ri.bindul-a.bindul-a and e-ri.guluk-a.guluk-a. Such forms make up approximately 50% of the data. Mutaka and Hyman note that suggesting a separate reduplicative process to handle these forms would be an unfortunate solution, since it would not capture the fact that the semantic value of the reduplication is the same. Instead, they suggest that a full-copy model of reduplication would better account for these forms. They suggest the following analysis for verbs: (1), prefix a copy of the entire verb stem; (2) delete all but the first two syllabic nodes in the prefixed copy. Forms such as e-ri.guluk-a.guluk-a could be generated by marking the verb base as not undergoing the truncation rule given as step (2). The advantage of such an approach is that it captures the generalization that the reduplicative process is the same for both stems with the bisyllabic affix and stems with the polysyllabic affix. In general it is a flaw of the copy-and-association model that in any situation in which the reduplicative affix differs significantly for some group of forms, the model must posit separate templates and separate processes of reduplication. Tarok, the language discussed in the next section, offers a dramatic example of such a system.

2.2.2.4. Tarok (Robinson 1976, Sibomana 1980-81)

Tarok is a Benue-Congo language spoken in Nigeria. The reduplicative process found in Tarok is quite startling because of its semantic value: it marks third person singular possession. The following are some examples²³:

²³ Note that the forms are cited with their noun-class prefixes. These prefixes play no part in the reduplicative process.

76. Tarok reduplication

A. Monosyllabic roots

simple noun	possessive	gloss
ì-cù	ì-cù-cu	'voice'
ṁ-byàl	ṁbì-byal	'breast'
a-wó	a-wú-wo	'hand'
a-lúr	a-lú-lur	'nose'
a-cì	a-ci-ci	'eye'
ì-gyel	ì-gi-gyel	'chin'
ṁ-bwày	ṁ-bù-bwày	'money'

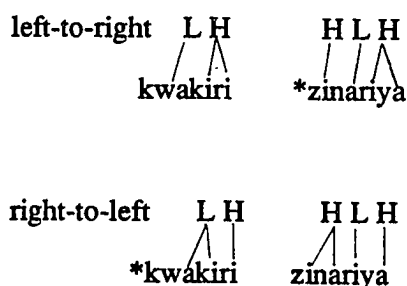
B. Polysyllabic roots

simple noun	possessive	gloss
a-fini	a-fini-fini	'yarn'
a-górò	a-górò-goro	'cola-nut'
ì-gisàr	ì-gisàr-gisar	'broom'
a-rǽjìyá	a-rǽjìyá-rìjìya OR a-rǽjìyá-jìya	'spring'
a-dànkálì	a-dànkálì-dankali OR a-dànkálì-kali	'potato'

As the data above show, the reduplicative process seems to be quite different for monosyllabic roots and polysyllabic roots. Monosyllabic roots appear to exhibit prefixal reduplication; the prefix seems to consist of a single open syllable, with the feature [+high] prespecified. Polysyllabic roots, on the other hand, appear to have suffixal reduplication; the second half of the form has mid tone, with the first half of the form showing lexical tone. Note that with polysyllabic roots an optional

truncation rule applies to forms of more than two syllables, resulting in a bisyllabic suffix.

The analysis of reduplicated monosyllabic roots, however, is complicated by their tonal behavior. As the forms above show, with reduplicated forms it seems that lexical tone is realized on the prefix; the base, in contrast, receives a default mid tone. Many different analyses of these forms are possible. One could suggest, for example, that tones are underlyingly not associated with their roots; reduplication occurs before association, and association proceeds from left to right. The result of this process is that lexical tone is associated with the part of the form that is leftmost: the prefix in monosyllabic forms and the base in polysyllabic forms. The problem with this analysis is that the tonal patterns seen in Tarok nouns force tone to be treated as pre-linked: the pair i-kwàkírí 'turtle' (or i-kwàkiri; Sibomana gives both forms in different places) and a-zínáriyá 'gold' would each require spreading in a different direction if tone were not pre-linked, as the following diagram shows:

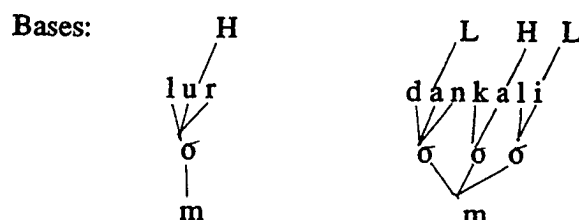


It is thus impossible to analyze nominal tone in any other way than pre-linked.

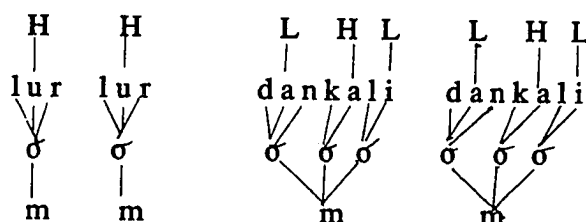
In the copy-and-association model of reduplication, reduplicative affixes as different as those seen in monosyllabic and polysyllabic forms must be handled separately. For monosyllabic forms, the template is a light syllable with a preassociated [+high] vowel which is prefixed to the base; for polysyllabic forms, the template is the complete stem (or, alternatively, a bisyllabic template) which is suffixed

to the form. Association proceeds in one direction for the prefixal forms and in the other direction for the suffixal forms. The conventions of the copy-and-association model require us to posit quite different processes of reduplication for the two groups, missing the generalization that the semantic values of the two processes are identical. A preferable analysis would be one which treated the two forms as variations of one reduplicative process.

The full-copy model provides a framework to do just that. The following forms are underlying representations of the bases:



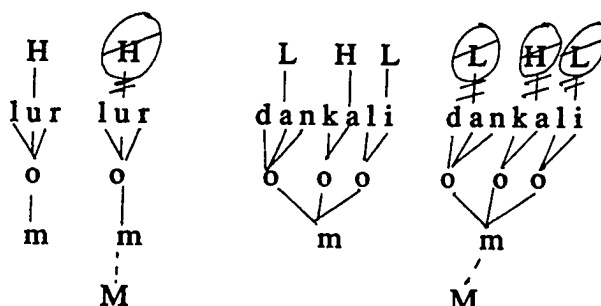
Reduplication proceeds via full copying:



Next, a rule of tone insertion inserts mid tone²⁴ into the right-most morpheme,

²⁴ In this analysis, it is easiest to treat mid tone as a definite tone, rather than treating it as a default tone. Nothing in Tarok suggests that mid tone should be analyzed differently from high or low tone. It is possible to reformulate this analysis so that instead of inserting a mid tone, the grammar first delinks the lexical tones of the rightmost morpheme, followed by later insertion of a default mid tone. As far as I can tell, nothing is gained by adopting such an analysis.

resulting in delinking and deletion of the lexical tones:



The next steps are truncation of any syllable-final consonants in the leftmost half of the monosyllabic form and insertion of the value [+high] into the same syllable. An optional truncation rule can apply to the rightmost half of the polysyllabic form. The output: a-lú-lur 'his/her nose' and a-dànkàlì-kali 'his/her potato.'

As the preceding derivation shows, the full-copy model is superior to the copy-and-association model in a number of respects. First, it handles variants such as a-dànkàlì-kali or a-dànkàlì-dankali 'his/her potato' as part of the same reduplicative process; within the copy-and-association model, on the other hand, two different reduplicative rules with two different reduplicative templates would be required. Second, it handles monosyllabic reduplication and polysyllabic reduplication as part of the same process; again, the copy-and-association model must treat them separately. Third, the full-copy model allows us to treat the tonal behavior of the forms as a single process; the copy-and-association model misses the generalization that in both monosyllabic and polysyllabic reduplicated forms only the left part of the form shows lexical tone. An additional bonus is the fact that the full-copy derivation probably gives a good picture of the historical path that lead to such a strange situation; while synchrony need not recapitulate diachrony, it is a point in favor of a given analysis if it is reasonable both historically and synchronically.

The Tarok example brings up a point which, to my knowledge, has not previously been commented on: since reduplication in the full-copy model completely copies all information about a stem, then modifying processes which are specific to reduplication ought to be able to apply to either half of the form. In the full-copy model of reduplication, it is theoretically possible to specify a template for either half of the form or for both. The copy-and-association model requires us to clearly identify one part of a reduplicated form as the affix and one part as the base. In the full-copy model, on the other hand, both parts of the form start out on a par. It is true that in many cases, any modifications which affect a form all concentrate on one side of the form or on the other. A number of cases exist, however, in which the reduplicative process modifies both halves of the forms. One of these cases is Tarok. A second such case is found in Hausa.

2.2.2.5. Hausa (Newman 1989)

Hausa exhibits a number of reduplicative processes. In some of these processes, tone is copied along with segmental material, so that each half of the form exhibits the same tonal pattern as the base. Examples are wátàa-wátàa 'monthly' from wátàa 'month,' bìyáǎ-bìyáǎ 'five each' from bìyáǎ 'five,' and sálóo-sálóo 'different styles' from sálóo.

In other processes, however, the tonal pattern of the reduplicated form is different from that of the base. Newman notes (1989:251) that in one of these processes, lexical tone is replaced by a tonal pattern H-L, with the first half of the form exhibiting high tone and the second half low tone. The forms are primarily adjectival qualifiers, often with an implied plural meaning²⁵. The following are

²⁵ Newman does not always cite a corresponding simplex for each of the reduplicated forms he cites. In the cases where he does cite an unreduplicated form corresponding to a reduplicated

some examples:

77 A. Hausa reduplicated forms

simplex	gloss	reduplicated form	gloss
càkwàlfi	'slush'	càkwál-càkwál	'slushy'
jǐnfi	'blood'	jǐnáa-jìnàa	'bloody'
fàbèenfiyáa	'dangling'	fàbée-fàbèe	'pendulous (breasts)'
		kǐrǐ-kirìi	'brazenly'
		tsámóo-tsàmòo	'dripping wet'

Another reduplicative process involves the tonal pattern L-H; Newman states that these words describe distinctive kinds of actions. The following are examples:

B. Hausa reduplicated forms

reduplicated form	gloss
bàga—bágáa	'floundering'
càkàa-cákáa	'chattering noisily'
mùtsùu-mútsúu	'fidgeting'
wàtsàl-wátsál	'squirming'

Newman characterizes these kinds of reduplication as involving the prespecification of the tone of each half of the form. He notes that the way the tones are realized on these reduplicated forms differs from the normal Hausa pattern of tone spreading; the prespecified tones spread only across one half of the form, producing a form such as tsámóo-tsàmòo 'dripping wet' rather than *tsámóotsámòo, which would be the result of the normal Hausa rules of tone spreading.

form, I give both the reduplicated and the unreduplicated forms.

Newman does not explicitly discuss how these groups would be formalized in the various theoretical approaches to reduplication, but it is clear that the copy-and-association model runs into difficulties. The main problem lies in the fact that the tonal pattern of the reduplicated form is specified over the entire form. In the copy-and-association model, this could be handled in a number of different ways, none of them satisfactory. For example, the reduplicative affix could have a prespecified tone attached to the template; a later rule would then insert the second tone into the base. The problem with such an analysis is that it misses the generalization that the overall tonal pattern of the form is as much a part of the creation of the form as the reduplication is. Furthermore, treating the tone of the base so differently from the tone of the affix is unsatisfying. A second possible approach would be to insert the tones of both halves via a rule applied subsequent to reduplication; reduplication itself would only copy the phonological melody, leaving the tone of the affix unspecified. The advantage of this approach is that it captures the fact that the tonal pattern of the entire form is significant. The disadvantage is that such a rule is posited as a separate process from reduplication, even though the tonal pattern and reduplication together make up the form. A second disadvantage, in theory-internal terms, is the fact that prespecified material could now be obtained in two ways: through preassociation and through insertion.

In the full-copy model of reduplication, on the other hand, the forms could be generated very easily. All material of the base would be copied, including tone; the result would be two identical morphemes, side-by-side. A template would be specified for each half of the form. The tone of each of the two halves would be inserted as part of the process of matching the form to the template. The full-copy model captures the intuitive and historically correct generalization that monosyllabic and polysyllabic reduplication originate in the same process of reduplication.

2.2.3. Summary

It is possible to make some general observations concerning the cases which present a problem for one theoretical framework or another. The cases which have been shown to be problematic for the full-copy model of reduplication are all cases in which, to some degree or another, the reduplicative affix has a shape independent of the particular stem to which it is attached. In Mokilese, the reduplicative prefix must always be a heavy syllable, regardless of the syllabic structure of the base; the reduplicative process consists of doing whatever is necessary with the copied material to make up a heavy syllable. In Swati, the prefix must be bisyllabic; if the material copied from the base is insufficient to fill up a bisyllabic template, then default segments are inserted to take up the slack. In Kinande, both nominal and verbal affixes must be at least bisyllabic; if the copied material is insufficient to fill up the template, then the form is copied again. In Bahnar, the reduplicative suffix always has the shape Coñmoñ; the shape of the suffix is dependent on the base only to the extent of copying the initial consonant cluster.

In contrast, the cases that present a problem for the copy-and-association model are more of a mixed bag. The reason that Sanskrit intensive reduplication presents a problem for the copy-and-association model is because the shape of the affix is difficult to explain on the basis of an underspecified affix and universal principles of association; on the other hand, it is easy to explain on the basis of the syllable structure of the base. Similarly, the structure of the forms found in the Chinese language games Bao (1990) discusses are difficult to motivate as an affix and association principles, but are easy to explain when the structure of the base is the starting point. Kinande presents problems for the copy-and-association model because the size of the affix varies according to the size of the base to which it is affixed; in many cases, if the base is longer than two syllables, then the affix also is longer than two

syllables. Tarok presents a problem for the copy-and-association model because the process of reduplication forces a choice between prefix and suffix before copying occurs; the full-copy model, on the other hand, offers the possibility of treating reduplication as a single process for monosyllabic and polysyllabic stems.

In general, the primary difference between cases that work best in the copy-and-association model and cases that work best in the full-copy model is the degree of phonological independence from the base exhibited by the affix; that is, affixes which maintain some constant phonological feature across forms work better in the copy-and-association model than they do in the full-copy model. This fact can be related to the historical tendency described in Chapter 1: through time, reduplicative systems tend to become more and more independent of the specific stem to which they are attached, developing prespecified segments and a more invariant shape. This tendency suggests a resolution to the current theoretical debate concerning the appropriate way to characterize reduplication: systems develop from a model best characterized by the full-copying approach to a model best characterized by the copy-and-association model. The reason that different systems vary as to which theoretical model best characterizes them is that the various systems are at different points on a grammaticization continuum.

Comparing the historical behavior of reduplication to the historical behavior of other grammatical affixes will make my claims clearer. It has long been known that one of the most common sources of derivational morphology is compounding; that is, the process of grammaticization results in a form which was originally part of a compound word developing into a grammatical affix. Bybee (1985:106) cites a well-known example of this development:

There is a diachronic relation between compounding and derivational morphology, in that one element of a compound may become a derivational affix if it

occurs in a large number of combinations. For instance, the Modern English adjective and adverb-forming suffix -ly, as found in friendly, manly, kingly, and so on, developed from an earlier compound similar to the modern compounds with like, such as child-like, god-like, and phantom-like.

A point that Bybee does not discuss, but which is important to the discussion at hand, is the fact that when a word develops into a derivational affix via compounding, the free word may continue to exist as well; the development of an affix results in a split between the affix and the original word. The example of -ly is a good one in this respect: both the word like and the affix -ly ultimately come from the same source, the Old English form līc 'form, body'; in one case, the word developed into the affix -ly, and, via the unattested form *gelfc, in the other case into the word like. The Modern English compounds based on like that Bybee cites show the process starting again. This split is the result of various processes of grammaticization; at the semantic level, the meaning of the form broadens; at the phonological level, developments such as loss of stress, phonological erosion, and tighter coalescence with the root have been observed (Lehmann 1985, for example). The various effects of grammaticization have the result of creating an affix which exists independent of the word which was its original source.

The same historical processes are involved in the development of reduplicative systems; certain aspects of the development, however, are specific to reduplication. A discussion of the semantic developments of reduplication in such systems is beyond the scope of this thesis, and so I shall concentrate on the phonological developments. At the earliest stage of reduplication, the process essentially consists of conjoining two words; we can conceive of reduplication at this stage as a kind of compounding, with the proviso that both halves of the compound must be the same root. Eventually, phonological erosion will apply to reduce part of the form; the

formation may still be a compound, but it no longer exhibits two complete versions of the base. At this stage one of the versions of the base in a form may have started to develop an identity of its own; it can be distinguished as being different from the word it originated from. It can be defined according to the ways in which it differs from any of the roots in the language; for example, it may be limited to a bisyllabic foot or to a monosyllable. In non-reduplicative morphology, the difference between the initial formation and this second stage is comparable to the difference between the English word *man* in compounds where it has secondary stress versus where it is unstressed: maɪlmən compared to póstman (at least in my dialect). It is still possible to relate the unstressed -man seen in postman to the independent root man, and to generate it via destressing, but the unstressed form is on its way to status as an affix rather than as part of a compound.

The tendency in reduplicative affixes to reduce variation across forms will eventually result in one part of the reduplicated form being less dependent on the base for its phonological structure; instead, it begins to acquire a prespecified shape and prespecified phonological material. The combined effects of these processes will be that the reduplicative affix will begin to be much more independent of the roots of the language; rather than being defined according to how the affix differs from the roots of the language, it will begin to be defined in terms of its own constant properties. The reduplicative affix behaves much more like an affix at this stage and less like a root. In non-reduplicative morphology, this development can be compared to the split between -ly and like in English; although the affix is clearly related to the word *like* historically, synchronically the affix has a separate entry in the lexicon. No one would attempt to avoid listing the affix by having rules apply to reduce like to -ly in appropriate formations; at this stage the affix clearly has an existence independent of the root it is historically derived from.

These different historical stages can be related to the two models of reduplication discussed in this chapter. At the earlier stages of grammaticization, the reduplicative affix is closely dependent on the root; to the extent that the affix differs from the root, those differences are characterized as modifications of the root rather than as special properties of the affix. This stage closely resembles the complete-copy model of reduplication: the affix starts out as an identical version of the base, and is modified in certain limited ways. At a later stage of grammaticization, however, the affix has a separate identity of its own. It no longer can be defined in terms of modifications of the base; instead, it is largely defined in terms of its own constant properties. This stage of reduplication resembles the copy-and-association model of reduplication: the affix has a fixed form of its own and only relies on the base for a limited amount of material.

The model of reduplication I am suggesting here offers a way of accounting for the fact that each of the two models has difficulty in handling some cases of reduplication. The full-copy model works best in characterizing systems at the earlier stages of grammaticization, when the affix is best defined in terms of modifications to the base. At the later stages of grammaticization, the copy-and-association model works best because it captures the fact that the reduplicative affix has its own inherent structure. It is important to note that at both the earlier stage of grammaticization and at the later stage reduplication is 'partial'; the discussion in this dissertation suggests that the traditional division of reduplicative systems into total and partial reduplication is not fine-grained enough to characterize the various stages of grammaticization.

It is also important to note that arguing for the existence of a continuum of grammaticization does not imply the claim that every reduplicative system will inexorably march along the continuum; instead, the claim is that if a system does develop

historically, then it will develop in the direction described in this chapter. A corollary of this is that it is not possible to determine where along the continuum a given system falls simply by determining the age of the system. As is commonly the case with historical change, some languages seem to be quite stable and to change very slowly while other languages seem to be quite volatile and change very quickly. A further important point to note is that the vast majority of reduplicative systems will probably fall somewhere in the middle of this continuum, and could be readily characterized by either of the two theoretical models of reduplication; it is only a minority of systems which will be close to one extreme or another and hence will clearly work best in one model or another.

The following diagram illustrates the various stages of grammaticization:

78. Stages of grammaticization

- i. Stage 1: $X > XX$
- ii. Stage 2: $X > X^1 X \text{ or } X X^1$
- iii. Stage 3: $X > x X \text{ or } X x$
- iv. Stage 4: gemination ?

Note that the development from Stage 3 to Stage 4 is attested in two languages: Trukese, a Micronesian language discussed in Goodenough (1963), and Sahaptin, cited in Chapter 1. Goodenough notes that Trukese uses initial gemination to mark a number of grammatical categories. He compares the language to Gilbertese, a closely related language, and finds a number of cognate forms which show initial gemination in Trukese but initial CV reduplication in Gilbertese; Goodenough concludes that the initial geminates arose through phonological weakening of the initial

reduplication. Similarly, Sahaptin exhibits geminate initial consonants in forms which correspond to Nez Perce forms with initial CV-reduplication; clearly the Sahaptin forms are the result of phonological weakening of the initial reduplicative prefix.

The remainder of this chapter will be devoted to discussing some of the ramifications of the model of reduplication I posit. One consequence of this model is that systems of partial reduplication should exist in which the boundary between the reduplicative affix and the base is a word boundary rather than a morpheme boundary. Such systems represent the conjunction of two stems rather than that of a stem and an affix. Several such systems have been described in the literature.

2.3. Compounding reduplication

Several languages have been described in which reduplication involves conjoining two stems rather than a stem and an affix. One such language is Turkish.

2.3.1. Turkish (Dobrovolsky 1987)

Turkish uses reduplication to form intensive adjectives. The following are some examples:

79. Turkish intensive adjectives

root	reduplicated form	gloss
kara	kapkara	'black'
temiz	tertemiz	'clean'
belli	besbelli	'obvious'
beyaz	bembeyaz	'white'
açık	apaçık	'open'

The reduplicative process consists of copying and prefixing the initial CV- of the root and adding an additional consonant between the prefix and the root (henceforth C2). The consonant is one of the four segments m, r, p, or s, and is, to a large degree, unpredictable. Dobrovolsky notes that when vowel-initial stems are reduplicated, C2 is invariably p; other than this, however, C2 cannot be predicted.

It is possible, however, to find a motivation for the presence of C2 in general. Dobrovolsky considers various explanations for the consonant, including the possibility that it is the result of epenthesis. He rejects this final possibility on the grounds that the consonant simply does not behave the way epenthetic consonants in other languages do: it is not homorganic to an adjacent sonorant, and it is not predictable. A more reasonable explanation, Dobrovolsky suggests, lies in the fact that Turkish monosyllables for the most part must end in a consonant. A monosyllable of the form *CV is prohibited; a few exceptions exist, but the number is extremely small. Dobrovolsky suggests that if the boundary between the reduplicated prefix and the root were, in fact, a word boundary, then this would motivate the presence of a C2; he notes as well that treating these forms as compounds would explain the existence of a seemingly prefixal form in an overwhelmingly suffixal language.

The second piece of evidence Dobrovolsky cites to support this analysis of intensive adjectives is the stress pattern they exhibit. The reduplicated forms exhibit primary stress on the reduplicative prefix, with the former primary stress on the stem reduced to secondary stress: kará, kápkarà, temĩz, tértemiz. Dobrovolsky notes that in general, Turkish stress alternates from level to level between right-end-stress and left-end-stress; thus at the word level the rightmost edge of the word receives stress, at the compound level the leftmost edge receives stress, and at the syntactic level the rightmost edge of a construction receives stress. If the reduplicative prefix were genuinely a prefix, one would expect the stress rule to stress the rightmost edge of the word. Several pieces of evidence thus indicate that the Turkish reduplicated forms should be analyzed as compounds rather than as a stem and affix.

2.3.2. Diyari (Poser 1989)

Another language which exhibits reduplication which seems to be the conjunction of two stems rather than the conjunction of a stem and an affix is Diyari, an Australian language. In Diyari, reduplication copies and prefixes the first two syllables of a stem; the second syllable, however, is always open. The following are some examples:

80. Diyari

simplex	reduplicated form	gloss
ɖaka	ɖakaɖaka	'to pierce'
wakari	wakawakari	'to break'
kanku	kankukanku	'boy'
nankanti	nankanankanti	'catfish'

Poser notes (1989:132) that it is difficult to characterize the reduplicative template, since the first syllable can be either open or closed but the second syllable must

always be open. He suggests, however, that the affix should be characterized as a bisyllabic foot; the behavior of the second syllable of the foot can be explained if the boundary between prefix and base is a word boundary rather than a morpheme boundary, since closed syllables with short vowels are not permitted word-finally. Poser notes that Austin (1981:30) previously argued for the existence of a word boundary rather than a morpheme boundary in these forms because of their stress pattern: both components of the reduplicated forms bear primary stress. This stress pattern is confirmed by the fact that the vowel in the first syllable and the vowel in the third syllable (i.e., V_1 in prefix and base) exhibit the allophones found in syllables bearing primary stress. Thus positing a word boundary rather than a morpheme boundary between the two pieces of the reduplicated form finds support from a number of sources.

McCarthy and Prince (1986:32,35) note that several of the reduplicative systems they discuss exhibit a word-boundary rather than a morpheme boundary. They do not discuss the consequences of their observation; however, they seem to relate such systems to the use of the minimal word as a reduplicative affix (this point will be discussed further in section 2.5.2). The mechanism they use to derive such forms is straightforward: the reduplicative affix contains the prosodic element $W_{\min}$ at the level above the foot. The affix is attached to the base, and copying and association proceed normally. The question they do not address is whether or not it is reasonable to treat compound reduplication as the same as affixal reduplication. The benefit of doing so, of course, is that the theory seems to handle all instances of reduplication with the same theoretical devices. Since, however, we have seen cases which require a full-copy model of reduplication, it is clear that the copy-and-association model cannot handle all cases anyway, so the benefit of using copy-and-association mechanisms to handle cases of reduplicative compounding is at best very

slight. The disadvantage of using the same mechanism to handle affixal reduplication and compound reduplication is that it ignores the fact that, in general, compounds behave differently from non-compounds. The distinction between roots and affixes is firmly entrenched in morphology with good reason - morphological process treat them differently. Blurring that distinction in the case of reduplication offers dubious benefits at best.

It is interesting to compare compound reduplication in the copy-and-association model and in the full-copy model. Neither McCarthy and Prince nor Steriade explicitly discuss the behavior of reduplicative compounds in their theory, but a few general remarks can be made. In the full-copy model, since the process of reduplication produces two identical stems anyway, treating the boundary between the two as a word-level boundary is unproblematic; the conjunction of two stems simply results in a compound, as must be the case in the formation of non-reduplicative compounds as well. McCarthy and Prince imply (1986:31) that cases of reduplication which involve an affix consisting of a minimal word are in fact compounds. They discuss the Diyari data described above, and conclude,

From our observations about Diyari prosody, we conclude that the reduplicative affix in this language is just the minimal phonological word, $W_{\min}$. Everything follows from this. We must reduplicate two syllables, because the minimal phonological word is a trochaic foot. The second syllable of the reduplication must be open, because it immediately precedes a phonological word juncture.

Their treatment of minimal word affixes has a number of flaws; I will discuss these in more detail in section 2.4.2. Their analysis makes the strong prediction that all cases of reduplication which exhibit a word boundary rather than a morpheme boundary should also have affixes which constitute a minimal word, since that is the only reduplicative template which will result in a phonological word juncture between

affix and base. The claim would be disproved if one of the cases of compound reduplication could be shown to involve an affix which is not a minimal word; to my knowledge, however, no such cases have been described. At this point my objections to their treatment of compound reduplication stem from general principles rather than from empirical evidence.

2.4. Other consequences of this approach

The treatment of reduplication argued for here, in which the full-copy model is appropriate to characterize forms at an earlier stage of grammaticization and the copy-and-association model is appropriate for later stages, raises a number of questions. The main question is whether there is any principled way of determining whether a given reduplicative system ought to be characterized by the full-copy model or the copy-and-association model. As I suggested earlier, many systems will be equally analyzable under one model or another. It is possible, however, to point to several guidelines which can determine whether the full-copy model or the copy-and-association model ought to be invoked.

2.4.1. Prespecified segments

One issue is the problem of how to handle prespecified segments. In the earlier stages of grammaticization, it makes sense to think of such segments as the result of an insertion rule; such a rule amounts to starting with a root and modifying it as part of the process of compound formation. In this respect it is very similar to a rule in English destressing -man in certain compounds. As the form becomes more affixal, however, prespecified segments are preassociated with the reduplicative template: the extreme example of this situation is the Bahnar distributive suffix-Cofimofñ. At some point inserting segments via rule is less preferable than treating segments as

pre-linked to a template. The question is how to determine what that point is.

Intuitively, it makes sense to say that the number of segments which can be inserted by rule for a given affix should be limited in some way. Steriade's suggestion that inserted segments have to find their place in a pre-existing syllable is one limitation: the number of syllables cannot be increased via insertion rules. A second reasonable constraint is that a certain percentage of the reduplicative affix must be material copied from the base in order for insertion rules to apply. It is impossible to formulate the percentage precisely: certainly the Bahnar distributive suffix contains too much prespecified material for insertion to be an option, but aside from pointing to the extreme case I can be no more precise than that.

Although the distinction between the two treatments of segmental insertion seems at first glance to be without parallel in other theoretical treatments of morphology and phonology, in fact the same kind of distinction is implicitly invoked in a number of places. Consider, for example, the theoretical treatment of languages which use vocalic variation to express morphological information. At one extreme lie ablaut systems, such as that seen in English sing - sang - sung. As Halle and Mohanan (1985) note, such ablaut can readily be handled via feature insertion: the past tense of sing is derived by inserting the feature [+low] into the matrix of the root vowel, resulting in sang. Steriade (1988:77), in fact, refers to the treatment of ablaut in Halle and Mohanan (1985) as formally identical to the treatment of prespecified segments in reduplication.

At the other extreme lies the treatment of vocalic variation in a system such as Arabic verbal morphology, as developed in McCarthy (1981). Arabic also uses vocalic variation to express morphological information: compare katab 'write (active)' with kutib 'write (passive).' In this case, however, the vocalic variation involves several segments rather than just one. McCarthy expresses this

generalization by positing morphemes consisting of the vowels used to convey a particular grammatical meaning and then proposing that those morphemes are mapped onto a template. One could, of course, characterize Arabic verbal morphology as a set of feature insertion rules, with various rules applying to generate a given form. Such an approach, however, does not capture the intuitive generalization that if a consistent meaning is associated with a consistent phonetic realization, then speakers are likely to acquire a lexical entry consisting of the phonetic sequence and its grammatical value. The templatic approach to Arabic morphology captures this generalization nicely.

When we compare the treatment of English ablaut with the treatment of Arabic morphology, it is clear that the main difference between the two systems is the amount of the vocalic material in question. When a single vowel varies, as is the case in English ablaut, characterizing that variation in terms of insertion rules is quite reasonable: most of the form remains constant, and a single segment varies in easy-to-characterize ways. When several vowels vary to express morphological information, on the other hand, a large percentage of the form changes as a result, and insertion rules are less reasonable as a way of characterizing the variation. The two systems lie at two extremes of vocalic variation; one can conceive of a system midway between English and Arabic which could be characterized either way. The theoretical treatment of vocalic variation in the literature implicitly assumes the sort of distinction I am arguing for with respect to reduplicative systems.

2.4.2. Minimal word constraints

Another guideline to determine cases when a full-copy model is more appropriate than a copy-and-association model concerns languages in which a minimal-word constraint seems to apply to reduplicative affixes as well as to lexical words.

McCarthy and Prince (1986) cite a number of such cases²⁶; I will argue, however, that their characterization of the minimal-word affix has a number of problems which vanish if such cases are handled in a full-copy model. One language they cite (1986:31) is Diyari, discussed in section 2.3. As mentioned earlier, Diyari reduplication is used to create a word-level compound; McCarthy and Prince note also that all phonological words contain at least two syllables. They conclude that the reduplicative prefix is simply the minimal word.

A second language McCarthy and Prince cite (1986:32-34) is Lardil, an Australian language. Lardil exhibits a minimal-word constraint of two morae, which is realized in a number of ways in the grammar. If a word underlyingly is monomoraic and occurs in uninflected form, a rule adds a final morphologically empty -a to prevent the surface form of the word from violating the minimal-word constraint. The following forms illustrate this constraint in action:

81. Lardil (McCarthy and Prince 1986:32-3)

underlying	uninflected	accusative	gloss
/peer/	peer	peerin	'ti-tree sp.'
/maan/	maan	maanin	'spear gen.'
/kela/	kela	kelan	'beach'
/wik/	wika	wikin	'shade'
/wun/	wunta	wunin	'rain'

²⁶ McCarthy and Prince do not consistently demonstrate for each language they discuss that a minimal word constraint is in force elsewhere in the language; instead, they seem to treat any instance of a bisyllabic or bimoraic foot as affix as a minimal word. The examples I cite here are only those for which they demonstrate a minimal word constraint in the language as a whole.

Similarly, a rule of final-vowel truncation is blocked from applying to any form of less than three morae; the motivation is clearly to prevent the rule from producing forms whose size is below the minimal-word constraint.

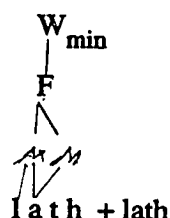
The reduplicative prefix obeys this constraint as well. The affix is bimoraic; when the base is also at least bimoraic, reduplication simply copies the first two syllables. When the base is monomoraic, however, the syllable²⁷ is copied and the vowel is lengthened to make up the required two morae. The following are some examples:

82. Lardil reduplicated forms (McCarthy and Prince 1986:33)

underlying	simple	reduplicated	gloss
/keleth/	kele	kele-kele	'cut'
/kelith/	keli	keli-keli	'jump'
/parelith/	pareli	parel-parel	'gather'
/lath/	latha	laa-la	'spear'
/neth/	netha	nee-ne	'strike'

McCarthy and Prince derive forms such as laa-la by positing a prefix of the following form:

²⁷ I am leaving out a number of details which are irrelevant to this analysis concerning the absence or presence of syllable-final consonants in the reduplicative prefix.



The *a* of the base spreads to fill both of the morae, resulting in the form *laa-la*.

McCarthy and Prince are undoubtedly correct in relating the behavior of the reduplicative affix to the minimal-word constraint seen elsewhere in the language. What is less clear is whether their formalization of this constraint is correct. McCarthy and Prince treat $W_{\min}$ as a prosodic constituent on a par with the foot, the syllable, and the phonological word; they compare the minimal word with the core syllable, CV. The objection to this analysis is the fact that the minimal word is unique in the way it interacts with phonological processes. As the Lardil data cited above demonstrate, the minimal word constraint can both trigger processes and block processes. No other prosodic element behaves in this way. In the case of the reduplicative prefix, the minimal word constraint is responsible for triggering a process of vowel lengthening if the base is too short; the minimal word constraint ought to trigger the process of lengthening just as it triggers or blocks other processes.

The disadvantages of treating minimal-word constraints as they apply to reduplicative affixes as McCarthy and Prince do become clearer in their treatment of reduplication in Yidin^y. Yidin^y is an Australian language which also has a minimal-word constraint: the minimal word is the bisyllabic foot. Yidin^y reduplication prefixes a bisyllabic foot to the base. What is particularly interesting about the process is the presence or absence of syllable-final consonants in the second syllable of the foot. The following are some forms:

83. Yidin^y reduplication (McCarthy and Prince 1986:35)

simple	reduplicated	gloss
mulari	mula-mulari	'initiated man'
kintalpa	kintal-kintalpa	'lizard sp.'
kalamparaa	kala-kalamparra	'March fly'

Note that the second form, kintal-kintalpa, copies the syllable-final -l- of the base. Neither mula-mulari nor kala-kalamparra, on the other hand, exhibits a syllable-final consonant in the prefix. In this context it is significant to note that the sequence -mp-, seen in the word kalamparaa, is tautosyllabic: the prenasalized stop forms the onset of the following syllable. A non-theoretical statement of the reduplicative pattern is thus straightforward: the prefix copies all and only the material in the first two syllables of the base.

The problem in the copy-and-association model is how to achieve this effect, given that the only thing copied in reduplication is the segmental melody. After copying, nothing distinguishes the -r- which is in the third syllable of the base mulari, from the -l- which is in the second syllable of the base kintalpa, from the -m- which is in the third syllable of the base kalamparra. McCarthy and Prince get around this difficulty by treating the prosodic constituent $W_{\min}$ as the base for reduplication rather than the entire word. Thus, the first foot of the base (that is, the first two syllables) is designated the minimal word. The copying operation only copies the material in this prosodic constituent and then associates the material with the reduplicative affix. Since only the first two syllables of the base are copied, the only syllable-final consonant available to associate with the affix is -l- seen in kintalpa.

The main objection to this analysis lies in the fact that the action of designating the first two syllables as a minimal word and then only copying the material in those

syllables duplicates the process of associating the melody to the affix. That is, two syllables are copied and then associated with an affix of two syllables. Permitting an analysis such as this means that nothing in the theory prevents other prosodic constituents from behaving in the same way. Consider a hypothetical language in which the reduplicative prefix is a CV syllable. Within the theory, it is now possible to analyze such reduplication in two different ways. One way is the standard copy-and-association analysis: prefix a core syllable as affix, copy the melody, and associate it with the affix, deleting any unassociated material. Another analysis is to prefix a core syllable as affix, copy the melody in the initial core syllable, and then associate it with the prefix. No unassociated material needs to be deleted, because no such material was copied. It is a flaw in the theory that it permits both of these analyses. Empowering the theory enough to side-step the normal constraints of the copy-and-association model in this way permits the theory too much power.

The Yidin^y data can be handled quite easily in the full-copy model of reduplication: completely copy the base, then truncate all but the first two syllables. Furthermore, the full-copy model of reduplication permits a much more natural characterization of the minimal-word constraint: the minimal-word constraint applies to all stems in the language, including the stem copied in reduplication. However that constraint applies in the grammar as a whole, it also applies in reduplicative processes; although the precise realization of the constraint may differ with respect to reduplication, its application does not. This approach allows a more unitary treatment of minimal-word constraints; in McCarthy and Prince's framework, the constraint shows up in reduplication as an affixal template, and must show up elsewhere in the grammar as well.

Considered in light of the grammaticization of reduplication I have outlined in this dissertation, it is not surprising that instances of minimal-word constraints

affecting reduplicated forms would fall toward the less-grammaticized end of the spectrum. At this stage, reduplicated forms still behave largely like compound forms rather than like a stem and an affix. It is to be expected, then, that the full-copy approach would better characterize the behavior of such forms than would the copy-and-association approach.

2.4.3. Truncation

The theoretical approach suggested here, with the copy-and-association model and the full-copy model applying at different poles of grammaticization, raises the question of how to characterize truncation. Both McCarthy and Prince (1986) and Steriade (1988) try to make do with only one possible kind of truncation process. In McCarthy and Prince's framework, truncation is just association of a melody to a template followed by deletion of any unassociated material; they use this mechanism to account for reduplicative shortening, but also to account for truncation seen in nicknames and compounds. In Steriade's framework, on the other hand, shortening is always deletion, either of some number of syllables or of segments within the syllable. In most cases the end result of the two different approaches to truncation will be identical. Examining the optional truncation rule in Tarok, however, suggests a problem with the template-association approach to truncation.

As was mentioned in section 2.2.2.4, in Tarok polysyllabic nouns undergo total reduplication to form the third singular possessive: a-rĩjiyá-rĩjiya, 'his/her spring,' a-dànkálì-dankali, 'his/her potato.' Optionally, the reduplicative affix may be truncated to two syllables: a-rĩjiyá-jiya, a-dànkálì-kali. The question to consider is how to handle such an optional rule. In the full-copy model the variation presents no problem; we can simply formulate a rule deleting all but the last two syllables of the affix, and have it apply after reduplication. In the copy-and-association model,

on the other hand, the situation is more difficult. We have to formulate two different reduplicative templates, one consisting of the whole stem and the other consisting of two syllables; to go along with the two different templates, we have to formulate two different processes of reduplication. Having two separate reduplicative processes is dissatisfying because both the longer and shorter versions of the forms are clearly examples of the same reduplicative process. A further problem is the question of how the bisyllabic template would be acquired by a language which had previously only reduplicated the entire stem. Speakers would have to spontaneously develop the shorter template and the reduplicative process to go with it; it is hard to see what would motivate them to do such a thing. We could posit the bisyllabic template as a universal, inherent part of grammar, but such a solution seems a bit drastic. Overall, the full-copy model handles this sort of variable shortening much more readily than does the copy-and-association model.

If it is not possible to eliminate a truncation rule which chops off syllables, is it possible to do away with McCarthy and Prince's kind of truncation? That is, is it possible to follow Steriade in always analyzing truncation as deletion of syllables or segments in a syllable? The answer is less clear, but I believe the answer is negative. Consider the Bahnar data discussed in section 2.2.1.4, which involve copying the initial onset of the base and associating it with a suffix of the form Coñmoñ. I argued earlier that it is not possible to derive the prespecified segments of the affix via insertion; rather, they must be preassociated with a template with the initial onset unspecified. In order to fill the initial onset position, the reduplicative process must copy the phonological melody of the base and associate it to the template. Following association, something has to get rid of the unassociated material left from the copied melody; the convention of deleting any material which is not prosodically licensed is a standard way of dealing with such a situation. Thus this mechanism of

deleting any unassociated material is also necessary to the grammar.

B. Reduplication in Indo-European

The previous two chapters have looked at reduplication across as large a number of languages as possible in an effort to discover patterns of development. The next three chapters will look at particular instances of reduplication in depth. There are several reasons for focussing so closely on a particular language family. The first reason is that looking at Indo-European reduplication in a typological context offers new insights on the behavior of these systems. The observation that reduplicative affixes tend to develop prespecified vowels but not to start copying vowels calls into question previous assumptions about what perfect reduplication looked like in the proto-language and how it developed in the daughter languages. Similarly, understanding how reduplicative systems tend to develop makes it more possible to relate Hittite reduplication to the rest of Indo-European.

Another reason for focussing closely on particular systems is because a given morphological system rarely develops in a vacuum; instead, other historical developments in the language affect how any particular morphological system changes through time. This is particularly clear in the discussion of Indo-European present reduplication. In Chapter 5 I present evidence that present reduplication spread through Sanskrit and Greek primarily in response to the loss of laryngeal segments in root-final position. The spread of present reduplication can only be understood in light of how the rest of the language was changing.

The survey of languages presented in the first chapter made me acutely aware of how superficial a treatment any one language could receive in such a framework, either by me or by other researchers discussing reduplication. This is another reason why a close examination of a particular language family is useful: it offers a chance to observe the tendencies mentioned in Chapter 1 at a minute level. It is the case that broad systematic developments look very different close up; compare the

different impressions of sound change offered by the Neo-grammarians and by Labov. Both kinds of data are necessary to understand how systems develop; Gulliver's perception of the Brobdignagians was as real as their own perceptions of themselves.

3.0 Anatolian reduplication

The purpose of this chapter is to consider the relationship between Anatolian reduplication and Indo-European reduplication. By and large, the attitude of most scholars has been to treat an Anatolian form as exemplifying one of the kinds of Indo-European reduplication if the reduplications have similar semantic values; to date no rigorous, systematic comparison has been made. The Anatolian picture is complicated, however, by the fact that many of the forms connected semantically with Indo-European reduplication have shown semantic values which are commonly associated with reduplication cross-linguistically, such as intensiveness, raising the possibility that the Anatolian forms arose independently. A second complicating factor is the fact that several of the non-Indo-European languages spoken in the region also show reduplication, raising the possibility that Anatolian acquired reduplication through contact.

I will address the question of how Anatolian reduplication relates to Indo-European reduplication in several ways. First, I will briefly survey the examples of reduplication found in the non-Indo-European languages spoken in Anatolia. Second, I will discuss the etymologies available for the roots actually found reduplicated; though an Indo-European pedigree for a given root is no guarantee that the process of reduplication itself was not borrowed, it does suggest that a particular root could not have been borrowed in its reduplicated form. Clearly, the more reduplicated roots found which have Indo-European ancestries, the less likely it is that reduplication was borrowed. Third, I will compare the formal properties of the Anatolian forms with the properties of Indo-European forms, considering such characteristics as the sort of reduplicating affix seen and the affixes associated with a given reduplicated stem. This formal comparison is useful for several reasons. First, to the extent that formal properties are independent of semantic values, formal comparison

partially sidesteps the problem of possible polygenesis of reduplication. Second, the extent to which reduplication in these languages is entrenched in the morphological system will be reflected by the systematicity of its formal behavior; if reduplication is still just a sporadic process, then its morphological behavior would not be expected to show much systematicity.

3.0 Neighboring languages

3.1.1 Akkadian reduplication

One of the best-known languages in contact with Hittite was the Semitic language Akkadian. Akkadian exhibited nominal reduplication fairly extensively; von Soden (1952:71) notes that a fair number of roots with four and five radical consonants can clearly be identified as the result of reduplication. The following are some of the examples he cites:

84. Akkadian reduplicated nouns

form	gloss	form	gloss
kakkabun	'star'	qaqqadum	'head'
^v š ^v š ^v arum	'saw'	pappasu	'mush'
^v š ^v š ^v aṣu	'joint illness'	lallaru	'yelling priest'
kakkabtu	'star symbol'	rabrabtu	'famine'
kikkisum	'reed hut'	kimkimu	'wrist'
lillidum	'pubescent animal'	sissiktum	'garment hem'
sussulum	'trough'	kukkupu	'kind of water vessel'
būbūtum	'hunger'	kankannu	'fermentation vat'
pappallu	'vine'	dandannu	'high and mighty'
kaš ^v kaš ^v sum	'all-powerful'	kamkammatum	'arm ring'
halhallatum	'a kind of flute'	sissinum	'date panicle'
birbirrū	'brightness'	gulgullum	'skull'
^v š ^v ur ^v surru	'a copper vessel'	hurhuratu	'dark red paste'
babbanū	'very good'	malmališ ^v	'in equal division'
puhpuhhū	'battle snort'		

Von Soden notes that in a number of these examples the medial geminate consonant is the result of assimilation of the second consonant to the third consonant: kakkabun 'star' from *kabkabun²⁷. He also notes that the assimilatory process seen here is broader than that seen elsewhere.

²⁷ It is extremely interesting to note that this assimilation results in the development of 'root-and-pattern' morphology (see McCarthy 1981 for a discussion of Arabic) for these forms; a form such as kakkabun could be reanalyzed as the result of spreading a root which is underlyingly biconsonantal (/kḥ/) to fit a CV-skeleton to derive the attested form. These cases suggest one route by which such morphology can develop. It is important to note, however, that Akkadian already exhibited such root-and-pattern morphology elsewhere in the grammar; possibly this lent analogic force to the development seen here.

In contrast to the nominal reduplication described above, Akkadian exhibits little or no verbal reduplication. Its influence on Hittite verbal reduplication would thus seem likely to be slight. As I will argue in section 3.3.3, however, Hittite verbal reduplicated stems which also take the suffix **-ye-* are, at least in origin, denominational verbs; hence, the influence of the Akkadian reduplicated nouns on Hittite must be discussed more fully. I will return to this point in section 3.3.3.

3.1.2 Sumerian reduplication

In contrast to Akkadian, in Sumerian reduplication is wide-spread; Sumerian exhibits nominal, adjectival, and verb reduplication. Nouns are reduplicated to express the notion of totality: e.g., *diġir-diġir*²⁸ 'all the gods.' The probable semantic value of reduplicated adjectives is superlative (Thomsen 1984:65). In both cases reduplication is total; most often this is expressed by writing the logograph twice. Although it is possible that some words were present in the writing system in already-reduplicated form, and hence entered Hittite via the written language, it is highly unlikely that such minimal contact could have influenced Hittite in any significant way.

Sumerian exhibits two kinds of verbal reduplication: partial²⁹ and total. The partial reduplication is used to create the so-called *marû* stem of approximately 25%

²⁸ The exact value of the character usually transcribed as *ġ* is subject to some debate; the likeliest possibility is that it represented a velar nasal (Thomsen 1984:44). All Sumerian forms are cited in the standard romanization; note that in many cases the exact phonetic value of the phonemes is subject to debate.

²⁹ Note that in the majority of cases reduplication is indicated by writing the ideograph in question twice; hence, in most cases partial and total reduplication are orthographically identical. Enough phonetic spellings exist, however, for most scholars to agree that one kind of reduplication seems to render the root in fuller form than the other kind. In both cases, the two versions of the stem seem to be identical; that is, in partial reduplication the stem is first shortened and then copied.

of Sumerian verbs. The semantic value of this stem is subject to a great deal of debate. Thomsen (1984:118-121) summarizes the various scholarly proposals concerning the marû stem, and concludes that the marû stem denotes 'actions the completion of which has not yet taken place, without specifying whether the action has already started or is to start in the future' (1984:121). In contrast, the basic, or hamtu, stem, expresses 'statements of universal validity, ...states and results of actions, or actions which have been completed' (1984:120).

Total reduplication is possible with all verbs and is primarily used to express plural subjects of intransitive and plural objects of transitive verbs. It has also been suggested that such reduplication in some cases might express iterativity or intensivity, but Thomsen notes (1984:126) that it is difficult to verify such uses because they are based on subjective interpretations of the texts.

It is unlikely that Sumerian verbal reduplication had any significant influence on Hittite reduplication. The system of distinguishing marû and hamtu forms is so different from the Hittite verbal system that it is highly unlikely that there could be any systematic influence by the reduplicated marû forms, though it is of course possible that individual reduplicated lexical items could be borrowed into the language ready-made via the writing system. Similarly, the semantic value of totally-reduplicated forms is quite distinct from any of the kinds of reduplication seen in the Hittite verbal system, although if iterativity and intensivity really are possible values for Sumerian reduplicated verbs, then it is barely possible that such forms had an influence on Hittite. Given that such values are at best uncertain in Sumerian, and given that the other Indo-European languages offer evidence that reduplication in Proto-Indo-European probably expressed such values, it is most likely that any Hittite reduplicated stems which express iterativity or intensivity are probably inherited. It thus seems unlikely that Sumerian reduplication had any systematic influence on

Hittite reduplication, in spite of the fact that reduplication is common in Sumerian.

3.2. Anatolian etymologies³⁰

As a starting point, I will list the forms as cited in van Brock (1964:120-22). I will then discuss the etymologies of those roots for which such discussion is possible, in some cases modifying van Brock's analysis of a form in light of subsequent scholarship³¹. Although the etymologies of many of the forms are still uncertain, it is apparent that a sizeable fraction of the forms are descended from Indo-European roots.

Limiting this discussion to the forms listed by van Brock is to some degree artificial, since scholarship subsequent to her article has turned up more reduplicated stems; ideally I would gather all the reduplicated stems listed anywhere, and discuss their etymologies. Again, time constraints must prevent me from giving more than a preliminary treatment to this topic. A further difficulty is the lack of a complete etymological dictionary of Hittite; I have been forced to make use of several different etymological sources, some of which (such as Kronasser 1966) have been shown by subsequent scholarship to be less than entirely reliable. I make heavy use of Oettinger; it is useful to repeat at this point Watkin's caveat (1983:474) that the etymologies in Oettinger are rather unreliable. Similarly, I sometimes cite Pokorny as an etymological source, even though many of his etymologies have been modified or disproven by subsequent scholarship. In general, I will cite what I consider to be the most reasonable analysis of a form; if only one analysis has been proposed, that

³⁰ Note that the Hittite data will be cited using the graphemes *s* and *h* rather than *š* and *h*. I will use the symbol *š* only when the language in question distinguishes a palatal fricative from a dental fricative.

³¹ Note that many of the cases van Brock analyzed as Luvian are now classed as Hittite. When current scholarship analyzes a form as Luvian I will treat it as such.

is the one I will cite, making clear any difficulties with the etymology I can see. At the very least, making some guess as to what percentage of van Brock's forms come from Proto-Indo-European gives a rough estimate of what percentage of reduplicated forms in the language as a whole have Indo-European etymologies, since van Brock's article provides a representative sampling.

In a number of cases it is impossible to provide any cognates in other Indo-European languages, but the forms in question exhibit Indo-European ablaut variation. Those cases I will tentatively classify as Indo-European roots as well, even though the evidence for such classification is less strong than for roots with cognate forms. Other reduplicated forms also lack clear etymologies, but are clearly derived from unreduplicated Anatolian verbs; although the simplex forms may not be of Indo-European provenance, the transparent morphology of the reduplicated stems suggests that they were created via already-productive patterns in the language, rather than being the result of borrowing. Such roots are neutral with respect to the question of the sources of verbal reduplication, since they clearly were created via already-existing patterns. I will thus factor them out of the analysis.

The stem le-lhuwa- 'libate'³², unreduplicated lahhu(wai-), is connected by Pokorny³³ to the root related to the root *lewh₃- 'wash.'

The stem memai- 'say' is cognate with the Luvian stem ma-mmana- 'say.' Oettinger (1979:486) notes that the Hittite form could be based on a plural stem *me-mn-, which would regularly give mem-; the Luvian form, he notes, is clearly derived from a stem *me-mon-. The form seems to be descended from the Indo-European root *men- 'think'.

³² Unless otherwise specified, Hittite and Luvian roots are from van Brock (1964:120-22).

³³ Page references to Pokorny are given after roots when appropriate. The reconstructions are cited in currently-accepted notation.

No clear etymology for tethai- 'thunder' is apparent.

As van Brock's discussion of we-wakk- suggests, the root is of Indo-European origin: the Indo-European root *uek- 'wish'.

The stem la-lukkai-, unreduplicated lukk(ai-), is descended from the root *leuk- 'light' (P687).

The stem nanna- 'turn,' unreduplicated nai-/neya-, is descended from *nei-. The stem niniya- 'move (oneself)' is descended from the same root.

The form pappars- 'sprinkle with water,' is a descendent of *pers-, also meaning 'sprinkle.'

The stem pappas- 'swallow' is found in the form pappasala 'esophagus.' Van Brock suggests (1964:139) that the noun is based on an iterative stem meaning 'eat without stopping.' Kronasser (1966:119) takes the form as an example of baby-talk reduplication, citing numerous other words for body parts which also show reduplication. Kronasser's analysis seems the most reasonable; thus I will not consider the form as an example of verbal reduplication.

The etymology of paprai- 'soil oneself' is unclear. Watkins (1973:79) analyzes the form as a denominative in -ē. Oettinger (1979:282) rejects this analysis, since the Hittite form is never written with scriptio plena. Given the uncertainties of the writing system, Oettinger's objection is not sufficient to reject an otherwise-reasonable etymology.

The etymology of tattalus- is not apparent.

I can find no etymology for the form tattarai- 'wipe.' The form looks semantically be connected with the root *terh_x- 'rub, turn' cited by Watkins (1985:70); the problem with this analysis is that the Hittite form shows no sign of the final laryngeal in the Indo-European root.

The stem wa-wars- 'strip off' is found in a participle wawarsant-; it is based on the root wars-. Oettinger (1979:429) connects this root with Latin verre 'wipe' and Old Church Slavic vřěti 'thresh.'

The Luvian stem la-lai- 'take' is analyzed by Oettinger (1979:501,569) as related to the root lā- 'let.'

No etymology can be cited for either lalinai- or for nana-.

The stem pa-pparkuwai- 'clean' is analyzed by Watkins (1973:81) and Oettinger (1979:334) as a denominative verb based on the adjective parkui- 'pure.' Their analysis seems reasonable.

The stem pa-ppasai- 'plant, erect' is discussed by Oettinger (1979:327). He rejects a connection between this Hittite form and Greek pósthē 'penis,' preferring to connect the Greek form with the Hittite root pes- 'rub.' He suggests, however, that a connection between the Hittite form and Latin postis, Greek parastás 'post,' and Sanskrit past-yà- 'permanent dwelling' is possible.

I can find no etymology for pa-pra- 'hunt.'

The form sasarla- 'sacrifice something' is attested in Hieroglyphic Luvian and is clearly related to the Hittite root sarla- 'extoll, sacrifice.' I can find no etymology for the form.

The meanings and etymologies of sasla- and tatta- are unknown.

Van Brock cites the form tatariya- 'curse.' The reduplicated form is clearly related to the Hittite verb darie- 'call'; Oettinger (1979:346) suggests that this root derives from the Indo-European root *d^her- 'hold fast,' also connecting the form with Hittite tarie- 'exert oneself' and to the Hittite root dar- 'speak authoritatively.' The semantic shift Oettinger posits, however, is not entirely convincing to me.

The meaning and etymology of wauwalip- are not apparent.

The etymology of ki-kkis is uncertain. Laroche (1958:170) connects the form to Latin gerō 'bear, act,' suggesting that the Hittite and Latin forms come from *ges-. His suggestion is reasonable; evidence from only two languages, however, is not sufficient to reconstruct the form with great confidence.

The form lilai- 'propitiate' seems to be a denominal derived from the noun lila- 'conciliation,' as the Chicago Hittite Dictionary suggests; the form is discussed in more detail in the section of this chapter concerning denominal -ye- verbs. The etymology of lila- is unclear.

Oettinger (1979:434) derives the stem lilakk- 'curve' (trans.) from the root *leg^h- 'lie'; he compares this semantic relationship to that seen between Skt. vr̥t- 'turn oneself' and the aorist vavart- 'turn.'

The stem li-lipp- 'lick' is cited in Pokorny (P670) as a form descended from the root *leip- 'smear.' Oettinger (1979:208) follows this analysis.

The stem mimma- 'refuse' is cited in Pokorny (P729) as being related to the root *men- 'think.' Oettinger, however, derives the form from a root *meh₁-, which is also attested in the prohibitive particle *mē; he interprets this particle as originally being an imperative form of the verb. Oettinger's analysis is semantically more reasonable than Pokorny's.

The stem pippa- 'overthrow' is connected by Oettinger (1979:498) with Skt. ud pipīte 'rebel'; he derives both of them from a root *peh-. Mayrhofer (1963:294) connects the Sanskrit form with the verb pīyati 'reviles' and suggests a connection between the Sanskrit forms and Gothic fjand 'enemy.' Referring to the Gothic form, Watkins (1985:47) reconstructs a possible root *peh(i)- 'to hurt.'. Oettinger's analysis of the Hittite form is possible; one difficulty in this analysis lies in the fact

that the relationships among the putative cognates have not been entirely worked out.

Laroche (1963:73) analyzes the stem sissa- 'plant' as being of Proto-Indo-European origin. One reason he gives is the fact that the unreduplicated simplex form sai-/siya- participates in the same Indo-European ablaut patterns as such forms as dai-/tiya-. The second reason he cites is that the form is probably cognate with Latin serō 'sow.' He also notes a possible connection to Greek hēfēmi 'send'. Frisk (1960:715) notes that the possible relationship between Greek hēma, Armenian himn, 'basis,' and Latin sēmen points to the reconstruction of a derived form *sē-mn- to the proto-language, providing further evidence that hēfēmi is derive from the root *sē-. Laroche (1963:76) notes further that the Hittite stem samana- 'foundation' can be added to this cognate set. Chantraine (1968:459), on the other hand, traces the Greek form back to the root *ieh₁- because of the connection between the Greek aorist hēka and Lat. ieci. Watkins (1985:79) reconstructs the same root as Chantraine for the Greek form. In any event the Hittite reduplicated stem is clearly of Indo-European provenance. Although it is difficult to choose between the two possible sources for the Greek form, I am inclined to favor the form with initial *s- over the form with initial *i- because of the the cognate set derived from *sē-mn and because of the parallelism between the Greek reduplicated stem and the Hittite reduplicated stem. Frisk's alternative suggestion (1960:715) that the Greek paradigm could be the result of mixing forms based on both roots is also reasonable.

The stem ti-tta-nu is derived from the root dai-/tiya- 'place.' The root is clearly descended from *d^heh₁-.

Oettinger (1978:347) notes that the stem tittie- 'suckle' is descended from a reduplicated form *d^hi- d^hh₁- ie- also attested in hieroglyphic Luvian titaimi-. Pokorny (P.241) reconstructs a root *dhē(i)- with the same meaning.

The forms kikilimai and wiuidai- remain unexplained. Oettinger (1979:347) connects the Luvian stem tita- with the Hittite stem tittie- 'suckle.'

The reduplicated form kukkurs- 'mutilate' is clearly derived from the root kuer- 'cut.' The root itself exhibits the ablaut variation expected of an Indo-European root, with full-grade kuerzi 'he cuts' alternating with zero-grade kuranzi 'they cut.' In spite of its Indo-European appearance, its etymology is extremely uncertain. Tischler (1983:608-610) mentions several different proposed etymologies. A number of scholars have suggested that the Hittite root ultimately comes from the Indo-European root *kuer- 'do, make,' and thus would be cognate with OIr. cruth 'form' and Skt. karóti 'do, make.' The difficulty with this etymology is that the Hittite form is rather far removed from the semantic range seen in other Indo-European languages. A second proposal is that the form should be connected with the Indo-European root *guer- seen in Av. grava- 'pipe' and Lat. verū 'spear;' the main difficulty with this etymology is that the Indo-European root seems to be primarily nominal, with Hittite the only language in which the root is verbal. A third proposal connects the Hittite root with Indo-European *(s)ker- 'cut,' seen in forms such as Gk. keirō 'cut off.' The difficulty with this etymology is phonological; Hittite ku- points to a labiovelar segment in the proto-language. Another proposed etymology connects the Hittite root with Indo-European *skeu- 'cut'; in this case the difficulty is accounting for the final -r- in Hittite. None of these etymologies is entirely satisfying; the first possibility, that the form comes from *kuer- 'do, make,' strikes me as the likeliest.

The stem duddu- 'govern' is discussed in some detail by Oettinger (1978:231). He notes that Kronasser (1966:510) suggests that the stem was originally nominal and secondarily inflected as a verb, but rejects this suggestion because the nominal form is only attested at a late date. He suggests that if the verb descends from a form

meaning 'stop,' then it might be related to dudduwarant- 'lame, stiff'. Neumann (1959:225) relates this last stem to Norwegian daana 'be stiff, lame (of limbs),' suggesting that the stem is derived from *d^heu- 'be unconscious, die'; he notes that the semantic development is attested in Germanic, comparing Norwegian daana 'be stiff, lame (of limbs)' with Icelandic doði 'apathy.' Oettinger further connects the Luvian stem duddu- with the Hittite verb.

I can find no etymologies for kugurniya- 'keep secret' (?) or for mummuwai- (uncertain meaning).

Oettinger (1978:385) cites Neumann as connecting the stem pu-pussa- 'crush' with Latin pavire.

Van Brock cites the Hier. Luvian stem susu- with the meaning 'fill.' If this interpretation of the form is correct, then it must certainly be related to the Hittite stem sunna- 'fill.' Oettinger (1978:298) derives the Hittite stem from the reconstructed root *seuh₂- 'be full.' Oettinger further connects the root with sū- 'full'; he notes that Watkins (1973) had derived the latter form from *suh₃-u-. Evidence that this reconstruction is reasonable comes from the first person pret. form sunnahhun; Oettinger notes that this stem must come from *sunéh₂-, rather than from a form with *h₃.

Van Brock cites the Luvian stem du-dupa- based on the unreduplicated stem dupai- 'hit.' Oettinger (1978:535) reconstructs a root *(s)tup- based on this form, but unfortunately discusses the matter no further. Pokorny lists a root *(s)teu-p- 'push, hit,' attested in forms such as Greek tuptō 'hit'; the Luvian form undoubtedly descends from this root.

The form as-es- 'seat' leads Oettinger (1979:431) to posit a proto-form *h₁eh₁- 'sit.' He does not explicitly mention such cognates as Skt. ās- 'sit,' nor does he refer to previous scholarly discussion concerning the form. He mentions that in his opin-

ion the Hittite root ēs- cannot be explained as a lengthened-grade form, since statives as well as middle voice verbs do not routinely exhibit lengthened grade. He notes that on morphological grounds one might expect a reduplicated formation to underlie ēs-, and posits the rather unwieldy form *h₁e(h₁)-h₁(o)h₁s- as underlying *ēs-/ās-. Winter (1965:202), on the other hand, posits a root *h₁es- 'eat' which is homophonous with the root meaning 'be'; he interprets forms such as Skt. āste as lengthened-grade forms. Lindeman (1987:54), however, dismisses the lengthened-grade analysis as 'unverifiable,' but notes the possibility of a reduplicated form *h₁e-h₁s-o as the source of Hittite ēsa. In any event, although the precise morphological behavior of the cognate set remains obscure, the root seen in Hittite is certainly cognate with the root seen in Sanskrit.

I can find nothing about el-elhai.

The form upp-uppa- 'bring' is mentioned in van Brock but in no other source that I have found. The reduplicated form would be based on the unreduplicated verb uppie- 'bring,' which is itself a compound form of the particle u- 'here' and piie- 'give.'

The form has-has- is attested once, and seems to be based on the verb häss- /hëss- 'open.' I can find no etymology for the form.

The form hul-huliya- 'fight' is connected by Oettinger (1979:264) to the root *h₂uelh₂-, also attested in Latin volnus 'wound.' This etymology seems reasonable to me.

The stem katkattiya- 'sink down, tremble' is clearly based on the adverb katt(a) 'below.' The adverb clearly must be related to Greek kata 'down.'

The stem kur-kuriya- 'cut' is related to the form ku-kkurs- 'cut' discussed earlier. Both derive from the simplex kuer- 'cut.'

The stem kuskus- 'crush' is related to the stem kukus-, also meaning 'crush.' The origin of the form is unclear. Oettinger suggests (1979:97) that the form is ultimately based on the Indo-European root *g^when- 'slay' via a sk-formation based analogically on the Anatolian stem *gun-, found in certain zero-grade environments, such as the 3rd person plural present or the participial form of the verb. The form *gun-ske-, he states, would have given guske-; this form, in turn, could have been the source of the reduplicated stem kuskus-. Oettinger's analysis is not convincing to me.

The stem lah-lahhiya- 'be marching' is based on the form lahha- 'campaign.'

The meaning of tuh-tuhhuya- is unknown, as is the meaning of hanhaniya-, cited as a Luvian form by van Brock.

The form hui-huiya- 'hurry' is attested in Luvian. I could find no discussion of its etymology.

The form lahhi-lahhiya- 'be marching' is based on the same root, lahhi- 'campaign' as the form lah-lahhiya-, discussed earlier.

The meanings of the forms purpurriya-, dunduma-, and ahhuwahhuwa- remain unknown. I could not find the form aruwaruwa- explicitly discussed anywhere. The stem may be based on the root aruwae-, 'worship.' Oettinger (1979:345) connects the Hittite form with Greek aráomai 'pray, curse,' noting that both are denominal forms based on the root *h₂er-u-. This etymology may be correct.

Indo-European etymologies have been suggested for a reasonable percentage of the reduplicated forms. On the other hand, the meanings of a fair proportion of the forms still remain unknown; it is possible that the reason these meanings are still undiscovered is because they are loan words from non-Indo-European languages, and hence Indo-European etymological research has not offered the help in translation it

has for other forms. Nevertheless, the proportion of roots with probable Indo-European pedigrees is high enough for it to be unlikely that reduplication was borrowed into Anatolian from a non-Indo-European language.

3.3. Formal characteristics of reduplicated Anatolian verbs

The purpose of this section is to explore the formal characteristics of Anatolian reduplicated verbs and to relate them to corresponding categories in other Indo-European languages. In some cases this will be quite straightforward; in other instances, however, I will suggest that the Anatolian evidence motivates a reanalysis of Proto-Indo-European reduplication.

My approach to the formal behavior of the reduplicated forms will differ from that adopted in Kronasser (1966:120); although in general Kronasser's research has largely been superceded by later work, I will use his discussion as a starting point, since he is the only scholar aside from van Brock to attempt to analyze all the reduplicated Hittite verbs into various subsets, Kronasser equates several small groups of reduplicated forms found in Hittite with reduplicative classes found elsewhere in Indo-European on the basis of the vowel seen in the reduplicative syllable. Thus, he connects one subset of forms with Indo-European reduplicated perfect forms on the grounds that they show the vowel -e- in the reduplicative syllable, another subset with Indo-European reduplicated present forms on the grounds that they show the vowel -i- in the reduplicative syllable, and a third subset with the Indo-European intensives because they exhibit "total" (that is, CVC-) reduplication. This approach suffers from several problems. The first problem is that it takes as a given the theory that the vowel of the reduplicative syllable was used in Proto-Indo-European to distinguish present reduplicated stems from perfect reduplicated stems. As the languages cited in Chapter 1 show, in languages with a mixed system in which some

forms show a fixed vowel in the reduplicative affix while others copy their vowel from the root, the vowel-copying system is older and the fixed-vowel system represents an innovation. This general behavior calls into question the assumption that in Proto-Indo-European the present and perfect reduplicative affixes showed a fixed vowel, as in Greek, with the partial vowel-copying systems seen in Sanskrit, Latin, and Old Irish representing innovations. In a mixed reduplicative system such as that seen in Hittite, it is at best chancy to rely on the reduplicative vowel to distinguish between various kinds of reduplication. A more cautious approach is to simply treat all reduplication as equivalent morphologically and to use other formal information to try to connect reduplicated forms to classes in other languages. For example, in all Indo-European languages with both present and perfect reduplicated forms, the forms differ in the desinences they show in addition to any difference in the form of the reduplicated affix; this difference would be a more reliable way of sorting out the groups than is the form of reduplication shown³⁴. For example, in both Greek and Hittite, reduplicated stems frequently co-occur with the -ske/sko- suffix to express iterativity; the co-occurrence of that specific affix with reduplication permits us to consider connecting the two groups of forms even though in Greek the reduplicative vowel is always -i- (gi-gnó-skō 'I know') while in Hittite the reduplicative vowel is copied from the base (duddusk- 'control, manage').

A second problem with the approach taken by Kronasser is exemplified by his identifying the forms exhibiting total reduplication of the root with the Indo-European intensives. As Hoffmann (1952) points out, using reduplication to express intensivity is extremely common cross-linguistically and hence could arise independently in several different languages; if such an innovation did arise spontane-

³⁴ As is well known, Hittite has no distinct perfect class.

ously, it is probable that at first speakers would reduplicate the entire root rather than some portion of it. Thus connecting the Hittite forms with intensives seen in other Indo-European languages on the basis of either the form of the reduplicative affix or the semantic value of the formation is perilous. Again, considering other formal criteria provides a way around this difficulty. As I argue in section 3.3.3, the association between reduplication and the denominal suffix **-ye/yo-* found in some reduplicated intensive forms in Sanskrit and Greek is also found in Hittite; this formal behavior provides a reliable justification for connecting the Anatolian forms with the Sanskrit and Greek forms. The fact that the semantic value of the formation is different in Hittite than in the other languages also strengthens the reconstruction of the formation to the proto-language, since, given the absence of clear semantic motivation, independent genesis is much less likely.

3.3.1 Reduplicated *mi*-verbs

The first group of reduplicated forms are those Oettinger cites (1979:12) as characterized in Hittite by an athematic stem, the *mi*-conjugation, and absence of stem ablaut; nearly all of the stems exhibit the stem-final consonant *-s-* as well. Only a handful of forms fall into this group: *hahhars-* 'laugh (at),' *hashass-* 'open (?),' *kukkurs-* 'mutilate,' *kukuss-* 'trample (?),' *kuskuss-* 'trample,' *pappars-* 'squirt,' *wawars-* 'strip off,' and *du(wa)ddu-* 'manage well.' At first glance this set of forms looks similar to the Greek reduplicated *mi*-verbs; both the reduplicated present-tense stem and the *mi*-conjugation offer evidence of such a connection. There exist, however, numerous problems with this equation. One problem is that the Greek verbs show stem ablaut while the Hittite verbs do not. A second problem lies in the observation that the vast majority of these forms in Hittite end in *-s-*; whatever its etymological source, its association with the reduplicated present stem has no equivalent in

Greek. A final problem is the strong association in Greek and Sanskrit between present-tense reduplication and laryngeal-final roots; this association is absent in Hittite. In addition to these difficulties, a closer examination of the data suggests a problem with Oettinger's classification: a sizeable number of the forms are only attested in participles, suggesting that caution should be exercised in classifying these forms as mi-verbs. I will discuss the forms in some detail, distinguishing between those verbs which clearly belong to the mi-conjugation and those which are less certain, and differentiating among the sources of the stem-final -s-.

The problem of the lack of ablaut in these stems can be resolved very easily. As Oettinger (1979:184) points out, in athematic forms such as these, a full-grade root containing a resonant and the corresponding zero-grade root would fall together in Hittite: *eRC > aRC and *RC > aRC. Indeed, in some cases the paradigm seems to retain traces of stem ablaut: Oettinger compares the 3 sg. present form pa-ap-pár-as-zi 'he squirts' from *pe-pors - ti with the 3 pl. form pa-ap-pár-sa-an-zi from *pe-prs-nti³⁵. The apparent absence of ablaut in Hittite can be dismissed as the result of a Hittite-internal development.

Three of the seven stems cited by Oettinger are not attested in any finite verbal forms: hashass- 'open,' kukkurs- 'mutilate,' and wawars- 'strip off.' Oettinger does not cite any attestations of hashass-; Kronasser (1966:307), however, cites the verbal noun ha-as-ha-as-su-ar and the participle hashassan. For the stem kukkurs-, the only attested form is the participle ku-gur-sa-an-ti-is. Oettinger (1979:428) notes that all the attested forms of wawars- are participles. Given the absence of finite verbal forms for these three stems, they can only tentatively be classified as mi-verbs, par-

³⁵ Note that I do not necessarily agree with reconstructing the prefix with *-e-; nevertheless, since the issue of the prefixal vowel is irrelevant to Oettinger's discussion, I will cite the reconstructions as he gives them.

ticularly since the unduplicated stems of wars- and has- are hi-verbs.

It is a bit surprising that such a large proportion of these verbs are found only in non-finite forms, although in such a small group this skewed distribution could be due to the vagaries of attestation. Another explanation, however, can be found in the fact that many of these verbs have corresponding reduplicated sk- verbs attested in the earliest stage of the language as well (for example, kukkurask-, papparask-, alongside participles kugursan-, papparasan-). Kronasser (1966:257), following Bechtel, notes that the -nt participle is almost entirely lacking for sk-verbs; only a very few forms are attested. It is possible that the reduplicated stem with -s- provided a useful way of forming participles corresponding to reduplicated sk-verbs. This hypothesis accounts for both the fact that such a large percentage of the verbs are found only in non-finite forms and also for the fact that so many of the reduplicated stems end in -s-.

Although all but one of these verbs end in -s-, the final segments come from different etymological sources. A number of the forms exhibit the s- extension seen in numerous other Indo-European languages; as Kronasser (1966:394) notes, the function of this extension is impossible to determine. Kronasser groups under the category 's-Erweiterungen' both roots for which the extension is reconstructible to the proto-language (pappars- compared to Toch. pärs, wawars- compared to Lat. ver-rere, Russ. vřesti) and roots for which the extension must be a strictly Hittite development (kukkurs- compared to Hitt. kuer-, hahhars- as an onomatopoeic formation *har-har-). In the case of the stem hashass-, the final -s- appears to be part of the root; in any case, the segment is copied as part of the reduplicative prefix.

The most reasonable explanation of the association between reduplicated stems inflected in the mi-conjugation and the stem-final -s- seen in most of the forms lies in the fact that this reduplication, whether its origin can be found in old iteratives and

intensives or not, has lost most of its semantic value in Hittite and has simply come to function as a stem-formative; speakers can then reanalyze stem-final -s- as a phonological marker of roots which undergo reduplication to form a present stem. Certainly when a preponderance of roots in a given stem class all have some phonological feature in common, this suggests that the phonological feature is at least as important in determining stem shape as are semantic features; indeed, phonological shape may be more important than semantics at this point in the language. The reanalysis seen in Hittite parallels the development of present-tense reduplication in Greek and Sanskrit, in which a root-final laryngeal comes to be seen as a marker of roots which form their present stems via reduplication; the Greek and Sanskrit cases will be discussed in more detail in Chapter 5.

3.3.2 Reduplicated sk-verbs

A handful of reduplicated present verbs occur with the iterative suffix *-ske/o-³⁶. The association between reduplication and the sk- suffix is found in Greek as well as in Hittite, suggesting that the possibility of reconstructing the formation to the proto-language should be considered. Speaking of the Hittite formation, Bechtel (1936) notes

Many of the reduplicated verbs, though the material on any one of them may not be extensive, show a tendency to take the -sk- suffix more freely than might be expected, and it is not always possible to tell whether the intensive or the durative meaning is the more prominent. Thus hahharsk- 'corrupt', lahlahhesk-

³⁶ For evidence that the original value of the suffix was iterativity, see Rix (1976:213-214). Chantraine (1945:223), on the other hand, assigns a different value to the suffix, claiming that in its original use, "il souligne la durée de l'action, en même temps qu'il en envisage l'aboutissement." Dressler (1968) finds that in Hittite the suffix has an iterative or distributive meaning.

of uncertain meaning beside lahlahhiya- (cf. Götze KIF I 185f), papparsk- 'sprinkle' beside pappars-, duddusk- 'control, manage', etc... The intensive force outweighs the durative in kukkursk- 'mutilate' from kuer-, kur- 'cut'...

Dressler, speaking of the reduplicated Hittite forms which have the -sk- suffix, notes, "Es ist communis opinio, dass es sich um archaische Bildungen handelt, die von den bedeutungsähnlichen sk--Formen verdrängt oder verstärkend erweitert wurden" (1968:209). He is unable to find a clear semantic difference between sk--forms with reduplication and sk--forms without reduplication which are based on the same root.

Although reconstructing the formation to the proto-language seems reasonable, a number of complications must be addressed. One issue is the form of the reduplicated prefix; in Hittite, the prefix copies the vowel of the root, but in Greek the vowel is invariably -i-. As I suggest elsewhere, the most reasonable course of action is to treat the vowel-copying form as archaic, with the Greek vowel -i- representing an innovation.

A more serious problem is the fact that the reduplicated sk--verbs correspond to unreduplicated sk--verbs elsewhere, with the reduplicated variants of the verbs appearing to have the same meaning as the unreduplicated variants. Speaking of Greek, Rix (1976:212) states

Neuerung ist die zusätzliche Reduplikation: gi-gnō-skō gegenüber lat. (g)nōsco apers. xsnasatiy ('möge erkennen') < *gn-ske/o; ferner mi-mnē-skō di-da-skō (*di-dns-ske/o-, zu hom. dédae...)

Indeed, as Dressler suggests, reduplicated and unreduplicated sk--forms exist side-by-side in Hittite, with little or no distinguishable difference between them. The question to be addressed is why speakers bother to reduplicate the stem at all if doing so seems to have no semantic effect.

One way of dismissing this question, of course, is to simply note that if reduplication was used to hypercharacterize the sk-forms then little semantic effect other than strengthening of the existing meaning would be apparent; in most cases such strengthening would be too subtle to be discernible in the texts. This would explain why reduplicated forms could exist side-by-side with unreduplicated forms; the unreduplicated form of a sk- verb would be sufficient in most cases to convey the appropriate meaning. In some cases, however, speakers would feel that the unreduplicated form is not strong enough and so would use the reduplicated variant of the verb.

A second factor, however, undoubtedly was at play as well: the analogic influence of other reduplicated stems based on the same root. This influence is apparent in the discussion of reduplicated perfect forms (Chapter 4), where I suggest in several cases that a verb exhibited a reduplicated perfect stem because of the influence of the corresponding reduplicated present stem. It is noteworthy that in Hittite the reduplicated sk- forms nearly all exist alongside other reduplicated variants of the same roots. For example, hahharsk- 'corrupt' exists beside hahhars-, lahlahhesk- exists beside lahlahhiya-, papparsk- 'sprinkle' exists beside pappars-, and duddusk- 'control' exists beside duddus-. Of course, it is impossible in each case to determine in which direction the influence flows; as I suggested in the last section of this chapter, in some cases the reduplicated sk-forms may account for the existence of reduplicated present stems. Nevertheless, it is clearly the case that a root which undergoes reduplication to form one stem is much more likely to undergo reduplication to form another stem. Note that the ease with which such analogic pressure flowed from one stem form to another suggests that the semantic value of reduplication must not have been very well-determined, even at an early stage; if reduplication had a clear, distinct semantic value then various stems based on a sin-

gle root would not influence one another as much as they did.

It has been argued that in Greek the reduplicated sk-forms have a distinct semantic value. Chantraine (1945:224) summarizes the role of these forms:

Ces présents à redoublement sont expressifs et soulignent la valeur du suffixe: ils semblent exprimer une action que l'on répète pour réussir: gignōskō "apprendre à connaître peu à peu" ; kiklēskō "appeler par appels répétés" (I 11); didáskō "enseigner par des leçons répétées" (cf. I 442); titrōskō "accabler de blessures."

On the other hand, it is possible that the semantic value Chantraine ascribes to these forms is present more in the hind-sight of the linguist rather than in the grammar of the speaker; certainly verbs such as gignōskō and didáskō are not in contrast with other non-reduplicated versions of the same root in Greek. Although the semantic value Chantraine ascribes to the forms may be true historically, it is probably not the case that such value was present in Greek synchronically.

Regardless of their semantic value, most of the forms in Greek have in common the phonological shape of their ancestors; that is, most of the verbs in Greek which undergo sk-reduplication ended in a laryngeal in the proto-language. The following are the reduplicated sk-forms and their Proto-Indo-European ancestors cited by Chantraine (1945:224):

86. Reduplicated sk-verbs in Greek:

form	gloss	reconstructed root
bibáskō	'go'	*g ^w em-
bibrōskō	'drink'	*g ^w erh _x -
mimnēskō	'remember'	*mneh ₂ -
titrōskō	'wound'	*terh ₃ -

gign ^ó skō	‘know’	*ĝneh ₃ -
hom. kikl ^é skō	‘call’	*kelh _x -
‘iláskomai	‘appease’	?*selh _x -
didáskō	‘teach’	*dens-

The only two roots in this set of forms which do not point to ancestors with root-final laryngeal are didáskō and bibáskō; the second of these forms is probably influenced by the related reduplicated present stem bib^émi ‘I stride.’

It is difficult to know how to explain this preponderance of laryngeal-final roots; certainly the Hittite forms show no such distribution. The large percentage of laryngeal-final roots seen in this group is reminiscent of the group of reduplicated present verbs seen in Greek and Sanskrit, discussed in detail in Chapter 5. The likeliest explanation of the presence of so many laryngeal-final roots in the reduplicated sk-class is that it is due to the influence of the reduplicated present class. During the prehistory of Greek, reduplication in the present tense came to be associated with laryngeal-final roots; this association spread to the reduplicated sk-verbs as well. The pattern of associating *-ske/o- with optionally reduplicated stems was already part of the language; since reduplication had also come to be associated with laryngeal-final roots, this same set of roots was much more likely to be reduplicated when the -ske/o- suffix was affixed to them to create an iterative form than were roots which did not end in laryngeals. In these instances, reduplication seems to have had an iconic value in that it served to hypercharacterize iteratives; although the iterative suffix alone was sufficient to convey the meaning of iterativity, reduplicating the stem reinforced the aspect of the verb. Roots which ended in laryngeals thus were doubly motivated with respect to iterative reduplication; the reduplication was motivated by its semantic value, but it was also motivated by the association between reduplication and final laryngeal segments. Given this double motivation, it

is not surprising that the vast majority of verbs attested in Greek which show iterative reduplication also can be traced to roots which had ended in laryngeals in the proto-language.

The final question to be considered with respect to these forms is the question of whether or not the association between reduplication and the -sk- suffix is of Proto-Indo-European date or not. Dressler (1968:209), quoted earlier, interprets the formation as archaic, citing this view as the 'communis opinio.' On the other hand, Rix (1976:212) rejects this view, interpreting the Greek reduplicated sk-forms as innovations, since cognate forms show -sk- and the root without reduplication. Unfortunately, the evidence does not provide clear support for one view or another. Greek and Hittite do have a number of things in common: the use of reduplication with the suffix, and the close ties between the sk-forms and reduplicated present tense stems. On the other hand, the fact that in both languages the sk-forms are so closely tied to present-stem reduplication suggests that in both languages the sk-forms could have arisen because of analogy to reduplicated present stems. Similarly, the suggestion that reduplication was used to hypercharacterize these iteratives can cut both ways: such hypercharacterization could easily have been part of the proto-language, but it could also have arisen independently in Greek and Hittite. I see nothing that would motivate a choice between the two possibilities.

3.3.3. Indo-European intensives and *-yé/o-

Intensive reduplication and the suffix *-yé/o- co-occur in various Indo-European languages: familiar examples are Skt. marmrjyáte 'he wipes,' Greek poiphússō 'I blow,' and Old Church Slavic glagoljō 'I speak.' Based on such attestations, Meillet (1927) reconstructs the formation to the proto-language. Jamison (1983:53), however, is rightly cautious, noting, 'Certainly most IE languages with

intensively reduplicated formations inflect them as *-yé/yó-presents (Greek, Latin, OCS, Armenian), but these are languages where that suffix has expanded its domain considerably.' She convincingly argues that the use of the -yá- suffix was exploited during Vedic times as a means of thematicising the intensive formation, leaving open the question of whether or not Vedic was exploiting a pre-existing formation inherited from proto-Indo-European times. Similarly, in discussing the spread of the -ye/o- suffix in Greek, Chantraine notes that the suffix mainly spread by means of a large number of secondary suffixes such as -izō, -azō, -ssō, etc., which each must have had an independent development: he states, 'Ce qui apparaît en grec, c'est une grande diversité de types secondaires, en particulier -īzō, -ázō, -ssō, -áo, -éo, etc., qui comportent tous le suffixe *-ye/o-, mais qui se sont développés indépendamment les uns des autres' (1961:229). If we do reconstruct the formation back to the proto-language, on the other hand, we raise a further question: why would speakers use an affix which was at that time mainly used denominally to characterize intensive verb stems?

Further difficulties lie in the semantic value of the reduplicated stem. Hoffmann (1952) notes that in many cases, particularly in languages other than Vedic, the reduplicated form with *yé/o- has an onomatopoeic value; given the ease with which such onomatopoeic forms can be coined afresh in each language, reconstructing the formation to the proto-language is at best uncertain. Since the value of intensity is much more prevalent in Vedic than in other languages, Hoffmann suggests that the onomatopoeic formations seen in Greek and other languages should be compared with Vedic reduplicated onomatopoeic nouns rather than with the intensives; the -yá- intensives in Vedic, then, would be independent of these forms.

My purpose in this section is to add Anatolian data to the equation. In order to do this, I will initially focus solely on the formal properties of the forms in question,

namely the cooccurrence of a reduplicated stem with the suffix *-yé/o- and the shape of the reduplicated stem itself; although these formal properties partially serve to express semantic values, they are also to some extent independent of semantics and hence provide more security in reconstruction. I will then focus on the semantic value of the Anatolian forms, and will re-examine the forms found in Greek and Sanskrit, tentatively suggesting an origin and developments which link the forms seen in all the languages.

The Anatolian forms are given below. The forms were culled from Oettinger (1979); most of the glosses given are his, although some are taken from Kronasser (1966).

87. Anatolian forms (Note: stems cited as in Oettinger 1979)

A. mi-verbs; athematic

hahharie-	'rake'	hulhulie-	'fight'
ilalie-	'desire'	katkatie-	'sink down'
kurkurie-	'mutilate'	lahlahhie-	'be excited'; lahhilahhie- found once
mummie-	'fall'	sesarie-	'sift'
sissurie-	'dampen'	tastasie-	'whisper'

B. mi-verbs; thematic

galgalinae-	'sing (in a certain way)'	lelhuntae-	'libate'
lilae-	'propitiate, soothe'	luluuae-	'further'

(Kronasser 1966)

pāpuuae-	'set out dishes (or furniture)' dakkudakkuuāblacken'		
sassumae-	'sleep'	tattarae-	'sweep'
waliwala-	'strew'		

C. hi-verbs

parip(a)rie- 'blow (a horn)' halihlie- 'kneel'

More than twenty instances of a reduplicated stem co-occurring with the suffix -ye- are attested. While it is true that even in Hittite the suffix -ye- is not invariably denominal, it is the case that the suffix had not become the all-purpose formative that it had in Sanskrit and Greek. The Anatolian examples thus make projecting the reduplicated ye- form to the proto-language more certain.

The form of the stem seen in Hittite strengthens the case for connecting the Anatolian forms with the intensives seen in Sanskrit and Greek. Roughly half of the forms cited show a reduplicative prefix of the form CVC-. For the sake of comparison, I looked at all the reduplicated forms found in Oettinger which do not show the -ye- suffix; approximately a quarter showed a prefix of the form CVC-. The forms with the -ye- suffix thus show twice as many examples of CVC- reduplication as do forms in the rest of the language. This preponderance of heavy reduplication is reminiscent of the intensive reduplicated stems, which are characterized by a heavy prefix either of the form CVC-, as in Greek gargařrō, Skt. marmrjyāte, or of the form CV- with the vowel either long, as in Skt. vāvadŕti 'he speaks,' or a diphthong, as in Greek poiphússō. It is impossible to know if the Anatolian forms with apparent CV- prefixes have long vowels or not due to the uncertainties of analyzing plene writing; certainly the CV- prefixes are often spelled with an additional vowel sign, but the spelling is not consistent enough to determine if the CV- prefixes are heavy or not. In any case, the striking preponderance of CVC- prefixes associated with the -ye- suffix make projecting the association back to the proto-language reasonably certain.

A further intriguing formal resemblance between the Anatolian stems and Vedic intensive stems is seen in the stems waliwalae- 'strew', parip(a)rie- 'blow (a horn)', halihlie- 'kneel', and in a variant of the stem lahlahhie- 'be excited,' lahhilahhie-. These examples all exhibit the vowel -i- between the reduplicated

prefix and the root. A number of Sanskrit forms, such as kánikrand- ‘neigh,’ gánīgam- ‘go,’ varīvrj- ‘turn,’ and dauidyut- ‘shine,’ exhibit the vowel i between reduplicated prefix and root. This form has generally been assumed to be a Sanskrit-specific development, since other languages show no trace of such forms; the source of this vowel is obscure, but it has been suggested by scholars such as Beekes (1981) that it is the descendant of an interconsonantal laryngeal, either one which was root-initial or root-final, with lots of analogic extension to other stems. If my equation of the Hittite forms with these Sanskrit forms is correct, then the forms are important for two reasons. One, it is possible that this connecting i may have been inherited from the proto-language rather than innovated in Sanskrit. Two, it is highly unlikely that the vowel can be explained as the vocalization of a root-initial or root-final laryngeal; some other explanation must be sought. I will return to this question later in this section.

Thus far I have ignored the semantic value of the Hittite forms, instead focusing on establishing their formal resemblance to reduplicated -yé- forms seen in other Indo-European languages. Now I wish to turn to the semantic value of the Hittite forms. By and large, the forms do not seem to be intensive, although intensive values have been suggested for stems such as kurkurie- ‘mutilate’ compared to kur- ‘cut’ and mummie- ‘fall’ compared to mauss- ‘fall.’ Instead, a sizable portion of the stems seem to be denominal verbs based on already-reduplicated nominals. I will discuss the pairs of nouns and verbs I have found; due to the vagaries of attestation, of course, it is not to be expected that in all cases each verb can be paired up with a corresponding noun.

The following eight forms are all clearly based on reduplicated nouns or adjectives. The nouns and adjectives in this group are concrete rather than abstract nominals:

88 A. Non-abstract nominals (including adjectives)

1. hahharie-, 'rake', ^{GIS}hah(ha)r(a)- 'rake' (noun)
2. sesarie- 'sift'; ^{GIS}sesarul 'sieve'
3. siss(i)urie- 'dampen'; sissura- 'damp'
4. ulilie- 'become green'; ulili- 'green'
5. galgalinae- 'sing (in a certain way)'; galgalturi (kind of musical instrument)
6. pāpuuae- 'set out dishes'; ^{GIS}papu- 'dish'³⁷
7. tattarae- 'sweep'; Kronasser (1966) classifies as probably denominal, though no nominal form is attested
8. waliwala- 'strew'; walliwalli- 'turbulent' (see also name Waliwali-)

The forms in the next group are derived from reduplicated abstract nouns and adjectives:

B. abstract nominals (including adjectives)

9. lahlahhie- 'be excited'; lahlahhi- 'excited'
10. luluuae- 'further'; lulu- 'growth'
11. lila- 'propitiate, soothe'; lila- 'conciliation'

It is interesting to note that the Chicago Hittite Dictionary suggests that the form lila-, 'conciliation,' given in number (11), may originally have referred to some object used in a conciliation ritual. It is possible that the reduplicated abstract nominals in general are the result of a semantic shift from the name of an object to a term for the abstract characteristic exemplified by the object. Due to the paucity of data, it is impossible to do more than suggest such a possibility.

The forms in the following group are attested in Cappadocian names:

C. Personal Names (Cappadocian) (Laroche 1966)

³⁷ It is possible that this form is not reduplicated; see discussion later in this section.

12. ilalie- 'desire'; Ilali-

13. waliwala- 'strew'; Waliwali- (see also adjective walliwalli-)

14. tuhtuhie- 'swing' (?); Tuhtuhani-

Many Cappadocian personal names are based on Hittite words; hence the reduplicated names seen in this section presuppose corresponding reduplicated words. It is possible that the names are themselves based on reduplicated verbal forms, but such a source is unlikely, given that none of the unreduplicated personal names for which Kronasser (1966:129) cites a corresponding Anatolian word are based on verbs; instead, names such as Hasu- and Naki- are based on nouns such as hassu- 'king' and adjectives such as nakki- 'difficult.' The reduplicated names in this section thus presuppose the existence of reduplicated nouns or adjectives.

The forms in the following section are derived nomina actionis forms in -ma:

D. Nominals in -ma

15. katkatie- 'sink down'; katkatima- 'snort' (noun)

16. kurkurie- 'mutilate'; kurkurima- 'injury'

17. lahlahhie- 'be excited'; lahlahhima- 'motion' (see also lahlahhi-)

These forms could conceivably be derived from the reduplicated verb stems. I note, however, that a striking portion of the forms in -ma cited in Kronasser are reduplicated; the exact relationship between the -ma nominals and the -ie- verbal forms remains to be explored.

It is important to note that, although comparative evidence (to be discussed below) provides a reason for treating the Hittite formation as the reflex of an Indo-European process, it is not necessarily the case that all of the reduplicated nouns underlying the verbal forms are based on Indo-European roots. As I mentioned in section 3.1.1, Akkadian reduplicated nouns have the form $C_1V_1C_2-C_1V_1C_2$; Akkadian forms such as halhallatum 'a kind of double flute' or sur^vsurru 'a copper vessel'

could easily be borrowed into Hittite and then be subject to the denominal -ye- formation. For example, the verb tattarae- 'sweep,' which Kronasser (1966) classifies as probably denominal, could be based on an Akkadian noun rather than on an Indo-European root. It is also possible that not all of the forms which appear to be reduplicated actually are reduplicated; for instance, the verb pāpuuae- 'set out dishes' is based on the noun ^{GIŠ}papu- 'dish,' which appears to be reduplicated. Due to the uncertainties of the writing system, however, it is not certain that the initial p and the medial p have the same value for voicing; phonetically, the noun could be [papu], [pabu], [bapu], or [babu]³⁸. This concern is less of an issue with forms involving reduplication of an entire CVC rather than just a CV; nevertheless, the writing system provides another reason for caution.

As I will argue below, comparative evidence leads us to analyze the Hittite reduplicated -ye- formation as an Indo-European inheritance; the fact that some of the stems involved are not themselves inherited from Indo-European does not invalidate this comparison. Speakers of a language have no knowledge of diachrony; if a noun is reduplicated in a certain way, it may be the basis for a reduplicated -ye- formation regardless of its pedigree. The more a borrowed word resembles a native word structurally, the likelier it is that speakers will use the form freely in regular word formation processes.

The Hittite reduplicated -ye- verbs can thus be explained as formations based on reduplicated nouns. This analysis of the forms, however, simply casts the question of the source of the reduplication back a step. The problem now becomes how to explain the reduplication seen in the nominal forms. Some of the nouns seem to be onomatopoeic: for example, the form galgalturi 'musical instrument of some

³⁸ I am grateful to Sara Kimball for this observation.

sort.’ The etymological source of other forms, however, is unclear. To find a plausible explanation for the reduplicated nouns, I turn to common sources of linguistic nouns cross-linguistically. One clear pattern observed cross-linguistically is the fact that if a certain behavior or action is associated with an object, the object may be named by reduplicating the word describing the behavior: examples of this are given below.

89. Typological parallels

1. Moravcsik (1978:325): ‘One common use of reduplication is to create nominal forms with the implied connotation of habitualness: compare Tagalog ta:ta:wa ‘one who will laugh’ (ta:wa ‘laugh’) and Ewe nyanyralá ‘raver’ (nyra ‘rave’).’
2. American Sign Language: CHAIR apparently reduplicated derivation from SIT, AIRPLANE reduplicated derivation from FLY, CAR reduplicated derivation from DRIVE (Supalla and Newport 1978).

One possible example of this kind of reduplication in Proto-Indo-European may be found in the related set of forms *wer-wer-, *wi-wer-, *wai-wer- ‘squirrel,’ which Pokorny posits based on such forms as Pers. varvarah ‘squirrel,’ Lat. viverra ‘ferret.’ Anyone who has ever seen the undulating run of a squirrel will understand my reason for connecting this form with the root *wer- ‘curve.’ Reduplicated onomatopoeic forms can be viewed as a subset of this general tendency, where the characteristic behavior of an object involves making a particular sound, and the object is named by mimicking and reduplicating the sound. If the most salient attribute of an object would be characterized by an adjective, then the object can be named by reduplicating the adjective. Conceivably, if the most salient attribute of an object would be characterized by a noun, then the object could be named by reduplicating the noun.

Data found in Sanskrit and Greek support this analysis of the Hittite forms. Hoffmann (1952) describes onomatopoetic nouns in Sanskrit and finds a number in the oldest stage of the language. He notes that in Vedic the forms could only be nominal although in later times it was possible to create derived verbs in -āya- based on the stems. The following are some of the examples he cites:

90. Sanskrit onomatopoetic nouns (Hoffmann 1952)

1. RV. gārgara- a musical instrument (possibly cognate with Hitt. galgalturi?); AV. 'rushing stream'
2. RV. budbuda- 'bubble' (in compound)
3. RV. karkarī- a kind of lute; AV. karkarī- and karkarikā-
4. AV. maṭmaṭā- (a kind of demon)
5. AV. kāṣkaṣa- (a kind of destructive worm)
6. AV. kurkurā- 'dog'

Although Hoffmann classifies all the forms as onomatopoetic it is clear that he is using the term in its broadest sense. gārgara-, the name of a musical instrument, probably imitates the sound of the instrument, as did the Hittite noun galgalturi; the word budbuda- 'bubble,' on the other hand, is probably derived from the Indo-European root *beu- 'swell,' though sound symbolism might also have played some role in its formation. Hoffmann concludes by suggesting that the Sanskrit reduplicated nouns might be linked with Greek reduplicated -ye- verbs such as gargaíre-; the Sanskrit intensives in -ye/o-, he suggests, must have a separate origin.

Tichy (1983), in her work on Greek onomatopoetic verbs, discusses the reduplicated *-ye- forms at length. She notes that in Greek a number of reduplicated CVC- verbal forms exist alongside reduplicated nouns. The nouns, she suggests, are themselves derived from earlier adjectival forms; she states,

Von onomatopoetischen Basen der Struktur $*K_1VK_2-K_1VK_2-(K_1VK_2\dots)$ werden in vorklassischer Zeit - nur in Einzelfällen auch später - defektive primäre je/io-Präsentien abgeleitet; daneben können thematische, selten auch athematische Nomina der Bedeutung 'den durch die Basis wiedergegebenen Sinesseindruck hervorruhend' stehen, die ursprünglich wohl adjektivische Funktion besitzen, doch zur Substantivierung neigen (1983:267).

She distinguishes such forms from reduplicated *-ye/o- verbs which do not correspond to nouns and adjectives. Some of the pairs of nouns and verbs she cites are given below:

91. Greek onomatopoetic verbs; corresponding nouns and adjectives (stems cited as in Tichy 1983)

1. Hes. kokkúze- 'cuckoo' (verb); kókkuks 'cuckoo' (noun)
2. Cratin. gargaíre- 'swarm' (v.); Aristomen. gárgara (nom. pl.) 'swarm'
3. Hom. mormūre- 'boil, bubble'; mórmuro- (a fish name; Tichy interprets it as a variant of múrmā)
4. Hom. porphūre- 'billow, surge'; Myc. po-pu-re-jo-, po-pu-ro₂ 'purple,' Hom. porphúreo- 'purple,' halipórphuro- 'sea-purple,' Aol. porphúrio-, pórophuro-
5. Hom. marmáíre- 'shimmer'; Hes. marmáreo- 'shimmering'; Hom. mármaro- 'marble'
6. Hom. daidálle- 'work elaborately'; daidáleo- 'elaborately worked'; daídala (nom. pl.) 'pieces of elaborate work'
7. Hom. maimalo- in patronymic Maimalídēs; Myc. personal name ma-ma-ro-; name of river Maimalōpe(s)-
8. Hom. paipalóent- (adj.), 'shimmering'; polupaípalō- 'rich in illusions'

As was the case with Hoffmann, Tichy uses the term "onomatopoetic" in a broader sense than I would. She suggests, for instance, that the noun mámaro- 'marble' and

the verb marmaře- 'shimmer' are based on an Indo-European root *mer- 'to shimmer,' while such a formation may have a sound-symbolic component, it is not directly imitative in the way a noun such as kókkuks 'cuckoo' is.

Tichy's only reason for positing adjectival ancestors of the nominal forms is that she has difficulty semantically with the notion of nouns formed from verbal roots directly via reduplication. Given the cross-linguistic pattern I described earlier, however, there is no reason to treat either nouns or adjectives as primary; both can be formed directly via reduplication. For example, the noun daǰdala 'pieces of elaborate work,' can easily be explained as a formation based on the root Indo-European root *del- 'to carve,' also seen in the name of a Latin chopping tool, dolābra, and in Greek delto-, 'writing tablet.' Tichy expresses uncertainty about this etymology because she has difficulty semantically relating the reduplicated form to the verbal root. Within the analysis suggested here, however, the traditional etymology fits nicely: a verbal root meaning 'to carve' is reduplicated to create a noun referring to an intricately carved object. The noun can then be used to make a denominal verb meaning 'to carve intricately,' or, more loosely, 'to do an action strongly associated with the noun.'

Tichy further notes (1983:381) that the same pattern of reduplicated verbs with *-ye/o- alongside nouns based on the same reduplicated stem is attested in Slavic; she cites OCS. glagolje-, glagolati 'speak' compared to glagolŭ 'utterance,' Czech. krákorati 'crow, cackle' compared to krákor 'cackling,' Russ-CS. tot(i)nati 'to sound' compared to OCS. totŭnŭ 'a sound,' and so on. She mentions in passing that Hittite also exhibits reduplicated verbs with *-ye-, with both onomatopoeic examples such as tastasiia- 'whisper' and iterative examples such as hulhulīia- 'fight' beside hulla-, hullai- 'do battle with' attested; she does not, however, discuss the Hittite nominal forms I have discussed in this section.

3.3.4 The linking vowel -i-

The evidence discussed thus far provides a motivation for connecting the Hittite forms with the Greek nominal and verbal forms and the Sanskrit denominal forms. It is still possible to follow Hoffmann in treating the Sanskrit intensive verbs as a separate development. To address this question, I wish to return to the Hittite forms with connecting -i-, since these stems give us a formal motivation for relating the Hittite class with the Sanskrit intensive class: the forms in question are waliwala- 'strew,' parip(a)rie- 'blow (a horn),' halihlie- 'kneel', and lahhilahhie- 'be excited,' As mentioned earlier, these forms resemble Sanskrit intensives such as kanikrand- 'neigh.' It is possible that the resemblance between the two sets is coincidental. Another possibility is that the Hittite forms are vestiges of a distinct intensive verbal class and should not be grouped with the Hittite reduplicated denominal verbs, although they should be linked with the Sanskrit intensives; supporting this second possibility is the existence of unreduplicated verbal stems haliya- 'prostrate oneself' and parie- 'blow' corresponding to halihlie- and pariparie-. The third possibility, of course, is that the two sets descend from the same original source. It is this last possibility that I will consider at greater length.

The question of the source of the connecting -i- vowel in Sanskrit is a vexed one; thus far there has been a striking lack of success in identifying its historical origin. Beekes (1981) explores the possibility that either laryngeal-initial or laryngeal-final roots may have been responsible for the origin of the class; as he admits, however, there is at best a tenuous correspondence between roots which ended or began in laryngeals in the proto-language and roots which take the linking vowel -i- in their intensive forms. Jamison (1983:43), speaking of the problem of explaining stem shape historically, states,

[This difficulty] is completely natural and understandable in a formation whose only function is affective. Once the various possibilities for reduplication and i-extension are established (and here, no doubt, historical explanations are legitimate), they will be exploited almost at random for intensifying effect, to produce a form with a satisfactorily 'strong' sound.

Jamison is probably correct in stating that speakers will exploit resources available to them in creating these forms, regardless of whether or not the stems they create are historically 'legitimate'; on the other hand, a closer look at the class suggests that it is possible to better understand the sources of the class than we have so far. Since a single historical source for the Sanskrit forms has thus far been elusive, I will explore the possibility of multiple origins for this set; I will suggest three distinct historical developments which have played a role in the creation of Sanskrit i-extension stems, in addition to the possibilities suggested by other scholars.

One reason certain roots form a stem with i-extension is to avoid forming a cluster with three consonants at the boundary between prefix and base. The following stems (some with -ya- suffix, some without) fall into this camp: kanikrand- 'neigh,' dauidyut- 'shine,' malimluc- 'set,' caniścād- 'shine,' kaṇiṣkand- 'leap,' paṇiṣpad- 'quiver,' saniṣyad- 'move on,' sanisras- 'fall,' and saniṣvan- 'sound.' On the other hand, out of over a hundred intensive stems found by Whitney (1885:233) in the earlier language or the earlier and later language, only two stems have a cluster with three consonants: dandramya- 'run' and caṅkram- 'stride.' In the later language, two more stems have such a cluster: dandhvan- 'scatter' and bambhram- 'wander.' Clearly speakers are exploiting the i-extension as a way of avoiding unwieldy consonant clusters. This extension is not the only means they have of avoiding such clusters, since they could instead have created a prefix of the form CV-, with the vowel heavy; instead, speakers seem to have preferred the i-extension.

A group of forms related to this first group are those roots which began with a voiceless aspirated stop. At the earliest stage of the language, such segments patterned like clusters rather than single consonants, reflecting their probable origin as clusters of stop plus laryngeal³⁹. Stems based on roots with initial voiceless aspirates show the i-extension in almost all cases (though admittedly the cases are few): canīkhud- or kanīkhun- 'have intercourse with,' panīphaṇ- 'spring.' A variant of the last stem, pamphaṇ-, and the stem parphar- 'scatter' are the only two examples based on roots with initial voiceless aspirates; it is likely that these forms were created as the voiceless aspirates came to be felt more and more as single segments.

Examination of the forms with i-extension in Sanskrit reveals another interesting pattern: clusters of forms with similar or identical prefixes. The most striking cluster consists of forms based on roots beginning with v-: vanīvan- 'win,' vanīvāhya- 'carry,' varīvr- 'cover,' varīvrj- 'twist,' and varīvrt- 'turn.' This handful of forms is all the more striking in light of the Hittite form w(a)riwarant- 'burning,' one of the handful of Hittite stems which exhibit the i-extension; possibly the form waliwālae- 'strew' (with *-ye- suffix) ought to be mentioned in this context as well. These stems do not, for the most part, come from a common ancestor. They do, however, share a similar phonological shape. One can explain these forms as the result of analogy: speakers created stems with the i-extensions due to their phonological resemblance to a pre-existing form with such an extension. The Sanskrit forms, taken in conjunction with the Hittite stem, make it highly likely that a root of the shape *wer- (or, more conservatively, *weR-, where R is any resonant) had a corresponding stem with i-extension in the proto-language. It is not possible to

³⁹ Note, however, that the long -ī- implies that the segments are being treated as single for the purpose of lengthening the i-extension; as Hoenigswald (1965:93) notes, the voiceless aspirates commonly behave as single segments for some purposes and as double for others.

determine which of the roots with that shape was the originator.

A second smaller cluster of forms all begin with m-: marimrjya-, marimrṣya, and malimluc.⁴⁰ The forms have in common a prefix of the form maR-; it is probably the case that the analogical force responsible for the creation of the last group of forms was also at work in this set. These Sanskrit forms bear some resemblance to three of the four forms Winter (1950) cites as i-extension forms in Greek: melibdesthai (meaning uncertain), médimnos 'measure for grain,' and mérimna 'anxiety.' Winter's etymologies are extremely uncertain; in the case of médimnos, he must posit a proto-form *med-i-md-n- to account for the attested form, and in the case of mérimna he must posit a dissimilatory change *r-r > r--n attested only in this form. In the case of the form melibdesthai he also posits a dissimilatory change in which the sequence -bl- becomes -bd- if an adjacent syllable also contains an l; this case is somewhat more persuasive because he cites other possible examples of the sound change, but since the form is so isolated its etymology remains unclear.

Although it is far from certain that médimnos and mérimna actually are reduplicated formations, it is still possible to invoke reduplicated stems with i-extension to explain the otherwise inexplicable -i- seen in these forms: they must have had a phonological resemblance to a reduplicated stem with i-extension of the form *meC-i-m-. Due to this resemblance, they acquired -i- by analogy. When these forms are taken in conjunction with the Sanskrit forms cited above, they point to the probable existence of a reduplicated i-extension stem of the form meR-i-.

At this point I have accounted for the enlargement of the class of i-extension stems in Sanskrit by invoking a tendency to avoid unwieldy consonant clusters and

⁴⁰ Note that this form was also mentioned in the context of forms which take the i-extension to avoid clusters of three consonants. The form may thus be doubly motivated.

by invoking analogy. Although these two factors, together with the influence of the set forms, account for the spread of the class, they still do not provide a starting point for the formation. The Hittite forms lahhilahhie- and walliwallie-, on the other hand, suggest a straightforward explanation for the linking i they exhibit: the i is a remnant of a stage in which i-stem nouns and adjectives underwent full stem reduplication. The unreduplicated nominal forms lahhi- 'fight,' which underlies the stem lahhilahhie-, points to this explanation, as does the reduplicated adjective walliwalli- 'turbulent' which underlies walliwallie-. The form dakkudakkuwae- 'blacken,' which seems to suggest the existence of a form *dakku-, offers a parallel u-stem remnant. It is possible that the nominal reduplication I posit for Proto-Indo-European, which could be based on verbal or nominal forms, in some cases involved this sort of complete stem reduplication.

If such i-stem nouns and adjectives are the source of the linking -i- seen in some of the Sanskrit intensives, then it would be expected that some of the attested forms would have i-stem cognates attested elsewhere. It is difficult to find many instances of such cognates. I find one cognate for the intensive stem kanikrand- 'neigh, shout': Pokorny analyzes the intensive stem as being derived from a root *k(e)lem-, and finds the same root in an i-stem noun in Germanic seen in the Anglo-Saxon word hlemm 'a sound.' Aside from this example, I can find no other evidence linking this group in Sanskrit with i-stem nouns or adjectives.

It is possible that the fourth example Winter (1950) adduces for the existence of i-extension stems in Greek offers an example of this formation: opīp-, seen in the verbal form opīpeúō 'ogle, spy upon.' Winter analyzes this form as a reduplicated formation based on the root meaning 'eye': *h₃ok^w - *h₃k^w.⁴¹ The etymology of

⁴¹ Note that Winter actually uses the symbol A to represent the laryngeal; he goes on to say, however, that in his opinion the form is one more argument in favor of reconstructing an o-

this form is extremely debatable: opposed to Winter's reconstruction is that of Beekes (1969:129), who reconstructs *opi-h₃k^w-. Chantraine (1968:808) and Frisk (1960:403) both express uncertainty about the etymology of this stem, but both seem to feel that Beekes' explanation is the least unlikely. If, however, Winter is correct, then the nominal form opis 'vengeance or attention of the gods' may offer a related stem with -i-. Given that the etymology of opīp- is so uncertain, however, this argument is not very strong.

The ultimate source of the i-extension still remains undiscovered. Anatolian evidence suggests one possible source for the segment: full stem reduplication involving i-stem nouns or adjectives. Without more clear-cut evidence, it is impossible to say with any certainty how plausible this suggestion is. Given that the intensive linking vowel has not been satisfactorily explained by invoking laryngeals, however, I suggest my alternative as a working hypothesis; let me emphasize that I view it only as a working hypothesis at this point.

In any event, the analysis of reduplicated nominal forms I have suggested offers the possibility of a semantic link between Sanskrit intensives and the reduplicated -ye/o- forms seen in Greek and Hittite. A reduplicated noun is created based on some behavior characteristic of an object; the source of the reduplication can be a verbal, adjectival, or onomatopoeic root. A derived verbal stem is then created meaning 'do an action associated with the noun.' Any behavior which is characteristic is one strongly associated with the object due to its being repeated or excessive. This notion of repeated or excessive behavior is the semantic link between the Vedic

coloring laryngeal. He is apparently reacting to arguments being made at that time (for example, Crossland 1951) that the two-laryngeal system posited by Pedersen (1938) on the basis of the Hittite distinction between -h- and -hh- ought to be adopted for Proto-Indo-European. Since the existence of an o-coloring laryngeal is now commonly accepted, I have used this segment in the reconstruction of the form.

intensives with ~~-ye-~~ and the Greek and Hittite forms. Sanskrit also has a class of intensive verbs formed via heavy reduplication but with no -ye/o suffix, and the class of denominal verbs would have collapsed with this class of intensives due to this point of semantic similarity; I leave open the question of whether this second class of intensive verbs is of Indo-European date or not. The etymology of the Greek verb daídalle- suggested earlier illustrates the proposed path of development. The Indo-European verbal root del- 'carve' is reduplicated to create a noun referring to an intricately-wrought object, as seen in the nominal form daídala and the adjectival form daídaleo-. This nominal stem is then used to create a denominal verbal stem daídalle-, meaning 'to carve intricately.' If the denominal verb daídalle- is compared directly to the original verbal root del- 'to carve,' however, the difference between the two forms seems to be one of intensivity.

3.4. Reduplicated hi-verbs

The last group of forms I wish to discuss are the reduplicated stems which belong to the hi-conjugation. Two main groups of forms belong to the hi-conjugation: the athematic forms and forms which show the stem-final vowel -a- in the singular and no vowel in the plural. In addition to these groups, there exist the isolated stem asas-/ases- 'seat someone,' and the few stems with the -ye- suffix found in the hi-conjugation. Given that the hi-conjugation has frequently been linked to the perfect conjugation seen in other Indo-European languages, one might wonder if these reduplicated hi-verbs can somehow be linked to the reduplicated perfects discussed in Chapter 4.

3.4.1. Athematic hi-forms

Oettinger (1979:43) lists three reduplicated athematic hi-stems: wewakk- ‘demand,’ lilakk- ‘fell,’ and kuwarkuwark- ‘preserve, save’ (?). Oettinger cites no attested forms of kuwarkuwark- and discusses it no further, and as I can find no other mention of the form anywhere, I must leave it out of this discussion. The form wewakk- is attested more frequently; Oettinger (1979:433) states that semantically the stem has the value of an intensive, although morphologically it does not exhibit the expected ‘heavy’ reduplication. Oettinger does not discuss or justify this semantic interpretation in any detail; van Brock (1964:127), discussing this form in more detail, suggests instead that the form is an iterative. To support this analysis, she cites, following Otten, a passage with the reduplicated verb which corresponds to an unreduplicated sk-form in a duplicate of the passage. She also cites a use of the stem when a series of requests are being asked of the gods. Overall, van Brock’s interpretation of the form as an iterative is more persuasive than Oettinger’s interpretation of it as an intensive.

The stem lilakk- ‘fell, make bend’ is only attested once, in a Middle Hittite text. It appears to be a corresponding transitive stem to the intransitive stem lāg- ‘bend, bow.’ This transitivizing use of reduplication is also seen in the stem asas-, ases- ‘seat,’ corresponding to the root ēs-/as- ‘sit.’ The usual way of expressing the meaning ‘fell’ involves the same root plus a causative suffix: laknu-. It is possible that the isolated occurrence of lilakk- is due to the combined analogical influence of ases- and wewakk-; that is, ases- provides a model for using reduplication to form a transitive verb, and wewakk- provides a model for reduplicating a hi-root of the form Cāk-; in support of this interpretation is the lateness of the attestation. It is also possible that the stem involves an archaic use of reduplication as a transitivizer.

Van Brock (1964:144-145) suggests another interpretation of the stems lilakk- and ases-: perfectivity. She suggests that the reduplicated form is used when the result of an action is envisioned. She cites a number of pairs of verbs in support of this analysis. One example is kukkurs- compared to kuer(s)- 'cut.' Although the usual interpretation of the reduplicated stem is that of intensivity, van Brock, citing a legal text in which the stem refers to cutting off the ears and nose of a slave for punishment, suggests that a better interpretation is 'sever.' She also compares lā- 'release' with lilai- 'liberate,' and dāi- 'place' with tittiya- 'place in a durable manner, establish.' The stems lilakk- and ases-, then, she interprets as focussing on the result of the action rather than on the action itself.

A number of problems make van Brock's arguments less than convincing. For example, her interpretation of the difference between kuer- and kukkurs- would be more convincing if she demonstrated that all uses of the reduplicated form refer to severing some object from another object rather than simply having the meaning 'mutilate' which is commonly attributed to this form; simply pointing to a handful of examples which can be interpreted to mean 'sever' is not convincing. Similarly, it is difficult to see how the stem ases- focusses on the result of the action of seating in a way that ās- (usually used with the enclitic -za and/or middle voice to mean 'sit') does not. In general the difference between a verb focussing on a result and one focussing on a process is subtle, particularly if that difference only affects a handful of verbs; there is significant danger that the linguist will find nuances of meaning that the speakers of the languages never drew themselves. A second significant difficulty lies in her treatment of reduplicated stems as if they existed in a morphological vacuum; that is, she discusses the reduplicated stems by themselves without discussing other morphological behavior of the forms. For example, the stem lilai- 'release' is a mi-verb but lilakk- is a hi-verb; surely this difference deserves to be at

least mentioned, if not accounted for in some way.

3.4.2 Stems with the alternation final -a/0

The last remaining set of forms are those which show the stem-final vowel a in the singular but are consonant-final in the plural. Oettinger (1979:63) cites the following stems as belonging to this group: lellip(p)a- 'lick,'⁴² lelhuwa- 'pour out,' memma- 'refuse,' pippa- 'throw down,' and sesha- 'order.'⁴³ Oettinger (1979:496) asserts that these reduplicated stems are actually the source of this entire class of forms, and that the stems are the descendants of pre-Anatolian reduplicated perfect stems. He suggests that roots which ended in h₁ or h₃ were ultimately the origin of this stem class. In the singular paradigm, he argues, the form would have the shape *Ce-Cóh_{1,3}-e-i for third person singular, and the shape Ce-Ch_{1,3}- for the plural forms, giving CeCâi and CeCwéni for third person singular and first person plural. The unreduplicated stems which fall into this category would differ from the reduplicated stems only in the absence of the reduplicative prefix; in all other ways, the stem behavior would be the same. The category was, he argues, quite productive, spreading with relative ease throughout the language.

Oettinger's argument has a number of flaws, some general, some involving his analysis of specific stems. One general flaw lies in his assumption that perfect stems, whether reduplicated or not, all had o-grade vocalism in the singular and zero-grade vocalism in the plural; as I note in Chapter 4, it is more likely that the reduplicated perfect and the unreduplicated perfect differed in stem vocalism. A

⁴² Oettinger initially classifies lellip(p)a- as belonging to this group but then treats it separately as an iterative formation based on lipp- 'lick.' He does not further explain the stem shape.

⁴³ Note that although Oettinger classifies the verb arrir(r)a- 'scrape' as an unreduplicated formation, it may well belong in the reduplicated group. Since the form's affiliation is not crucial to this discussion, I will treat it as an unreduplicated stem, as Oettinger does.

second major flaw in his argument is the fact that he cites no semantic evidence to support his contention that these forms were originally perfect stems. A general problem is that he assumes that the reduplicative vowel for the perfect stem was *-e-; as I argue in Chapter 4 on the basis of comparative evidence, the vowel was originally probably copied from the root. Furthermore, he cites no evidence that the forms had any perfect semantic value.

In addition to the general problem with assuming the reduplicative vowel was *-e-, a further problem lies in Oettinger's treatment of the Hittite data. He argues that the Hittite forms show reflexes of a putative Proto-Indo-European *-e-. In fact, in the attested forms for two of the three stems he discusses in this context (namely memma-, pippa-, and sesha-), the prefixal vowel is most often -i-. He cites four attestations of the stem he lists as memma-: me-im-ma-i, mi-im-ma-i, mi-im-ma-an-zi, and mi-im-ma-as. In the majority of cases, then, this stem actually shows -i- as the prefixal vowel. Oettinger explains this away by noting that the writing mi-im can often substitute for me-im, and by noting that in Late Hittite the orthographically careful scribes often wrote me-im; since his arguments seem primarily motivated by his desire to match the form to the theory, they are unpersuasive.

The second stem, pippa-, is invariably attested with -i- in the prefixal syllable. Oettinger notes that the spelling pi-ip can represent for either the vowel i or the vowel e. Another explanation, he suggests, is that the perfect vowel was influenced by a reduplicated present, as attested in Skt. ud pipīte 'lifts oneself'; the vowel of the present prefix, he notes, must be due to assimilation. Apparently the only explanation that he does not entertain is the possibility that the attested Hittite vowel is the original vowel.

The stem sesha- is usually attested with the vowel -e- in the prefix. Oettinger argues that the form has a semantic value compatible with the perfect conjugation,

stating “'befehlen' kann auch einen erreichten Zustand meinen’ (1979:499) but he gives no examples of such a usage. His interpretation of the form is unpersuasive.

The last stem, lelhuwa-, is first attested in a late stage of the language, and is a reduplicated formation based on lāhu- ‘pour out.’ Oettinger merely states that the form shows the productivity of this class. Van Brock (1964:126), following Otten, notes that the reduplicated form of the verb seems to mean ‘pour in several containers’ whereas lāhu- seems to mean ‘pour in a container.’ It is interesting to note that this semantic value for the reduplication resembles that seen in reduplicated Sumerian forms, as mentioned in Section 3.1.2: verbs undergo total reduplication to express plural objects of transitive verbs and plural subjects of intransitive verbs. It is possible that this semantic value might be due to influence from the Sumerian reduplicated forms.

Oettinger’s interpretation of these forms as reduplicated perfect forms thus is unconvincing for a number of reasons. It is interesting to note, however, that all the roots in this group ended in laryngeals in the proto-language; on that basis, one might connect these Hittite forms with the reduplicated present-tense verbs seen in Greek and Sanskrit. I will discuss the relationship between these forms and the Greek and Sanskrit forms in more detail in Chapter 5.

4. Perfect reduplication in Indo-European

4.0 Introduction

The purpose of this chapter is to discuss the reconstruction of the reduplicated perfect verb to Proto-Indo-European. My discussion will focus on two issues. The first of these is the question of the form of the reduplicated prefix in the proto-language; the second of these is the question of which roots were subject to reduplication, both in the proto-language and in the Indo-European dialects.

Before I begin my discussion, a note about terminology is in order. As is well known, in Latin, Gothic, and Old Irish the perfect verbal paradigm reconstructed to Proto-Indo-European no longer existed as a distinct and productive verbal category; although certain specific roots retained a corresponding reduplicated perfect stem, the stem functioned as a general past tense form rather than as a specifically perfect form. In grammars of Old Irish and Gothic, reduplicated past tense forms are traditionally called 'reduplicated preterits' (Thurneysen 1966:424, Krause 1953:220) even though they are historically perfects; in Latin, on the other hand, the reduplicated past tense form is traditionally called a 'perfect' (Leumann 1926, 1977:506) even though it lacks the semantic value of a true perfect, and in fact can continue both aorists and perfects. Using different terms to refer to the same kind of formation in different languages is confusing. For this reason, I will limit my use of the word 'perfect' to those languages which had a distinct, productive perfect category; in languages such as Latin, Gothic, and Old Irish, I will use the term 'reduplicated preterit' to refer to forms which may once have been but no longer are part of a perfect paradigm. Such usage, of course, differs from that seen in traditional Latin grammars, but it accords with that seen in Gothic and Old Irish. In these languages, the problem of distinguishing former reduplicated perfects from former reduplicated

aoists is a difficult one; I will discuss this point in more detail later in this chapter.

4.0.1 The form of the reduplicated prefix

The traditional analysis of the form of the reduplicated prefix has been that it must originally have shown e-vocalism in all cases. Brugmann (1892:1208) states: 'Die Reduplicationssilbe endigte bei den consonantisch beginnenden Wurzeln in uridg. Zeit aus -e-, einerlei welcher Ablautsreihe der Wurzelvocalismus angehörte.' Szemerényi (1970) follows this analysis:

In verschiedenen Sprachen assimilierte sich der Reduplikationsvokal im Laufe der Geschichte oder schon in der Vorgeschichte an den Wurzelvokal; vgl. z. B. momordī spopondī poposci pupugī cucurrī, die in Altlein noch mit mem- spep- pep- cec- anlauteten, oder air. -cúala 'ich hörte' aus *kuklowa, idg. *ke-klow-a, aind. bubudhē 'ich war wach' aus idg. *bhe-bhudh- (Szemerényi 1970:271).

Similarly, Leumann (1977), speaking specifically of Latin, states "Zum Reduplikationsvokal: normal e, s. oben cecidī usw. Nur durch Assimilation an den folgenden Stammvokal auch i, u und o" (Leumann 1977:586).

Meillet (1964), on the other hand, expresses the opposite opinion:

Les racines qui comprennent les sonantes *i et *u sont sujettes à présenter *i et *u dans le redoublement du parfait en indo-iranien et en italo-celtique.. Le fait que les formes à *i et *u s'observent dans des langues périphériques engage à y voir des archaïsmes; lat. scicidī, qui a le redoublement complet de -sc-, a i, tandis que la forme, sans doute de type plus récent, à consonantisme réduit, secidī, a e comme les formes grecques. Si en grec, et aussi en tokharien, le type à *e a été généralisé c'est qu'il a paru caractériser le parfait. Le type lat. tutudī, skr. tutudé apparaît ainsi comme une trace d'un état de langue ancien, où le

redoublement du parfait était relativement complet (Meillet 1964:181).

Scholarly opinion is thus divided as to the form of the reduplicated prefix in Proto-Indo-European, although the opinion expressed by Meillet seems to be a minority opinion. If, as scholars such as Leumann and Szemerényi suggest, the vocalism of the prefix went from being an e in all cases to being in some cases copied from the root, as seen in Sanskrit, Latin, and Old Irish, then Indo-European offers three cases running counter to the developmental tendency discussed in Chapter 1. On the other hand, dismissing the majority opinion merely on the basis of typological evidence is clearly unacceptable. Old Irish, Sanskrit, and Latin offer forms which, depending on the authority consulted, are either innovations or retentions; I will examine the data in each language in some detail to determine its relevance to the discussion at hand. In the discussion of whether perfect reduplication was originally vowel-copying or not, I will assume that the vocalism of the root in reduplicated perfect forms was originally zero-grade, with the o-grade vocalism seen in Greek and Sanskrit a later innovation; this assumption will be treated in detail in section 4.0.2.

4.0.2 The distribution of reduplicated perfects in the proto-language

It has long been accepted that Proto-Indo-European originally had two ways of forming the perfect: one way involved the unreduplicated root plus o-vocalism, and the other way involved the reduplicated stem. As early as Brugmann (1892), many scholars considered perfect reduplication optional. Bader (1968) explores the relationship between root vocalism and reduplication in more detail; she concludes that the reduplicated stem differed from the non-reduplicated stem in that it also had zero-grade vocalism in the root. Bader bases her argument first on data from Latin; the perfect system reflected in Greek and Sanskrit, with reduplication and o-

vocalism of the root syllable is, she claims, a relatively new system. Latin data, however, point to an originally twofold perfect system. One system (reflected in forms such as uīdī⁴⁴) involved o-grade vocalism and no reduplication. The other system (reflected by such forms as dedī) involved reduplication and the zero-grade form of the root. She argues (pp. 169-174) that none of the Latin reduplicated perfects is distinctively characterized by o-vocalism⁴⁵; instead, the vocalism is either zero or identical to the vocalism of the present.

Bader finds that the same distinction can be pointed to by comparing other Indo-European languages. She notes that even in languages in which the normal means of forming a perfect involves reduplication, isolated remnants of non-reduplicated forms exist. In Greek, for instance, she notes that forms which have a prothetic e- do not reduplicate, and that a non-reduplicated Mycenaean form woke is attested. She also finds that in Vedic, some participles made from perfects do not show reduplication; for example, -viśivās-, a non-reduplicated form, exists alongside vivéśa (from viś- 'enter'), and sāhvās- exists alongside sāsāha and sasahvās- from sah- 'vanquish.' Cognate sets, such as Goth. man compared to Skt. mamné and Goth. kaus compared to OIr. roi-gu (from an earlier reduplicated form), point to the optional nature of reduplication. She concludes by summarizing the distribution of the two kinds of reduplication in the following manner:

⁴⁴ It is possible that the form uīdī is not a perfect; Ernout-Meillet (1959:734) suggest that the semantic value of the form in Latin speaks against connecting the form with Skt. véda and Gk. oīda. Watkins (1969:152) finds their argument convincing; he suggests that uīdī is actually an aorist. This reanalysis of the form does not affect Bader's argument in any substantial way; even if the Latin form is not a perfect with o-grade vocalism, the forms Skt. véda and Gk. oīda certainly are.

⁴⁵ One set of forms, however, exhibits o-vocalism in both the present and the perfect stem: those for which the present stem is an old iterative. Note that in the case of these forms, o-grade vocalism cannot distinctively characterize the perfect stem; I will return to this point later in this chapter.

La relation entre la présence ou l'absence du redoublement peut se définir de la manière suivante: le redoublement est facultatif, mais un parfait n'en peut manquer que s'il a le vocalisme **-o-* (type *oīda*, got. *man*).

To paraphrase Bader, then, an unreduplicated perfect stem was only possible if the root in question could exhibit o-grade vocalism. If, for some reason, the root was incapable of such vocalism, then reduplication was obligatory, and the root occurred in zero-grade.

Beeler (1978) points to a similar situation in Gothic. He notes that in Gothic the Class 7 preterits, formed via reduplication, must continue the Indo-European reduplicated perfect. He further notes that, aside from reduplication, the other defining characteristic of the class is the fact that the stem does not show ablaut. This behavior in Gothic clearly correlates with the behavior of the reduplicated preterits in Latin.

The theory developed by Bader and Beeler is undoubtedly correct; however, it leaves a number of questions unanswered. When the languages in which perfect reduplication has remained relatively limited are compared, certain root shapes recur; the most striking case is that of roots which originally contained **-a-* in the proto-language, as Watkins (1962:167) notes. Given the theory outlined above, the presence of these roots is unsurprising: they could not participate in regular ablaut patterns because of their unusual vocalism. Similarly, Bader (1968:172) notes that one clear set of examples in Latin comes from roots which ended in a laryngeal in the proto-language: examples are *dedī* 'give' from **deh₃-*, the compound form *-didī* from **dheh₁-* 'place,' and *stetī* from **steh₂-* 'sit.' Again, the presence of this set of forms within this group is easily explicable because of the vowel-coloring effects of the final laryngeals; the roots would differ from normal ablaut patterns because of their altered vowels.

Other sets of roots, however, occur among both Old Irish and Latin reduplicated preterits, and their presence in the group is much less explicable. The most noteworthy set is that of roots containing the vowels -i- and -u-. Instances of such root shape are quite common in both Latin and Old Irish; furthermore, as I will argue in this chapter, the reduplication exhibited by such roots is archaic, suggesting that the association of these roots with this class may be of early date. The problem is that nothing about these roots would prevent them from participating in normal ablaut patterns: the famous Greek reduplicated perfect λέλοιπα 'I leave' demonstrates that a root with the vowel -i- can quite readily take o-grade vocalism. We could, of course, dismiss the forms by saying that if reduplication was optional then presumably any root could undergo perfect reduplication if a speaker was so inclined, and that some of these optionally reduplicated stems simply remained viable in the language, even when the reduplicated preterit class was relatively limited, as it was in Latin and Old Irish. Such an explanation is unsatisfying; although it might be acceptable to explain a handful of random forms, it is much less reasonable when dealing with a coherent group of roots. A further explanation must be sought.

If we shift our attention from the issue of root shape and begin to look elsewhere for possible explanations, one pattern begins to emerge. In Old Irish, Latin, and Gothic the use of reduplication to form the perfect correlates very highly with the shape of the present stem: if the present stem shows invariant vocalism, and if that vocalism is something other than -e-, then the root is likely to form its preterit via reduplication. In order to demonstrate this correlation, I will discuss the reduplicated preterit classes in Old Irish, Latin, and Gothic in detail. Since this issue is, strictly speaking, outside the realm of reduplication proper my discussion must be brief; the discussion is meant as a preliminary treatment of a topic I intend to return to at a later date rather than as an exhaustive analysis.

4.1 Old Irish reduplication

4.1.1 The Old Irish prefix⁴⁶

The scholarly disagreement as to the original quality of the vowel in the reduplicated prefix is echoed in the principal grammars of Old Irish. Pedersen (1913) follows Brugmann in asserting that the vowel of the reduplicated prefix was invariably e, and that Old Irish forms which exhibited a vowel copied from the root in the prefix were innovations in late Old Irish and early Middle Irish: 'Die Reduplikationssilbe hat (im Gegensatz zum reduplizierten Futurum) immer den Vokal -e- (ohne Hebung)...In vereinzelter, spät-altirischen und mittellirischen Belegen hat die Reduplikationssilbe den Wurzelvokal des Verbums (des Präsens) angenommen...' (1913:367). Thurneysen (1966), on the other hand, treats forms with -o- in the prefix as continuing earlier *-u-, which must be the result of copying the *-u- of the root syllable, and suggests that for roots with -i-, the -e- seen in the prefix must likewise be the result of lowering an original high vowel. The proper analysis of the Old Irish reduplicated preterits thus remains unresolved.

Most of the reduplicated preterits in Old Irish exhibit -e- in the reduplicated prefix; as Thurneysen notes, in some cases this -e- may be the result of a lowered *-i-, but since no evidence confirms or denies this analysis, the question must remain unresolved. Two distinct sets of forms show vowels other than -e- in the prefix: stems which show -o- as the prefixal vowel and stems in which the prefixal vowel varies.

⁴⁶ Note that I have followed the standard conventions of citing Old Irish forms; thus a vowel with an acute accent (e.g. *í, é*, etc.) represents a long vowel, not an accented vowel.

The first set of forms are those which show o in the prefix; they are given in table 90. The forms are all attested in Old Irish or Early Middle Irish:

92. Old Irish roots which exhibit -o- in the prefix

(oss-)bond-	bobad-	'refuse'	*bheudh-
bongid	bobag-	'breaks'	*bheg-
(in-)loing	lolag-	'unites, occupies'	*legh-

Thurneysen states that the o is the result of lowering u through regular sound change; he describes the set of roots as "u-roots." A close look at the forms, however, suggests that describing them as u-roots is an oversimplification. The verb (oss-)bond- 'refuse,' has as its Indo-European ancestor the root *bheudh-, which does exhibit a u as part of the root; furthermore, the Irish present stem bond- has the corresponding cognates Greek punthánomai and Lithuanian bundù, pointing to the present stem being formed via the nasal infix in the proto-language. The verb bongid is descended from the root *bheg-, also seen with nasal infix in the Sanskrit present bhanákti. The o vocalism seen in the present stem is probably the result of the initial labial. Its reduplicated preterit must have been formed on analogy with (oss-)bond-, due to the strong resemblance between their present stems. The final member of the group, (in-)loing, 'unites, occupies,' also descends from a root which did not contain a u; Pokorny reconstructs the root *legh- for this verb. As Watkins notes, the nasal infix and vocalism seem to be Celtic innovations; whatever the origin of vocalism and infix, it is clear that the reduplicated preterit corresponding to this stem was created because of the present's resemblance to (oss-)bond- and bongid.

The group of forms which Thurneysen classes as u-roots thus does not provide the clear support for reconstructing vowel-copying perfect reduplication for roots with a u that Thurneysen suggests. On the other hand, Pedersen's analysis (1913:367) is also unsatisfactory. He suggests that the preterits took the vocalism of

the present stem to create the reduplicated prefix of the preterits, and suggests that this was a late development in Old Irish, but discusses the topic no further. It is true that none of these verbs is attested in the oldest texts, but that statement alone is not significant; certainly no other preterit forms of these stems are attested either. The lack of forms is simply due to the vagaries of attestation. A more compelling reason for rejecting Pedersen's analysis is that it is difficult to provide a motivation for speakers deciding that the vowel of the present stem would sound good in the reduplicated prefix of the preterit stem when the vowel of the preterit stem itself differs from both. I suggest instead that this small group of forms originated because of the behavior of (oss-)bond. If the preterit of this stem was a reduplicated perfect with u in the prefix, then we have a starting point for the development of this small set of forms. The two other verbs bongid and (in-)loing then modelled their preterits on that of (oss-)bond simply because of the strong similarity of their present stems. In general, it is the case in Old Irish that present stems which end in the sequence nasal plus stop formed reduplicated preterits; I will return to this point later. Assuming that the reduplicated preterit bobad- corresponding to (oss-)bond is archaic allows us to posit a much more natural sequence of events than that suggested by Pedersen.

One further piece of evidence supports this treatment of stems containing u: the preterit -cíala from the present stem ro-cluinethar 'hears,' with its Welsh cognate cigleu. The proto-form of the root is *kleu-. The long u points to the loss of the root-initial consonant; the vowel almost certainly came from an original u. Since in Old Irish times the form did not appear synchronically to be reduplicated, the vocalism in the prefix cannot be explained as the result of a late development; instead, the vocalism of the original prefix must be archaic.

A second group of forms show vocalism other than -e- in the reduplicative prefix. These are the forms in which the prefixal vowel varies between -e- and -i-.

Thurneysen states that these forms come from roots which ended in -i- in the proto-language. The forms are given under 91.

93 A. Forms with varying prefixal vowel

*den(a)id	3 sg. did	'sucks'	*dhēi-
len(a)id	3sg. -lil, 3pl. -leldar	'follows'	*(g)lei-
ren(a)id	1sg. -rer, 3sg. -rir	'sells'	*perh _x -

In addition to these reduplicated forms, a number of preterits exist which are not reduplicated synchronically but clearly point to earlier reduplicated forms and which show similar variation between -e- and -i-; these are given under 91 B.

B. Formerly reduplicated

cren(a)id	1sg. -cér, 3sg. -cŭir	'buys'	*k ^u rei-
glen(a)id	3sg. -gŭil	'sticks fast'	*(g)lei-
tlen(a)id	3sg. ro-t[h]ŭ[i]l	'takes away'	*tel-

These forms differ from other reduplicated preterits in a number of ways. Although, as Thurneysen states, most of them ended in -i- in the proto-language, in the preterits forms this -i- seems to have been lost; Thurneysen (1966:427) states, 'Most verbs whose roots ended or were felt to end in i have a reduplicated preterit, which is formed as if the radical final had been lost and the personal endings added directly to the preceding consonant.' In this set of forms the vowel in the reduplicative prefix varies, showing i in the third person singular but e in other persons and numbers. The explanation of this variation is unclear. Thurneysen seems to interpret the first and third person singular as coming from proto-forms with different vowels in the prefix, but doesn't specify how far back he projects this distinction; certainly nothing else in Indo-European suggests that it was present in the proto-language. One way of explaining the variation is to hypothesize that the original vocalism of the prefix

was i; the first person singular ending, *-a, and the third person plural ending, *(a)-ar, would account for the lowering of the prefixal vowel seen in these forms. Another possibility, however, is to posit an e vowel for the prefix and to suggest that the apparent i in the third singular forms simply express the fact that the third singular preterit is marked by palatalization of the stem-final consonant; Pedersen, in fact, suggests this interpretation of forms such as dith and lil. Under this analysis, the forms which apparently show a long í due to compensatory lengthening, such as cíuir and gíuil, must be interpreted as nothing more than variant spellings of a long *é; compare the variant spellings of the genitive of the word 'kindred,' cenél, which is spelled cenéuil, cenéoil, and ceníuil. Unfortunately no evidence exists that would allow us to choose between the two explanations. Most of the roots which fall into this class did in fact end in i in the proto-language; renaid 'sells,' however, comes from the root *perh_x-, and seems to have fallen into this class because of the similarity its present stem bears to the other members of the class. The verb tlen(a)id, 3sg. ro-t[h]íu[i] 'takes away,' from the root tel- corresponds to Latin tollō, tetulī; both the Old Irish and the Latin present stems show the nasal affix *-nā-. As I will argue in the next section, this nasal affix was probably responsible for the creation of a reduplicated preterit corresponding to this present stem.

One form in Old Irish, cachain from earlier cechain, shows a clear case of a prefixal vowel assimilating to a root vowel. The form is first attested in Middle Irish; cechain is attested earlier. All the evidence points to this form being an isolated case rather than an indicator of a trend: the vowel in the prefix, a, is only seen in this form, and the form is attested later than the forms of other verbs with -o- in the prefix. Certainly it is unlikely that we could generalize from the behavior of this form to the behavior of the so-called u-stems. It is possible that the preterit form arose in an attempt to avoid ambiguity with the reduplicated future stem, *cechana-,

which exhibits -e- in its prefixal syllable rather than the -i- which is usual for reduplicated future stems.⁴⁷

4.1.2. Old Irish stem shape

The Old Irish reduplicated preterit class is interesting in a number of respects. The first point to note concerns the behavior of root-initial consonants with respect to lenition: the expected outcome of a form *keklad- 'digs,' for example, would be unattested *cēlad-. As Watkins (1962:149) points out, the attested stem cechlad- suggests that Irish must have gone through a period of partial recompounding of such forms, both in the reduplicated preterits and in the reduplicated futures. This suggests that reduplication must have been a partially productive process until fairly late in the prehistory of Irish.

A second interesting question concerns the root vocalism -a- seen in the singular forms of these verbs. Table 92 shows a sample paradigm illustrating the the person and number alternations these verbs undergo.

94. Old Irish reduplicated preterit paradigm: reg- 'carry back'

1	sg.	-rerag	pl.	-rergammar
2		-rerag		-rerg(a)id
3		rer(a)ig		rergatar

In his discussion of these forms, Thurneysen seems to assume that the vocalism was -o-, accounting for the fact that the root-initial consonant has neutral quality in the reduplicated forms even if it has palatal quality in its present stem. Watkins

⁴⁷ This explanation leaves unanswered the question of why other reduplicated preterits for which a corresponding reduplicated future with -e- rather than -i- exists, for example memais-, 3 sg. from ma(i)id 'breaks' and nenas-, 1 sg. from nascid 'binds,' did not undergo a similar change.

(1962:142) asserts that Celtic in all cases generalized the zero-grade form of a stem throughout the paradigm, and that the apparent reflex of an Indo-European $\bar{o}$ -grade seen in these forms is illusory; unfortunately, he does not offer any evidence to support his claim. The above forms seem to show clear variation between full and zero-grade forms of the root. It is more likely, however, that the variation is simply the result of apocope; in all of the plural forms, the root vowel would have been in the syllable in which the vowel is normally lost. The vowel seen in the root in the singular is usually -a-; in an unstressed syllable, however, the vowel can tell us little about the original vocalism and serves primarily to mark the quality of the adjacent consonants.

As mentioned earlier, one coherent group of forms derive from roots which had the vowel -a- in the proto-language. The following are the attested roots:

95. Old Irish roots with PIE *a

braigid	bebrag-	'farts'	*bhrag-
claidid	cechlad-	'digs'	*klād-
canid	cechan-	'sings'	*kan-
maidid	memad-	'breaks'	*mad-

A second coherent group of forms are those which contain or contained the root-final sequence nasal plus stop. The forms are given below:

96. Old Irish roots with final sequence nasal + stop

lingid	leblang-	'leaps'	*(s)pleigh-
dringid	debrang- ⁴⁸	'climbs'	*dh(e)regh-
(oss-)bond-	bobad-	'refuse'	*bheudh-
bongid	bobag-	'breaks'	*bheg-
cingid	cechang-	'steps'	*ghengh-

(for-)ding -dedag- ‘oppresses’ *dhengh-

The motivation for members of this group forming reduplicated preterits can only be guessed at; the models for the group most likely were originally those roots which, in Indo-European terms, took the nasal infix in their present stem, seen in such forms as (oss-)bond- ‘refuse’ and lingid ‘climbs.’ The nasal infix had the effect of obscuring ablaut variation in the present stem, since it required the zero-grade form of the root; for example although in the Sanskrit present paradigm we see variation between singular and plural forms such as full-grade yunájmi ‘I yoke’ and zero-grade yunájmas ‘we yoke’, the fact that in the present stem the root vowel u doesn’t undergo its normal ablaut variation between vowel and semi-vowel would have made the root vocalism seem invariant; the infix carries the ablaut variation instead of the root. If the root contained a sonorant which could be vocalised in zero-grade, then that sonorant would have remained vocalised throughout the present paradigm. This invariant vocalism would have motivated speakers to use reduplication to form the perfect stem. Once a root-internal nasal was established as the marker of present stems which underwent reduplication to form the perfect stem, then roots in which the nasal was not a separate infix or roots which did not contain a sonorant, would be liable to reduplication.

A related set of roots are those which end in the sequence -nn- in Old Irish. The following are examples:

97. Roots ending in -nn-

(fo-)gleinn	-geglann-	‘learns’	*ghlnd(h)-n-
bruinnid	*bebrann-	‘flows’	*bhmdh-n-

⁴⁸ Note that dringid, debrang- ‘climbs’ formed its unusual preterit due to its resemblance to lingid, leblang- ‘leaps,’ with the -b- of leblang- pointing to a root with initial *p-.

(ad-)greinn -gegrann- 'persecutes' *ghrmdh-n-

Etymologically, the forms in this group have in common the fact that their source in the proto-language ended in the sequence nasal + stop; furthermore, Pedersen (1913:478, 540, 548) argues that these roots all formed their present stem via the nasal suffix **-na-*. Thurneysen (1966:353), noting that *-greinn* is cognate with OCS. *grędo* with both vowels nasalized, and with Latin *gradior*, argues that the stem with nasal suffix was present in the proto-language. The verb *sennid*, *sephann* (<**sesw-*) 'plays,' for which Watkins (1962:130) reconstructs **suenh_x-*, and the verb (*do-*) *seinn*, *sephann*- 'pursues,' for which Watkins reconstructs **senh_x-*, formed reduplicated preterits because of their resemblance to the other members of this group.

Another distinct subset of stems are those which involve a root which ended in *-i-* in the proto-language; most of these have also taken the nasal suffix also seen in Sanskrit Class IX verbs such as *grbh-nā-mi* 'I grab.' The following are the stems cited by Thurneysen:

98. Roots ending in *-i-*

*den(a)id	3 sg. did	'sucks'	*dhēi-
len(a)id	3sg. -lil, 3pl. -leldar	'follows'	*(g)lei-
cren(a)id	1sg. -cér, 3sg. -cŕuir	'buys'	*k ^u rei-
glen(a)id	3sg. -gŕuil	'sticks fast'	*(g)lei-
tlen(a)id	3sg. ro-t[h]ŕu[i]l	'takes away'	*tlēi-
ren(a)id	1sg. -rer, 3sg. -rir	'sells'	*perh _x -

The first two forms cited, *len(a)id* and *den(a)id*, clearly exhibit reduplicated preterits; the long vowels in the preterits of *cren(a)id*, *glen(a)id*, and *tlen(a)id* point to earlier forms with reduplication.⁴⁹ The presence of the nasal suffix guaranteed that the roots

⁴⁹ It is, of course, always possible that a preterit with long vowel could have been created on analogy with one of the other forms, without ever being reduplicated at all. Certainly the original model for this handful of forms must have come from a reduplicated stem; more than that is im-

would always be in the zero-grade and hence would exhibit invariant vocalism; the presence of the root-final *-i- guaranteed that the vocalism was something other than *-e-. An interesting point to note is that the stem ren(a)id 'sells' also fell into this class because of the resemblance of its present stem to the other members of this class, even though the root did not end in an *-i- in the proto-language. This point is significant because it illustrates a general tendency in Old Irish for a root to form a reduplicated preterit if its present stem rhymed with that of another verb which also formed a reduplicated preterit. This tendency suggests that to Old Irish speakers (or pre-Old-Irish speakers), the most important factor determining how a root formed its preterit was the shape of its present stem. The point is important to my analysis of the membership of the reduplicated perfect class; I will return to it later.

The preterit of the verb ara-chrin, ara-ruichíu 'decays,' points to an earlier reduplicated stem. As Pedersen (1913:339) notes, the raised vowel of the present stem points to an earlier formation with the "suffix" *-nu-, with the zero-grade form of the suffix generalized throughout the paradigm; the Skt. cognate śmāti 'breaks,' however, points to the suffix *-nā-. Pedersen suggests that the various classes of stems with nasal affixes must have become confused at some point during the prehistory of the language.

The verb ciid, cích 'weeps' also exhibits a reduplicated preterit. The etymology of this verb is obscure. Suggestions made by a variety of scholars are cited in Vendryes, but none of them is entirely persuasive. Pedersen, for example, posits a root *kei-, but can connect the root to no forms in other languages. Quin connects ciid with the verb ad-cí 'sees,' suggesting an original meaning 'do something with the eyes' as the source of these two verbs, but such an etymology is extremely possible to say.

doubtful. Lindemann connects the Irish verb with Skt. káuti 'he cries,' suggesting that in Irish the root occurs on zero-grade in suffixed form: *kw-éyeti. Lindemann's proposal, though not completely persuasive, strikes me as the most reasonable. In any event, the immediate ancestor to the attested form must have been a root or stem which seemed to end in -i-; that stem form most likely accounts for the creation of the reduplicated preterit attested in Old Irish.

Another verb which illustrates the importance of stem shape to the formation of the reduplicated perfect is the verb ro-cluinethar 'hears,' with its corresponding preterit -cúala-. As was mentioned earlier, the long vowel in -cúala indicates that the preterit must originally have been reduplicated. The history of the verb is a little complicated; as Vendryes (1959:C-128) notes, at some point the original present stem *kl-n(e)i-u- with nasal infix (compare Sanskrit śṃóti) must have been transformed into *kluni-, on analogy with forms without the nasal infix which were based on *klu-. The vocalism of the root in either the original or the remodelled present stem would have been invariant; nevertheless, it is most plausible to assume that speakers created the form -cúala after the present stem had been remodelled.

Another group of verbs which would have had invariant vocalism in their present stems is the set of verbs which formed their present stem with the iterative/inchoative suffix *-ske/o-. This group is represented by one verb in Old Irish: nascid 'binds,' with corresponding preterit nenasc-.

A further identifiable subgroup of reduplicated preterits in Old Irish are based on roots which form their present stem with a zero-grade root with thematic conjugation.

99. Roots from athematic presents

nigid	nenag-	'washes'	*neig-
ligid	lelag-	'licks'	*leig-

snigid	senag-	'drips'	*sneig ^w h-
mligid	do-ommalgg ⁵⁰	'milks'	*melg-

Watkins (1962:141) points out that these verbs, as well as the verbs fichid 'fights' and dligid 'is entitled to' have in common the fact that they are formed on the zero-grade of the Indo-European root, with thematic conjugation. Following Meillet, he argues that in Indo-European all of these roots were the basis for athematic present paradigms. In Celtic, he argues, the zero grade of the root was generalized throughout the paradigm, and the athematic endings were replaced by thematic endings. Meillet (1911:62), discussing the various reflexes of the root *melg- 'milk,' notes that the athematic paradigm was lost very early on in the prehistories of the daughter languages. In the context of this study, what is interesting is the fact that after this change in the paradigm took place, the present stem would have exhibited invariant vocalism. It is at this stage that the reduplicated preterits must have been formed. Certainly the high correlation between these stems with zero-grade vocalism and thematic conjugation and the reduplicated preterit suggests again that speakers were more concerned with present stem shape than with root shape when they were creating preterits. Unsurprisingly, the verbs sligid, -selag- 'fells,' reg-, -rerag- 'straighten,' and (con-)rig, -rerag 'binds' all formed reduplicated preterits because of their resemblance to stems such as mligid and nigid.

One coherent group of forms remains to be discussed. These are forms for which no apparent phonological motivation can be seen, but which correspond to reduplicated present forms in a number of languages:

100. Old Irish reduplicated preterits

⁵⁰ Note: Watkins (1962:173) identifies do-ommalgg as reduplicated.

gainithir	génair	'is born'	*genh _x -
-gnin	géuin	'knows'	*gneh ₃ -
-moinethar	ménair	'thinks'	*men(h)-

The verb gainithir 'is born' corresponds to Greek gígnomai; the verb -gnin 'knows' corresponds to Greek gignōskō; and the verb -moinethar⁵¹ corresponds to Greek mimnēskō. It is probable that these verbs created reduplicated preterits because of the association between these roots and reduplication in the present stem.

A number of verbs remain unaccounted for. One of these is gonaid, gegon- 'slays,' from the Indo-European root *g^when-. Binchy (1956:230), discussing the phonologically similar Irish word gor 'dutiful,' argues convincingly that the latter form is the phonologically regular descendent of an o-grade formation of the root *g^wher- 'heat'; similarly, gonaid is an o-grade formation based on *g^when-. The fact that the verb was inherently o-grade meant that it could not use vocalism to mark the perfect stem; as a consequence, a reduplicated perfect stem was developed.

Another verb which remains unaccounted for is réd-, rerad- 'drive,' which comes from the Indo-European root *reidh-. The reason for the formation of the reduplicated preterit is unclear. Thurneysen classes this verb along with forms such as nigid, nenag- 'washes' and ligid, lelag- 'licks' as an "i-root", that is, a form containing *-i- in the proto-language and, he suggests, *-i- in the prefix. As I noted earlier, since any instance of *-i- in the prefix would have been lowered to -e-, it is impossible to tell what the prefixal vowel was for these forms. It is possible that the presence of *-i- in the root was possible for its forming a reduplicated preterit. Certainly the shape of the present stem bears too little resemblance to other presents

⁵¹ Thurneysen analyzes ménair as having been created on the model of génair. Since he gives no reason for doing so, and since the form corresponds to a reduplicated preterit in Latin, I will treat the reduplicated preterit as original.

corresponding to reduplicated preterits to point to any analogical influence.

It is clear that during the prehistory of Old Irish the most important determinant of whether a verb formed a reduplicated preterit or not was the shape of the present stem. Evidence for this behavior comes from the coherent subgroups found among the reduplicated preterits and from the fact that a number of verbs which had no etymological reason for belonging to the group came to be associated with it because their present stems resembled other stems with reduplicated preterits. Whether or not this focus on the present stem as a determining factor of the shape of the preterit can be projected back to the proto-language remains to be seen.

4.2 Latin reduplication

4.2.1 The Latin prefix

The Latin reduplicated preterit class is interesting both because of the form of the prefix and because of the membership of the class. The prefix seems to show a development towards vowel-copying reduplication away from fixed-vowel reduplication; this apparent development runs contrary to the trend I discuss in chapter 1. Leumann (1977), cited earlier, analyzes such forms as pupugī as the result of an original e in the prefix assimilating to the stem vowel. Even during Classical Latin times, forms such as pupugī were analyzed as later developments from pepugī. Aulus Gellius (Book VI.IX), for instance, notes that in Old Latin forms such as momordi and pupugī had e-vocalism in the prefix, summarizing his findings in the following way:

"peposci" et "memordi," "pepugi" et "spepondi" et "cecurri" plerosque veterum dixisse, non, uti postea receptum est dicere, per o aut per u litteram in prima syllaba positam, atque id eos Graecae rationis exemplo dixisse...

It is important to note, however, that Gellius was not describing contemporary linguistic behavior, but rather was citing forms he had come across in older authors; he makes no claim of having done an exhaustive search of the older literature. Because of the importance of Latin evidence to my claim, I will discuss the forms attested in Old Latin in some detail. I have also noted when the forms must have been used by noting when the various authors died (all citations are taken from the Oxford Latin Dictionary). The attested evidence allows me to suggest that the forms have traditionally been misinterpreted.

101. Latin preterits

A. currō, cucurri 'I run'

cucurrerit Cicero, pro Quinctio 79 (d. 43 B.C.E.)

cucurrit Ennius, Annales (d. 169 B.C.E.)

occecurrit Tubero, iur. 2 (d. 1st century B.C.E.)

occucurri Plautus, Mercator 201 (d. 184 B.C.E.)

The perfect form cucurri is found from the earliest times on. Gellius noted that a form occeccurrit was found in the writings of Tubero. A form occucurri, however, is found in Plautus, roughly a century earlier.

B. scindō, scicidi 'I cut'

scicidi Naevius, com. 94 (d. 201 B.C.E.)

Ennius, scen. 293

The form scicidi is attested in Naevius in the third century B.C.E.

C. tundō, tutudi

tutudō cited in Varro (d. 27 B.C.E.)

The earliest attestation of tutudi is a form cited by Varro.

D. pungō, pupugi, pepugi 'I pierce'

pupugit Naevius, com. 51

pepugī Caesar, gramm. 10 (d. 44 B.C.E.)

pepugisset Cicero, pro S. Roscio Amerino

pupugit Cicero, pro S. Roscio Amerino

Cicero, Tuscularae Disputationes

The form pupugit is attested in Naevius. Forms with e-vocalism are found in the first century B.C.E.; note, however, that Cicero shows both u-vocalism and e-vocalism.

E. discō, didicī, dedicī 'I learn'

dedicī Publilius, Sententiae Q.2 (first century B.C.E.)

didicī Plautus, Epidicas 591, Mercator 147, Poenulus 122

The form dedicī is attested during the first century. didicī, however, is found a century earlier.

F. mordeō, memordī, momordī 'I bite'

memordī Ennius, Satirae 63

Plautus, Poenulus 1074

Atta com. 6

G. momordit Ovid, Metamorphoses 3.69 (d. 17 C.E.)

memordī is found consistently in the oldest authors. momordī is first attested in Ovid.

H. spondeō, spopondī, spepondī 'I pledge'

spepondī Valerius Antias (first century B.C.E.)

Cicero, singulae voces ex incertis libris

Caesar, gram. 30

spopondisse Cicero, pro S. Roscio Amerino

spopondit Cicero, pro Caecira 7

spopondī Plautus, Trinummus 427

spepondī is found in the first century. Cicero again varies, showing sometimes e-vocalism and sometimes o-vocalism. spopondī is attested in Plautus.

I. poscō, peposcī, poposcī 'I ask'

peposcī Valerius Antias, hist. 60

Cicero, in Verrem II.2.117

poposcit Cicero, in Verrem II.1.86

peposcī is attested from the first century B.C.E. Cicero once again shows variation, this time in the same work.

Let me summarize the data: forms based on roots with u- and i-vocalism found in the oldest authors consistently show u- and i-vocalism in the prefix. Such forms show vacillation during the first century B.C.E. Forms based on roots with o- generally are characterized by e-vocalism in the earliest authors. They, too, show variation during the first century B.C.E. Note that the forms with o-vocalism in the root would not have had such vocalism in the proto-language; poscō 'I ask,' for instance, is cognate with Sanskrit pr̥chati 'he asks;' since the root would occur in zero-grade in a stem with the *-ske- suffix, the o-vocalism seen in Latin must have been developed during the pre-history of Latin. As Ernout-Meillet note (1959:526) the Latin form comes from an earlier *porc-scō, the reflex of Indo-European *pr̥k-sko-.

One possible explanation of the Latin pattern described above is that it could be due to later normalization of the texts. The problem with appealing to normalization as a way of dismissing the forms with i- and u-vocalism in the prefix found in the earliest authors is that one would have no explanation of why only these forms had been normalized while forms based on stems with o-vocalism had not. The result of

normalization ought to either be consistency, with all forms altered, or it ought to be randomness, with no discernible pattern to the later alterations. To dismiss as normalization a pattern such as the one seen above, however, in which forms with u- and i-vocalism show the root vowel in the prefix while forms with o-vocalism show e-vocalism in the prefix, is unreasonable.

The traditional analysis of the Latin development tacitly appeals to an analogical force which has frequently been assumed in historical analyses but has never actually been demonstrated. Essentially, this assumption is that for reduplicated forms, speakers tend to heighten the identity between affix and base. In the traditional scenario of the historical development of Latin, the assumption is that, if in some cases the prefix and the base come to be characterized by the same vowel, speakers will extend this new copying rule at the expense of the older rule which only copied the initial consonant. The effects of such a force run contrary to the effects of levelling; rather than developing a more consistent phonological shape across forms, an affix will develop a less consistent shape, but one which more closely resembles the base. Although one can certainly envision the possibility of such a reduplication-specific analogical force existing, the question remains of whether it actually does exist. As I argue in some detail in chapter 1, no unambiguous cases of such a development have been described; furthermore, no one has ever considered the question of how such a development would interact with the well-established historical process of levelling.

A comparison of the entire set of Latin reduplicated perfect forms with the Proto-Indo-European roots usually reconstructed for these forms shows another interesting split. With the exception of the verbs currō and discō, all the verbs which show u or i in the reduplicated affix in Latin are descended from roots which contained these (semi-)vowels in Proto-Indo-European. The following are the recon-

structed Indo-European roots: for scindō, *skei- 'cut'; for pungō, *peug- 'pierce'; and for tundō, *(s)teu-d- 'beat.' With these forms as a model, discō (from *deḱ- or di-dḱ-skō) and currō (from *krsō) also formed a reduplicated stem with copied vowel. Without exception, all the verbs which show i or u in the root syllable but e in the prefix have i or u only as a consequence of post-Proto-Indo-European developments. The following table shows all examples of reduplicated perfect verbs cited in Leumann which show -e- in the reduplicated prefix and the accepted etymologies of these verbs.⁵²

102. Latin perfects with -e-

cadō, cecidī	'fall'	*kad- (516)
caedō, cecidī	'cut'	*(s)k(h)ai- (917)
canō, cecinī	'sing'	*kan- (525)
teneō, tetinī	'hold'	*ten- (1065)
ferō, tetulī	'bear'	*tel-, tel - (1060)
tangō, tetigī	'touch'	*tag- (1054)
tendō, tetendī	'stretch'	*ten-d- (1065)
pangō, pepigī	'fasten'	*paḱ-, paḡ-
pendeō, pependī	'hang down'	?*(s)pen-d- (988)(uncertain etymology)
parcō, pepercī	'refrain'	etymology unknown
pariō, peperī	'bring forth'	*per- (818)
fallō, fefellī	'deceive'	?*(s)phal-d- (E313; "étymologie embarrassante.")
memenī	'remember'	*men(h _x)-

As the above table illustrates, in the proto-language these roots simply had no high

⁵² References taken from Pokorny are indicated by page number only; those taken from Ernout are indicated by an E followed by page number.

vowel for the reduplicative prefix to copy.

In synchronic descriptions of Latin, the difference between the roots seen in the above table and those such as pupugī and scicidī has been characterized as a difference between roots in which the root vowel differs in the present and the perfect and those in which the vowel remains constant. Leumann (1977:586) expresses the same distinction in slightly different terms by noting, "Diese Assimilation wirkt nicht mehr bei den aus a e o geschwächten i bzw. u..." The assimilatory rule traditionally posited to account for these forms thus has to distinguish between vowels which are primary and those which are the result of secondary developments. Given that assimilatory processes usually disregard morphological structure, the idea of an assimilatory rule which is constrained to apply only in reduplicative syllables, and only when the vowel of the root is not itself due to an earlier change, is highly implausible. Whatever the explanation of these forms may be, simply calling the process 'assimilation' with no further discussion is inadequate.

One further interesting point to note is the fact that a general assimilatory process involving the vowel o seems to have taken place in Latin: Kent (1945) cites forms such as homō compared to Old Latin hemōnem and bonus compared to Old Latin DVENOS. The date of this assimilation is unclear. The process took place when the intervening consonant was something other than r or a voiceless stop; it would certainly have affected a form such as memordī. The forms spepondī and peposcī would not have been liable to this assimilatory process because of the voiceless p intervening between the two vowels; on the other hand, although p would normally block the assimilatory process, perhaps the presence of another p found as the initial segment or part of the initial cluster contributed to the rounding of the prefixal -e-.

On the basis of the preceding evidence, I conclude that forms with -u- and -i- in the prefix had -u- or -i- in the prefix during the prehistory of Latin; these forms are archaisms rather than innovations. Other forms, however, originally had e-vocalism in the prefix. During the first century B.C.E., forms with -o- in the prefix arose partially through regular assimilation and partially on analogy with the older forms with -u- and -i-. The existence of these bi-forms led some speakers to create bi-forms based on the roots with -i- and -u-; these forms, however, had a brief existence. (In this context it is interesting to note that Gellius himself states that the older authors said that they followed Greek usage in using *e* in the affix where later authors copied the root vowel: "...atque id eos Graecae rationis exemplo dixisse" (p. 44). It may be that some of the bi-forms arose through deliberate imitation of Greek perfects.)

The Latin evidence thus does not provide a counter-example to my claim that vowel-copying reduplication rarely, if ever, arises out of fixed-vowel reduplication. The Latin forms with -o- in the root, it is true, do show a shift from fixed-vowel reduplication to vowel-copying reduplication, but they do so partly through regular vocalic assimilation also seen in other non-reduplicated forms, and partly on analogy with previously existing vowel-copying reduplication. It is unlikely that a system showing vowel-copying reduplication should arise out of a fixed-vowel system in the absence of strong analogic pressure from some source such as pre-existing vowel-copying reduplication.

4.2.2 Latin stem shape

The next point to consider is the question of what determined whether or not a preterit form was reduplicated. The standard analysis of the Latin reduplicated preterits is found in Leumann (1977:585):

Die Perfektstämme. Man unterscheidet wie in anderen idg. Sprachen traditionell starke und schwache Stämme. Die sog. starken sind gebildet entweder mit praefigierter Reduplikationssilbe (pe-pend-it zu praes. pend-it 'wägt') oder mit Wechsel der Stammgestalt gegenüber dem Praesens (sēd-it cēp-it rūp-it neben praes. sedeo capio rumpo); alle reduplikationslosen lat. starken Perfekta scheinen letzten Endes lautliche Ersatzformen für ältere reduplizierte Perfekta zu sein... Als Grundlage der Perfektstammbildung dient bei Primärverben von der Grundsprache her die Verbalwurzel, nicht der Praesensstamm; demgemäss sind die Perfektstämme unabhängig von den Praesentien, nach denen die vier lat. Konjugationen festgelegt sind.

I will differ from Leumann on two main points: I will assume that the relatively limited class of reduplicated preterits seen in Latin is archaic and not due to replacement of earlier reduplicated forms by unreduplicated stems, and I will argue that during the prehistory of Latin the shape of the present stem was the primary factor determining whether or not a root formed a reduplicated preterit stem.

One general difficulty in analyzing the Latin reduplicated preterits is the fact that it is sometimes difficult to determine if a given reduplicated form is a reduplicated perfect or an aorist, since the Proto-Indo-European perfect and aorist have collapsed into a single class in Latin. In fact, Leumann (1977:588) suggests that forms like tetuli and pepugī may well originally have been aorists, citing as evidence their Greek reduplicated aorist cognates am-pepalōn 'schwingend' and tetagōn 'fassend.' Bader (1968:168) cites Leumann (1926) in this respect but notes that the forms cited are participles; she cites Chantraine (1958:430), who states that in general in epic Greek it became possible to create a participle by adding the present participle suffix to a reduplicated perfect stem. The Greek evidence thus presents no strong reason for treating these forms as aorists rather than as perfects. Bader concludes her dis-

cussion with the reasonable statement of principle, 'tetigī, pepulī, cecidī qui ont et la redoublement et les désinences anciennes de parfait peuvent au moins, en tout cas, être considérés comme d'anciens parfaits, et c'est comme tels que nous les étudierons ici.' In this case I shall follow Bader; to state the situation less elegantly than she does, since the forms walk like perfects and quack like perfects, I shall treat them as perfects.

One distinct subgroup of forms within the reduplicated preterit class consists of those roots which had *-a- in the proto-language; this set corresponds to sets of forms in Gothic and Old Irish. The following are the forms:

103. Roots with *-a- in Latin

cadō	cecidī	'fall'	*kad-
canō	cecinī	'sing'	*kan-
caedō	cecidī	'cut'	*kaid-
fallō	fefellī	'deceive'	*(s)phal- (E313)
pangō ⁵³	pepigī	'fasten'	*pag-
tangō	tetigī	'touch'	*tag-

The etymologies of the verbs cadō, canō, and caedō are straightforward. The etymology of fallō is less so: Ernout-Meillet (1959:214) notes that the connection between the Latin verb and Greek sphállō 'I make fall' is too clear to be dismissed, but that the expected reflex of the initial consonant cluster would be Latin *p-. The verbs pangō and tangō could either be included in this subgroup or in the set of forms which take a nasal infix. The verbs pariō, peperi 'bring forth' and parcō, pepercī 'refrain' both fell into this set of forms because of their a-vocalism; whether

⁵³ A number of Latin verbs could belong to more than one subgroup; for the sake of easy reference, I list the verb in each of its possible subgroups.

or not this vocalism is of Proto-Indo-European date is unknown.

A second set of forms consist of verbs which show a nasal infix in their present stems; this set also corresponds to a distinct set of forms in Old Irish. Bader (1968:171) makes note of this subgroup, but only discusses the vocalism of the root in this set of forms. The following are the verbs:

104. Nasal infix verbs in Latin

tangō	tetigī	'touch'	*tag-
pangō	pepigī	'fasten'	*pag-
tundō	tutudī	'strike'	*teud-
pungō	pupugī	'pierce'	*peug-
scindō	scicidī	'cut'	*skēi-d-

Some of these verbs undoubtedly formed a present stem with the nasal infix in Proto-Indo-European: scindō corresponds to Skt. chináti 'he cuts,' and tundō corresponds to Skt. tundáte 'he bumped.' Other members of this group developed the nasal infix during the prehistory of Latin; Ernout-Meillet (1959:676) note that the verb tangō most likely did not take the nasal infix in the proto-language. Forms which acquired a nasal infix at a late date must have developed reduplicated preterits through analogy with forms such as scindō and tundō. This analogical development suggests that speakers looked at the shape of the present stem to determine the form of the preterit stem.

Due to their resemblance to these forms, verbs containing the sequence nasal plus stop also developed reduplicated preterits:

105. Verbs with the sequence nasal plus stop in Latin

tendō	tetendī	'stretch'	*ten(d)-
pendō	pependī	'hang down?*(s)pen-d-	

tondeō totondī 'shave' *tend-

This development parallels that seen in Old Irish, as discussed in the last section. The verb teneō, tetini 'hold' may have developed its reduplicated preterit due to the fact that its root is the same as that of tendō.

One verb in Latin, poscō, poposci 'ask for' is based on a stem formed via the iterative/inchoative suffix *-ske/o-, with the root in the zero-grade: the Skt. cognate pr̥chati 'he asks' provides evidence for reconstructing the form to the proto-language. The motivation for treating this isolated form as representing a distinct sub-group is the fact that a similar form, the verb nascid, nenasc- 'binds' forms a reduplicated preterit in Old Irish.

Another reduplicated preterit belonging to this class is tetuli, which forms a suppletive paradigm with ferō 'carry.' The present stem originally corresponding to tetuli is also attested: tollō. Ernout-Meillet (1959:694) connect this form with Old Irish tlen(a)id, which also formed a reduplicated preterit; in Latin, however, as Ernout-Meillet note, the original stem *t̥l̥nā- has passed over to the thematic conjugation.

In addition to the Latin subgroups discussed thus far, all of which correspond to subgroups in Old Irish, there exist a number of groups which are limited to Latin. Bader (1968:172) identifies one such subgroup, that of roots which ended in a laryngeal in the proto-language. She cites the forms dedī 'give,' -didī 'place,' and steti 'stand' as instances of this group. The reduplicated preterits probably arose due to the vowel-coloring effects of the final laryngeals; the verbs in question would not have corresponded to the regular Indo-European ablaut system.

Bader also identifies another distinct subgroup: reduplicated preterits corresponding to present stems with -o- vocalism which are iteratives. The follow-

ing are examples:

106. Iterative present stems in Latin

mordeō	momordī	'bite'	etymology uncertain
spondeō	spopondī	'pledge'	*spend-
tondeō	totondī	'shave'	*tend-

The present stems of such forms fit into the theory outlined earlier: they exhibit invariant vocalism in the present stem, and that vocalism is something other than e. It is certainly true that these forms could readily form a perfect stem with o-vocalism; what is crucial, however, is the fact that such vocalism would not adequately distinguish the perfect stem from the present stem. In other words, since the present stem has already co-opted o-vocalism for itself, the perfect stem is unable to use such vocalism distinctively.

Another verb with a corresponding reduplicated preterit is currō, cucurri 'run.' Leumann (1977:58) notes that the present stem comes from an earlier *krsō, with the root in zero-grade. As Ernout-Meillet (1959:160) note, the source of the vocalism is unclear, though they note the intriguing correspondence between the Italic vocalism and Germanic *-ru-, as attested in such forms as ON. hross 'horse.' What is clear, however, is the fact that the vocalism of the present is invariant.

One verb which does not fit into any of the groups discussed so far is pēdō, pepēdī 'fart.' The verb's presence in this group is inexplicable phonologically; semantically, however, its presence can be explained by referring to the Indo-European verb *bhrag- attested in Old Irish braigid, bebrag- 'farts.' This second verb formed a reduplicated preterit because of its a-vocalism; the root *perd-, with similar meaning, formed a reduplicated preterit on analogy with the *brag-.

One verb remains to be discussed: memini 'remember.' The verb corresponds to an Old Irish reduplicated preterit: -moinethar, -ménair. As I suggested when discussing the Old Irish form, it is likely that the reduplicated preterit was created because of the association of reduplication with the present stem.

In Latin as well as in Old Irish, then, whether or not a given verb formed a reduplicated preterit was largely due to the shape of its present stem. In some cases the shape of the present stem was due to an exceptional root shape: examples are roots containing *-a- in Latin and Old Irish and roots ending in a laryngeal in Latin. In other cases, the shape of the present stem was determined by affixes: the nasal infix, the nasal suffix *-nā-, and the iterative suffix *-ske/o-. In such cases the stem would exhibit invariant vocalism; if the root contained a sonorant, the sonorant would be vocalised. Herein lies the explanation of the preponderance of roots contain *-u- and *-i-: these segments would be vocalised when the root was in the zero-grade.

It is entirely reasonable to suggest that speakers would find stem shape a more compelling determinant of the morphological behavior of verbs than root shape, given that stems are concrete entities while roots are something of an abstraction. The forms speakers actually hear and produce as finite verbs, after all, are stems; although speakers certainly would extract and lexically store roots, basing their behavior on stem shape rather than on root shape involves referring to less abstract forms. Furthermore, although in Proto-Indo-European the various stem formants had semantic value, in the daughter languages such value was obscured or lost; the lack of a clear semantic value for the formant would have made it harder for speakers to correctly segment off the root in such forms.

4.3. Sanskrit reduplication

In Sanskrit the reduplicated perfect is completely productive; as a consequence, Sanskrit can tell us nothing about the original membership of the reduplicated perfect class. The shape of the prefix, however, varies according to the shape of the root: the prefix is in the e-grade unless the root contains a -u- or an -i-, in which case the prefix also shows -u- or -i-. The root shows o-grade in the singular and zero-grade in the plural. The following are some examples:

107. Sanskrit reduplicated perfects

root	1st sing.	1st pl.
tud-	tutóda	tutudmá 'strike'
kr-	cakára	cakṛmá 'do'
stu-	tustáva	tustumá 'praise'
ni-	nináya	ninīma 'lead'

One path of development from a fixed -e- vowel in the prefix to a copied -i- or -u- vowel is suggested by Brugmann (1892:1220), who states concerning Sanskrit,

Die Reduplicationssilbe hatte bei den consonantisch anlautenden Wurzeln von Haus aus a = idg. e... Einen Hauptantheil an dieser Neuerung hatte vermutlich die analogische Einwirkung von reduplicierten Präséntia mit i und u in der Reduplicationssilbe... Von solchen Perfectformen aus konnte dann die Reduplication mit i und u leicht auf solche Perfecta von i- und u-Wurzeln übergehen, denen keine reduplicierten Präséntia zur Seite standen.

In Brugmann's scenario, then, roots which had a reduplicated present stem as well as a reduplicated perfect stem would analogically extend the present reduplicated prefix to the perfect forms. These perfect forms then would serve as models for other perfect stems which did not have corresponding reduplicated present stems.

Brugmann's analysis of the reduplicated perfect, though insightful in some respects, is unconvincing with respect to his analysis of the reduplicative vowel. The main problem is that he offers no explanation for why the minority of roots with both present and perfect reduplication should have exerted such a strong influence over the remaining verbal roots. His hypothetical development also requires that forms which had been originally characterized by two markers of perfectivity - the endings and the perfect reduplication - should develop into forms marked only by the perfect endings, adopting the reduplicated stem of the present tense. This development is unlikely.

The reduplication seen with i and u roots has also (like similar Latin forms) been analyzed as the result of assimilation. Renou (1930:453), describing perfect reduplication, states: 'Racines à consonne initiale: le redoublement est de timbre a : cakāra; mais il y a assimilation de timbre pour les racines qui comportent une voyelle ī ū: ciketa juhāva.' The same objections may be raised to invoking assimilation to describe the Sanskrit forms as were raised concerning the Latin forms: based on how observed assimilatory changes work, and based on how observed reduplicative systems develop, such a chain of events is unlikely. Furthermore, in the instances Renou cites, which show the root in full-grade, the assimilation would have to be triggered by the semi-vowel rather than by the root vowel. Given that the full-grade vocalism seen in the singular forms is not original, one could suggest that the assimilation took place prior to the collapse of o-grade perfects and reduplicated perfects, but no motivation for this step exists other than the desire to reconstruct a prefixal vowel *-e- to Proto-Indo-European.

One can envision another possible historical path which would have led to vowel-copying reduplication. The development of forms with -u- and -i- in the prefix might be explained as a later development triggered by the merger of *e, *o, and

*a to a in pre-Sanskrit. After this merger, forms which had originally had o-vocalism in the root and e-vocalism in the prefix would have had a in both syllables; on analogy with such forms, the argument goes, speakers would have begun copying the -i- and -u- seen in roots like tud- and ni-. Such developments clearly would need to take place after perfects had come to be characterized by both reduplication and o-vocalism in the root.

One major objection to this scenario lies in the ablaut pattern found in the perfect paradigm. Perfect forms in pre-Indic were characterized by o-vocalism only in the singular; in the plural, the root was in the zero-grade. The consequence of this ablaut is that the vowel merger would result in identical prefix and root vowels only in the singular. In the plural, however, such would not be the case. For roots with -i- and -u-, on the other hand, the segment would be vocalised only in the plural. In the singular, the segment would be realized as a glide (or, after monophthongization of *ai and *au to e and o, as part of the monophthong). The traditional scenario thus requires that speakers copy the root vowel of the plural form for roots with -i- and -u- on analogy with the vocalic behavior of roots without these segments in the singular. Such an analogic development is implausible.

As was the case with Latin, the traditional analysis of the Sanskrit development tacitly appeals to an analogical force which has frequently been assumed in historical analyses but has never actually been demonstrated: the desire to have affix and base of reduplicated forms resemble one another as much as possible. Until someone demonstrates convincingly that such a force exists, any appeal to it in reconstruction is implausible. If the Indo-European evidence could only be explained by appealing to such a force, then perhaps we would be justified in positing such a reconstruction, but the evidence in Old Irish, Latin, and Sanskrit points in the opposite direction: the forms with -i- and -u- in the prefix are probably archaic. This

reconstruction of the original form of the reduplicated prefix and its subsequent development to a fixed -e- also fits in with the observed typological pattern, further strengthening the plausibility of the reconstruction.

4.4 Gothic

Another language which possesses a reduplicated preterit class of relatively limited scope is Gothic. The Gothic reduplicated preterit class (Class VII) verbs fall into two groups: those in which the stem vocalism is the same through all tenses, and those in which the stem vowel is replaced by -ō- in the reduplicated preterit form. This Gothic reduplicated preterit class is unique in Germanic: no other language in the group exhibits a reduplicated preterit class (though most of the languages show isolated fragments of such a class, e.g. ON róa, rera 'row').

One extremely brief discussion of the Gothic reduplicated preterits is Beeler (1978), who suggests that the class is characterized by the presence of an a-vowel in place of the e-vowel seen in other verbal classes; unfortunately he mentions very few examples and cites no etymologies for any of the verbs he discusses. He further states,

An indication, for me, of the relatively recent origin of the Germanic 7th cl. verbs is the quite small number of them that have good Indo-European etymologies. Most of them have surviving cognates in most of the Gmc. languages, and we are constrained to admit their original constitution during the late Pr.-Gmc. period. They were, by this theory, however, new formations, i.e., not of IE date; and this meant that, just as other verbs of the language had past tenses, so these new verbs also had to acquire one (Beeler 1978:7).

It is true, as Beeler notes, that a frustratingly large number of the verbs have obscure etymologies; on the other hand, examining what etymologies are clear suggests a

picture much more complicated than that Beeler outlines. He suggests, for example, that the class primarily arose during late proto-Germanic times; when the class of forms is compared with Latin and Old Irish, however, a number of familiar examples and patterns emerge, suggesting that the distributional pattern found in these languages may be projected back to the proto-language. Similarly, he states that the Class VII verbs are characterized by the presence of -a- rather than the usual -e- vowel; this statement characterizes some, but by no means all, of the verbs in the class, and it fails to distinguish forms which have a reflex of Proto-Indo-European *-a- from forms which acquire the vowel at a later date. Furthermore, since a fair number of verbs exhibiting -a- actually do occur in the other verbal classes, Beeler's statement is by no means sufficient to characterize the class.

When the etymologies of the forms are examined, some patterns emerge. The first of these patterns is, as Beeler suggests, the presence of a-vocalism. The following forms have or had a-vocalism which is reconstructible to the proto-language⁵⁴:

108. Gothic forms with *-a-

fāhan	faīfāh	'sieve'	*paḱ- (788)
af-áikan	af-aíáik	'deny'	*aig- (F; etymology uncertain)
mátan	maīmáit	'cut'	*mai- (697)
áukan	aíáuk	'add'	*aug-

In addition to these forms, a number of verbs acquired a-vocalism at some time during Proto-Germanic, or are only attested within Germanic:

109. Gothic forms with Proto-Germanic *-a-

haldan	haīhald	'hold'	*hald-(F240; PIE*kel-)
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⁵⁴ Page references from Pokorny unmarked; those from Feist 1939 indicated by F.

ga-staldan ga-staīstald 'possess' *stald- (F50; PIE *stel-dh-)

Certainly these verbs must have formed their reduplicated preterits because of the a-vocalism. It is possible that even as late as Gothic the presence of -a- in the present stem would influence a verb to form a reduplicated preterit; given that a reasonable number of verbs with -a- are attested in other non-reduplicating verb classes, however, it is likely that verbs which fell into this class did so for reasons other than analogy.

One interesting verb is skáidan, skaiśkáip 'divide.' The verb is cognate with Latin scindō, which also has a corresponding reduplicated preterit. In Latin the root formed its present stem via the nasal infix; furthermore, the Skt. cognate chinádmi 'I cut' suggests that the nasal-infix present stem is of Proto-Indo-European date. The comparative evidence suggests that this verb acquired a reduplicated preterit because of its present stem. In Germanic, however, the various nasal affixes became moribund; speakers then may have created a new present stem based on the reduplicated preterit. The form is important because it supports reconstructing the association between the nasal affixes and reduplicated preterits; although the association between such stems and reduplicated preterits is less strong in Gothic than in Latin and Old Irish, nevertheless remnants of the association remain.

The verbs fāhan, faīfāh 'seize' and hāhan, haihāh 'hang' are interesting. fāhan was originally a nasal infix present; its Latin cognate, pangō, also is a nasal infix present with corresponding reduplicated preterit. This comparative evidence justifies reconstructing the association between the nasal infix present stem and the reduplicated preterit to Proto-Indo-European. The correspondence between fāhan and pangō, and between skaidan and scindō, taken in conjunction with the fact that both Latin and Old Irish show a strong association between nasal present stems and reduplicated preterits, strongly suggests that this association should be projected

back to Proto-Indo-European (or, at the very least, to West Proto-Indo-European).

The verb hāhan, haihāh 'hang' is descended from the PIE root *ṛonk-. The verb clearly fell into the class because of its resemblance to fāhan; what is unclear is at which stage this happened. It may be that formation of the reduplicated preterit was due to the nasal plus stop sequence in which the root ended, and hence was an early formation; on the other hand, it is equally possible that the preterit was formed after the loss of the nasal followed by compensatory lengthening of the stem vowel, and hence was a late formation.

Another interesting member of Class VII is the verb falpan, faīfalp 'fold.' The verb stem is formed on the basis of a nominal in *-to-; the same stem is seen in Skt. puṭati 'envelope with.' The stem thus exhibits an invariant root in the zero grade; the Sanskrit cognate provides evidence for reconstructing the present stem to the proto-language.

One distinct set of forms is the group made up of those forms with a long vowel in the present stem. The following are examples:

110. Gothic verbs with long root vowel

slēpan	saīslēp	'sleep'	* <u>(s)lēb-</u> (656)
grētan	gaīgrōt	'weep'	* <u>ghrē-d-</u> (439)
lētan	laīlōt	'let'	* <u>lē(i)-d-</u> (666)
ga-rēdan	ga-raīrōp	'reflect upon'	* <u>rē-dh-</u> (59)
tēkan	taītōk	'touch'	* <u>dēg-</u> (183)

It is quite clear that these verbs fell into this class because they all exhibited a long vowel in their stem. What is less clear is whether this is a strictly Germanic development or not. These verbs could be connected with the Latin verbs with final laryngeal, such as dedī and stetī. It is also possible, however, that Class VII simply

developed into a dumping-ground for unclassifiable verbs; a present stem with a long vowel certainly is an anomaly in Gothic, so perhaps speakers innovated reduplicated preterits for that reason. No evidence permits me to choose between the two analyses. It is interesting to note that because of the loss of the nasal before fricatives, both *fāhan* and *hāhan* also had long root vowels.

A residue of unruly forms remains unaccounted for. In some cases the difficulty of explaining the presence of a verb in this class is due to its etymology being obscure; in other cases, the etymology is reasonably clear, but does not fit into any of the categories suggested so far. The following are the problematic forms:

111. Inexplicable Gothic verbs

<i>fráisan</i>	<i>faífráis</i>	'tempt'	?*per-ei- (F162; unclear etymology)
<i>háitan</i>	<i>haiháit</i>	'call'	?*kei-d- (F236; unclear etymology)
<i>láikan</i>	<i>laílaík</i>	'leap'	*leig- (667)
<i>hvōpan</i>	<i>hvaíhvōp</i>	'boast'	no clear etymology

The first three of these forms exhibit similar present stem shape; it is possible that they fell into this class because of their resemblance to the verbs *af-áikan* 'deny,' *máitan* 'cut,' and *skáidan* 'divide,' all discussed earlier. The final verb in this set, *hvōpan*, may be a member of the set of present stems with long vowels discussed earlier; without clearer etymological information, however, it is impossible to tell.

In common with the Latin and Old Irish evidence, the Gothic evidence also points to the importance of present stem shape in determining whether or not a verb forms a reduplicated preterit. Simply the fact that in all three languages verbs joined this class because of an accidental resemblance between their present stem and stems already in this class suggests that present stems were particularly salient to speakers in deciding how to make a preterit. These three languages provide some justification in arguing that stem shape was also important in the proto-language; in particular, it

is clear that stems formed via the nasal infix belonged to this class in the proto-language.

5. Present-tense reduplication in Indo-European

5.0 Introduction

Thus far in this dissertation I have avoided discussing the semantic behavior of reduplicative systems. As the various examples of reduplication in chapters 1 and 2 show, reduplication typically expresses a meaning which has some non-arbitrary relation to the shape of the form; reduplication typically serves to mark such things as plurality of nouns, plural subjects of verbs, habitual or durative aspect, intensive verbs or adjectives, and so on. An increase or repetition of the form thus corresponds to an increase or repetition of an action, an entity, or a quality. Numerous exceptions to this generalization exists: for example, Tarok, discussed in chapters 1 and 2, uses reduplication to mark the third singular possessive form of nouns. By and large, however, the pattern is well-established enough that exceptions are interesting by virtue of their rarity. One noticeable set of exceptions to the general pattern of iconicity are the present-tense reduplicated verbs found in Sanskrit and Greek. The reduplication shown by these forms seems to have little or no effect on their meaning; no consistent grammatical function other than normal present-stem formation can be linked to these forms, nor can they be shown to be the result of an earlier iconic process of reduplication. A striking number of the roots which fall into this class have the form $\underline{C}\bar{V}$ -; that is, they are descended from roots which had ended in laryngeals in the proto-language.

Numerous scholars have attempted to attribute some iconic grammatical value to the reduplicated forms seen in the daughter languages. Kurylowicz (1964:86), for example, noted that a distinction such as the following, in which the reduplicated form of the root bhr̥- 'bear' has a habitual or durative aspect, was found in the R̥g-veda:

bībhrad drāpīm hiranyāyam 'wearing a golden cloak' (RV I,25,13)

vājram bibharti hāste 'he carries (habitually) a club in his hand' (RV VIII, 29, 4)

bhāranty asmai balīm 'they bring him the offering' (RV VIII, 10, 9)

vājam bharate 'he carries the booty away for himself' (RV II, 24, 9)

Kurylowicz does not, however, demonstrate a consistent distinction of this sort; indeed, forms such as dādhāti 'he puts' and tīṣṭhati 'he stands', which occur in almost all instances in the reduplicated form, show no clear-cut distinction between habitual and non-habitual. In the following example, for instance, the verb jīgāti from the Sanskrit root gā- 'go' has neither a durative nor a habitual aspect:

abhī yād vām viśvápsnio jīgāti 'so that, laden with all food, for you it may approach us' (RV VII, 71, 4)⁵⁵

Furthermore, explaining present-tense reduplication as a way of marking an aspectual distinction sidesteps the question of why only a minority of the verbal roots are ever found reduplicated. In the following example, note that although only the form bibhāti is reduplicated, the verbs valgūyāti 'honours' and vādate 'praises' equally express habitual actions:

Bṛhaspātiṃ yāḥ sūbhṛtaṃ bibhāti,

valgūyāti, vādate pūrvabhājam. (RV IV, 50, 7)

'who keeps Bṛhaspati well-nourished, honours him, and praises him as receiving the first.'

While it is certainly possible to interpret the form bibhāti as expressing a habitual action, such an interpretation does not explain why only one of the three verbs in the

⁵⁵ Macdonell (1917) notes that the verb abhī...jīgāti, cited above, is a subjunctive form, indistinguishable from the indicative form.

example above is reduplicated.

Given that forms which show such a distinction between iconic reduplicated forms and other present formations are in the minority of reduplicated forms, and given also that the forms which seem to be the oldest, such as **pi-ph₃-e-* from the root *peh₃-* 'drink', which has Lat. *bibō* and OI. *ibid* (with regular loss of initial *p*) as reflexes as well as Skt. *pībati*⁵⁶, and **di-dh₃-e-* from **deh₃*, which has reflexes in Italic (**di-dō*, found in the Lat. compound *reddō*), Indo-Iranian (Skt. *dādāti*), and Greek *δίδομι*, are found reduplicated in almost all instances, reconstructing any iconic value for these forms requires the implicit assumption that since they are reduplicated, their meaning must therefore have been some iconically related value such as stative, iterative, or habitual.

One way of explaining the observed lack of an iconic relation between form and function in the daughter languages is to assume that the forms must be descended from an earlier stage in which the meaning was more iconic. Numerous researchers have assumed that the value of the present reduplication in the proto-language was iterative, stative, or some such value without showing a consistent pattern of such usage in the daughter languages; they assume that the value of a reduplicated form must be iconic without showing strong evidence for reconstructing such a value. As I mentioned in the beginning of this chapter, however, the pattern of an iconic relation between form and meaning is by no means exceptionless; before such a meaning can be reconstructed with any confidence, further evidence from the daughter languages must be adduced.

⁵⁶ Unless otherwise specified, Vedic verbs cited are third person singular active forms, and Greek verbs cited are first person singular active forms.

In the absence of stronger evidence that semantic value motivated the reduplication, other explanations for the rise of the class should be considered. Once the roots which form the class are reconstructed to their proto-forms, a clear pattern begins to emerge: The majority of the forms, roughly 70%, can be reconstructed to roots which originally ended in a laryngeal. Before explanations which make unproven assumptions about the semantic value of the reduplication are appealed to, an attempt should be made to explain the formation of the class by invoking the observed pattern. The purpose of this chapter is to propose just such an explanation. I suggest that the final laryngeal consonants were primarily responsible for the emergence of the reduplicated present tense verb class. Though their vowel-coloring effect when they immediately followed the vowel the laryngeals obscured the normal Indo-European ablaut processes; through their disappearance they disrupted the canonical CV(R)C- structure of roots in Indo-European, as well as disrupting the normal consonant-vowel structure in the present-tense verbal forms. Thus, I suggest that the reduplicating present tense verb class primarily spread at some time during the prehistories of Vedic and Greek, during the period when the laryngeals were disappearing from the two languages. At some point, the class spread from the monosyllabic roots to other forms ending in laryngeals; that is, the disyllabic roots were affected as well. In the latter cases, doublets such as that seen in the examples from Kurylowicz cited earlier were created, and subsequently may have been subject to lexical differentiation.

Invoking the loss of the laryngeals to explain the spread of the class does not, of course, explain the ultimate origin of the class. It is probable that reduplication in the proto-language was used sporadically and non-systematically to create stems with an intensive or an interactive sense; possibly one or more of these stems ended in a laryngeal as well, providing another motivation for the association between final

laryngeals and reduplication. The important point to note is that if the development of a systematic pattern of present-stem reduplication can be explained by phonological developments then there is no reason to posit systematic present-stem reduplication in the proto-language, no reason to attribute to it a semantic value unsupported by attested evidence, and no reason to assume that this hypothetical value then vanished in the daughter languages.

A different analysis of the reduplicated present tense verbs is that proposed by Meillet (1964) and adopted by numerous other scholars. Meillet asserts that certain verbal roots are inherently aorist, stating

Si la racine indique un procès pur et simple, sans durée, le thème n'admet d'ordinaire que les désinences secondaires à l'indicatif: c'est un aoriste; ... Quand le thème à suffixe zéro a la valeur d'aoriste, on obtient le présent en recourant à une autre formation, notamment à la racine avec redoublement, ainsi skr. dádhāmi "je pose", gr. títēmi, etc., en regard de skr. ádhām "j'ai posé", gr. éthēmen, arm. ed "il a posé" (pp. 198-199).

Under this analysis, then, some roots in their unsuffixed form must be interpreted as aorists, and some derivational process is necessary to obtain a present-tense stem; reduplication is simply a handy derivational process. The reduplicated present-tense stems thus are reduplicated primarily because of their being root-aorists. If this analysis were correct, and if the laryngeals played no role at all in the development of the reduplicating present class, then one would predict that the reduplicating present-tense class and the root-aorist class in Vedic would have roughly the same percentage of roots with final laryngeals. As I will show later in this chapter, this prediction is easily proven false.

After a very brief discussion of the laryngeal theory in general, I will discuss the roots in Sanskrit and Greek from which reduplicated presents were made, and the

evidence for or against reconstructing laryngeal-final roots as the ancestors of these forms. In Sanskrit, these reduplicated present-tense verbs have traditionally been called Class III verbs. In Greek, the reduplicated stems clearly fall into three groups: reduplication plus a thematic vowel; reduplication, the suffix **-ske/o-*, plus a thematic vowel; and athematic reduplicated stems. After discussing the proto-forms of these roots, I will then outline the factors which lead to the creation of the reduplicating present class, and will describe the form and, in some instances, the function, of such reduplication in Proto-Indo-European.

The final section of this chapter will relate the development of reduplication among laryngeal-final roots to recent work in autosegmental phonology and morphology, discussed in chapter 2; such theoretical frameworks offer the possibility of relating the particular development seen in Indo-European to the behavior of other unrelated systems. I will also discuss data concerning reduplication obtained from language-acquisition studies.

5.0.1. The laryngeal theory

The model of the laryngeal theory assumed in this chapter is that which posits three laryngeals in the proto-language: the E-coloring laryngeal, usually represented as $\underline{h}_1$, the A-coloring laryngeal or $\underline{h}_2$, and the O-coloring laryngeal, $\underline{h}_3$. The symbol $\underline{h}_x$ will be used when the coloring of the laryngeal is uncertain. The evidence for the reconstruction of these three segments and for their phonetic manifestations is too extensive to discuss in this chapter; useful summaries of the theory to date are found in Mayrhofer (1986), Beekes (1969), and Polomé (1965). Most of the laryngeal theory is too well-known to require discussion. Because of their importance to this chapter, I wish to discuss two sub-parts of the laryngeal theory in greater detail: Winter's hypothesis of laryngeal-semivowel metathesis, and Kuiper's theory con-

cerning loss of laryngeal segments in the second syllable of compounds and reduplicated verbs.

Winter (1965) reconstructs a rule of laryngeal-semivowel metathesis which is based on the cognate set containing the Sanskrit root su- 'press out' as found in the verb sunóti. The form may be cognate with Gk. húei, húō 'rain'; Winter also connects these forms with Toch. B sūwam, swāmane, swese, as well as with Hittite sehur 'urine', ON. saurr 'male semen, impurity, filth,' and OCS. sy 'moist, raw.' based on these forms, Winter reconstructs the root *seh_xw-. Since one of the most consistent effects of a laryngeal segment is to lengthen a preceding vowel, Winter argues, it makes sense to state that instances of *ū which seem to result from the sequence *-h_xw- instead result directly from the sequence *-wh_x-; this analysis requires a step of metathesis to convert *-h_xw- into *-wh_x-. This cognate set demonstrates the effects of the rule of laryngeal metathesis posited. The Greek form húei and the Tocharian form sūwam are to be analyzed as deriving from *swh_x-; the Slavic form comes from an adjective derived from an -r- stem noun in the zero-grade (*sh_xwr- > *swh_xr-). The Old Norse forms, he claims, probably is a later full grade formation based on the same zero-grade -r- stem in Germanic.

He finds further evidence supporting this theoretical sequence of events in the Tocharian words for 'fire,' pūwar (Toch. B) and por (Toch. A). The form pūwar is derived from *pwh_xr-; this zero-grade form is cognate with Gk. pŭr, Arm. hur, Umbr. pir, and Olce. fúrr. The form por, on the other hand, whose Toch. B equivalent would be unattested *paur, is cognate with Hitt. pahhur and must be derived from full-grade *peh_xw-r. Winter concludes that a rule of metathesis applied whenever the laryngeal-semivowel sequence occurred after a consonant (as it would in zero-grade forms) and before a consonant-initial suffix.

Schindler (1969) accepts Winter's rule of laryngeal metathesis. He adds another example in support of the rule, comparing Hitt. tarhu-zzi (3rd sing. pr), Skt. tárute (3rd sing. middle) from *terh-u- 'cross', and Skt. túrvati from *trh-u-e/o- with Hitt. taruh-zi (3rd sing. pres.) (from *t(e)r-u-h-). These forms, he argues, also demonstrate the existence of a rule of laryngeal metathesis.

Mayrhofer (1986:174-5) also accepts Winter's rule of laryngeal metathesis and uses it to explain the alternation between such forms as Skt. ápāt (3rd sing. aorist) (from *peh₃-) on the one hand and Gk. pīthi, Skt. pī́tá- (past passive participle) on the other hand. The latter forms with long -ī- he derives from a suffixed form of the root *peh₃-i- 'drink'. When the stem is followed by a vowel, no metathesis occurs; the result can be seen in the Skt. form pāy-áyati 'allow to drink.' When the zero-grade stem is followed by a consonant, however, metathesis occurs, resulting in *pih₃-C from *ph₃i-C.

The second aspect of the laryngeal theory I wish to consider is Kuiper's hypothesis concerning loss of laryngeal segments in the second syllable of reduplicated and compound forms. Kuiper (1961) argues that, in Vedic, laryngeals were lost through a phonological process when the segment occurred in the second syllable of compounded forms (including reduplicated forms). Evidence for this claim can be found in such pairs as Vedic stīṃá 'strewn, scattered': á-str̥tá- 'not overcome,' sūti- : sú-ṣu-ti- 'easy birth,' śī- 'to lie' : nī-śi-tā 'night.' Beekes (1969:242-245) argues that this process was of Indo-European rather than strictly Vedic origin; he cites such forms as Greek gígnomai 'I become' based on the root *ǵnh₁-. Under normal circumstances, the sequence *ǵi-ǵnh₁-o- would have resulted in *gi-geno-; the form actually attested in Greek suggests instead that the laryngeal was realized as zero in that form. The form stratós 'army, camp' is parallel to Vedic á-str̥ta-; although no evidence for a compound formation exists in Greek, Beekes argues on semantic

grounds that the form must be from the same root as strōtós 'spread, laid,' deriving both from *sterh₃-. Compound shortening, he argues, is then the only reasonable explanation for stratós. Cowgill (1965:155) offers an alternative explanation: he posits two distinct roots: *ster- 'lay low' and *sterh₃- 'strew, spread out.' Cowgill's analysis is less convincing than that offered by Beekes in light of the semantic similarity between the forms. Mayrhofer (1986:129) is more cautious about reconstructing the rule of laryngeal loss to Proto-Indo-European.

At this point a word concerning the methodology of this study is in order. The set of reduplicating present tense forms under consideration are those enumerated by Whitney (1885:212-213). In some cases Whitney classes as a reduplicated present verbs which other grammarians have analyzed in other ways; in such cases the form and the various ways of analyzing it will be discussed. One way or another, all the forms cited by Whitney will be analyzed. The Greek forms were obtained from a variety of sources; most of the less common forms were found in Chantraine (1945).

5.1. The Vedic Data

The verb class which the Sanskrit grammarians call Class III is that class which contains the present-tense reduplicated forms. Whitney (1885)⁵⁷ cites nearly forty examples of this class attested either solely in the Vedas or in both the Vedas and the later language. Many of these reduplicated forms are quite rare; in some cases, a reduplicated form of the root in question is only attested once or twice. The class is

⁵⁷ Whitney (1885) has, to a large extent, been superseded by later scholarship. Nevertheless, he provides a useful starting point for this study, particularly for determining the percentage of laryngeal-final roots which fall into the reduplicating present class. Although the sample may be incomplete, there is no reason to believe that anything about Whitney's methodology would skew his list of forms either toward or away from laryngeal-final roots; therefore any statistical data obtained from this sample most likely holds for the language as a whole.

not consistent in the form of reduplication it shows. Some of the forms, such as jīgāti 'he goes' and pīparti 'he crosses,' exhibit reduplication with -i- in the reduplicating syllable. Other forms seem to copy the vowel of the root; examples are dādāti and mamandhī (2nd imperative) 'Think!'. Setting aside for the moment the issue of which of these kinds of present-tense reduplication was originally present in Proto-Indo-European, the roots can be divided into several sub-groups. The first of these sub-groups are those verbs for which a root with a final laryngeal can easily and uncontroversially be reconstructed to the proto-language.

The form jīghrāti, based on the root ghrā- 'smell' belongs to Class III. The root is also found in such forms as ghrātá- (past passive participle); the long ā in both forms suggests that the root vowel was followed by a laryngeal. Watkins (1985:26)⁵⁸ reconstructs a root of the form *gh^wreh_x-, attested in the Germanic suffixed form *brē-thaz, Eng. breath.

The root tr- 'cross over' is found in the form tītarti. The Hittite form tarh- makes it a certainty that this root ended in a laryngeal in the proto-language. Mayrhofer (1986) reconstructs a root of the form *terh₂- based on this cognate set.

Another form which certainly ended in a laryngeal is the root from which Skt. pībati, Lat. bibō and OIr. ibid (with regular loss of initial p) all derive. The root, *peh₃-, has been the topic of a great deal of discussion, most of which centers around the question of whether or not the medial b was the result of voicing from the sequence *-ph₃- or not. The root indisputably ended in a laryngeal. The presence of a present-tense reduplicated form of the verb in numerous language families

⁵⁸ Although Watkins (1985) uses long vowels rather than short vowels followed by laryngeals in his reconstructions, he explicitly states (p. xv) that these forms reflect earlier roots with laryngeal segments, and that the color of the laryngeal can be deduced from the color of the vowel. To maintain consistency with other forms in this chapter, I have converted forms taken from Watkins to their earlier reconstructions with laryngeal segments still present.

(although not in Greek) suggests that reduplicated forms of this root were also present in the proto-language⁵⁹.

The possibly onomatopoeic form mīmāti from mā- 'bellow' has a cognate form mamati 'stammer' in Old Church Slavic. The long ā in the Sanskrit form and the a in the OCS form permit the reconstruction of a root of the form *meh_x-.

The root hā- 'leave' is present in the reduplicated form jāhāti. The long vowel in the second syllable of the word points to the reconstruction *gheh₁-. Watkins (1985:21) reconstructs this root with the meaning 'release, let go,' and derives the Latin form hēres 'heir' from a suffixed form of the root, *ghē-ro-. The long vowel in Latin also points to a final laryngeal and indicates its color as well, suggesting the reconstruction *gheh₁-.

Another root belonging to Class III is jīgāti from gā- 'go.' One piece of evidence pointing to a root of the form *g^weh₂- is the long vowel in the Sanskrit form. Another piece of evidence is the Doric form bībāti with long ā pointing towards an original *h₂. The evidence found in the two languages leaves little doubt that the original root underlying these two forms was *g^weh₂-. The well-known variant form, *g^wem-, could not be the root underlying these verbs.

The class III form pīparti from pr- 'fill' has as its cognate in Greek the form pīmplēmi. Numerous pieces of evidence suggest the presence of a root-final laryngeal; one is the long vowel -ē- in the Greek form. Another piece of evidence is the Lat. plēnus 'full' with the long -ē- in the first syllable. Yet another piece of evidence comes from Sanskrit set forms such as pūrta⁶⁰ 'filled' and pārīman- 'bounty, plenty'.

⁵⁹ For a discussion of the problem of the medial b and some of the explanations which have been offered, see Mayrhofer (1986:143).

⁶⁰ The coloring of the vowel in the first syllable of pūrta- 'filled' is probably due to the influence of the initial labial consonant.

Watkins (1985:48) also derives Gk. plēthos 'great number' from a suffixed form *plē-dhw- based on the root *pelh₁-. Because of these and other forms the standard reconstruction of the root is *pelh₁-.

The form mimītas (3rd per. dual), from the root mī- 'damage,' may be a Class III formation. Several pieces of evidence suggest that the root originally ended in a laryngeal. The Sanskrit past participle mītā- offers some support for this claim. Another possible piece of support for this claim is the Class IX form mināti, with a nasal infix followed by a long vowel. If in fact the form comes from *mi-ne-h_x-ti, and if this form implies a root *meih_x-, then the Class IX form is further evidence that the root ended in a laryngeal.

The root śā- 'sharpen' is found in the reduplicated form śīśāti. The long -ā- points to the presence of a final laryngeal. Watkins (1985:32) derives the Old English form hān 'stone' from a suffixed extended form *koh_xi-no- of a Proto-Indo-European root *koh_x- 'sharpen,' possibly also attested in a Greek cognate kōnos 'peak, cone,' which also points to the presence of a root-final laryngeal. Although some ambiguity concerning the form of the root in Proto-Indo-European exists, since the attested cognates could either derive from a root in o-grade with an unspecified final laryngeal or from a root *keh₃- in e-grade with the o-coloring laryngeal, in either case the root certainly did end in a laryngeal segment.

The root rā- 'give' is found in the imperative forms rarāsva (2nd middle) and ririhi (2nd active). The verb is cognate with Lat. rēs. Pedersen (1926) notes that the fifth declension form rēs is completely parallel to the athematic nominal inflection, and, concerning the long ē, remarks,

On sait que F. de Saussure y voyait la continuation de groupes pré-indo-européens composés de la voyelle e et d'un phonème dont il ne déterminait pas la nature. On sait en outre que Hermann Möller avait défini les derniers

éléments de ces groupes comme des consonnes laryngales pré-indo-européennes. Si nous acceptons cette doctrine, dont la justesse me paraît de jour en jour plus évidente, nous parviendrons à une formule encore plus simple de la flexion athématique: c'est la flexion dans laquelle le thème se termine par une consonne...

The quality of the vowel in Latin further suggests that the laryngeal was $*h_1$, so that the root may be reconstructed as $*reh_1-$. Such is the analysis Mayrhofer (1986:124) suggests. He further offers the reconstruction $*reh_1-i-$ based on nominal forms⁶¹ such as gen. rāyāḥ < $*reh_1-i-ós$. It is the affixed variant of the root which underlies ririhi; this form and others like it will be discussed later.

The Class I verb náyati from the root nī- 'lead' has a corresponding Class III form ninīthas (2nd per. dual) (which is rarely attested in the earlier language and not at all attested in the later language). Set forms such as the infinitive náyitum suggest the presence of a final laryngeal, as does the past participle nītá-. The root can be reconstructed to the proto-language as $*neih_x-$.

The root sṛ- 'flow, run' is found in reduplicated present forms such as sīsarti. The nominal derivatives based on this root such as sūrmi- 'pipe'⁶² and sīra- 'plow' suggest the earlier presence of a laryngeal segment at the end of the root, permitting the reconstruction $*serh_x-$.

The form dádāti, from the root dā- 'give', and its Greek cognate dídōmi clearly show that the root in Proto-Indo-European had the form $*deh_3-$. This root is interesting in that it is one of the few forms which shows up reduplicated in languages other

⁶¹ Mayrhofer (1986:124) analyzes the nominative form rayiḥ as a back formation based on the accusative form rayīm < $*raīm$ < $*reh_1-i-m$.

⁶² The coloring of the vowel in the initial syllable of sūrmi- 'pipe' is probably due to the influence of the labial consonant of the affix; see note 3 above.

than Sanskrit and Greek. The Latin compound reddō suggests the existence of a form *didō in Italic (which was replaced at a later stage by dō). The evidence offered by three branches of Indo-European suggests that the verb was reduplicated in the proto-language as well.

A pair of Class III verb forms are mimate, mīmite (3rd sing. middle) from the root mā- 'measure.' The verb has as cognates Gk. mētis 'council' and Lat. mētior 'measure'. The cognate forms suggest that the root had the form *meh₁-. The form mīmite must come from a suffixed variant of the form; the suffixed form, *meh₁-i-, will be discussed later along with other such suffixed variants.

The root hū- 'call' is found in the form juhūmasi (1st per. pl.). It is also found in the participle hūtá- with a long vowel and in set forms such as hávīman 'call, invocation'. On the basis of such forms Mayrhofer (1986:148) reconstructs the proto-form *gheuh_x- with an unspecified final laryngeal.

The form tīṣṭhati from the root sthā- 'stand' behaves as if it were a Class 1 form based on a stem tīṣṭha-. Comparison with forms in other languages, such as Greek hístēmi (from hístāmi) and Lat. sistō, demonstrate that the Sanskrit form is the result of reduplication, coming from a form *sti-sth₂-ti derived from a root *steh₂-.

The root man- 'think' infrequently has a Class III form mamandhi (2nd per. imperative). Numerous pieces of evidence point to the root having had a root-final laryngeal. The native grammarians cite the set forms manitá- (past passive participle) and manitva. In addition, the verb has as cognates the Greek forms mémnēmai and mimnēskō (where ē corresponds to Doric ā). These forms point to a root of the form *mneh₂-.

One set of problematic forms are those verbs in which the reduplicating syllable contains a long rather than a short vowel: dīdyati (3rd pl.) from dī- 'shine,' dīdhye (3rd sing. middle) from dhī- 'think,' and pīpihī (2nd sing. imperative) from

pi-, pī- ‘swell.’ The three forms differ from the other members of the class in that the vowel of the initial syllable is long rather than short. Whitney (1889:249-250) notes that these three forms are ‘sometimes also classed as intensives; but they have not the proper reduplication of such, and may perhaps be best noticed here, as reduplicated present-stems with irregularly long reduplicating vowel.’ The irregular vowel length may be due to a number of influences; the problem is too involved to be considered in this chapter. In the absence of any explanation for the irregular long vowel in the initial syllable of each of these forms, it is best to treat them as also belonging to the class of present-tense reduplication, with an irregular reduplicating syllable.

The first of these verbs, dīdyati (3rd pl.), has the related nominal form dīti ‘splendor, brightness.’ The long vowel in the first syllable of the nominal form points to a root *dei-. Watkins (1985:10) relates the form to a root *deiw-, attested in Lat. deus ‘god’ and Old Norse Týr, ‘sky god.’ The root *deih_x- is, he notes, attested in the Greek word dēlos ‘clear.’ Schindler (1973), while arguing against the presence of a laryngeal in the root *dieu- ‘heaven,’ nevertheless accepts the reconstruction of a root *deih_x- which is attested in the Sanskrit root dī-.

The next member of this group, dīdhye (3rd sing. middle) from dhī- ‘think,’ has as its past passive participle the form dhītá-. The long vowel in the participle points to a reconstructed root of the form *dheih_x-. Watkins (1985:13) connects the Greek word sēma ‘sign’ with this root and also reconstructs the form as *dheih_x- ‘see, look.’

The last member of this group is the verb pīpihī (2nd sing. imperative) from pi-, pī- ‘swell.’ The past passive participle pīná- points to the presence of a root-final laryngeal in the proto-form. Watkins (1985:47) connects this root with the suffixed zero-grade form *pī-won attested in Gk. pīon ‘fat;’ he reconstructs the root as

*peih_x-.

The next group of forms found in the Class III group of reduplicated verbs are those forms which ended in the sequence -h_xU- (where U stands for the semivowels i and u). At first glance these forms seem to be counter-examples to the claim that the roots which developed reduplicated present forms originally ended with laryngeals. Basing my argument on Winter's rule of laryngeal metathesis, however, I will demonstrate that these forms instead provide strong evidence that it was in fact the presence of a laryngeal at the end of the root or stem which was responsible for the origin of the reduplicated present class.

The root su- 'press out' is found in the class III form suṣvati (3 pl). As was mentioned earlier, Winter connects this root with Gk. húei, húō 'rain', as well as with Toch. B sūwam, swāmane, swese, Hittite sehur 'urine', ON. saurr 'male semen, urine.' and OCS. syr 'moist, raw.' Based on these forms, Winter reconstructs the root *seh_xw-. The metathesis rule discussed earlier provides a way of accounting for the Skt. form suṣvati. The first step in explaining the form is to posit an unreduplicated athematic 3rd. pl. form *sh_xw-nti; the root would be in zero-grade, and thus the laryngeal-semivowel sequence would be in the appropriate environment for metathesis to occur. The root would then be reanalyzed as a laryngeal-final root, and would be subject to reduplication, giving the form *si-swh_x-nti (or *su-swh_x-nti). The syllabic nasal developed into a, and the laryngeal vanished. The end result was the attested form suṣvati.

The affixed form of the root *peh₃- discussed above, peh₃-i-, is attested in the reduplicated verb pipíte. The form is in the middle voice; again, the root is in the zero-grade, and the suffix begins with a consonant, creating the environment in which the metathesis rule applies.

The root hā- 'leave' is present in the reduplicated form jāhāti, which was mentioned earlier. Reflexes of a suffixed form of the root, *gheh₁-i-, are present in Skt. as well in the participle hīna-, and in the forms jihīte and jihāte, cited by Whitney (1885:204) as forms built on a root hā- 'go forth'. Whitney suggests that the forms are the middle conjugation of the first hā-, 'with the signification slightly weakened or generalized.' This explanation fails to account for the root vowel in jihīte. This form is clearly a reflex of the same root as jāhāti. In the case of jihīte, however, the root is present in its suffixed form. The form must originally have been *ghh₁-i-te, that is, the root *gheh₁- in the zero-grade followed by the affix *-i- and the middle voice endings. The laryngeal metathesis rule would apply in such an environment, creating the form *ghih₁-te; later, reduplication would result in the form *ghi-ghih₁-te, which would ultimately result in the attested form jihīte. The form jihāte is the result either of reanalyzing jihīte as a form based on a root *jih-, and then creating normal middle forms based on this newly-created root, or of a middle voice form of the unsuffixed form of the root.

The root rā- 'give', which, as was discussed earlier, comes from a root *reh₁-, also had a corresponding suffixed variant *reh₁-i- which has the Sanskrit reflex ririhi (2nd. sing. imperative). Mayrhofer (1986:124) offers evidence for *reh₁-i- based on the paradigm of a nominal form of the root meaning 'wealth.' The gen. sing. form, rāyāh in Sanskrit and rāiō in Avestan, comes from the form *reiós, which in turn comes from *reh₁-i-os. The form ririhi is also based on the affixed form of the root. Since the form, a second person imperative, would normally contain the zero-grade form of the root, the proper environment for the metathesis rule to apply would be met. The long i in the form shows the traces of the laryngeal metathesis rule; the laryngeal-final form thus created was then subject to reduplication.

The Sanskrit class III verb cikéṣi, from a root ci- ‘note,’ does not directly indicate a final laryngeal in Proto-Indo-European. The closely related verb cāyati, ‘he observes’, however, with its long ā, suggests the presence of a laryngeal at some earlier stage of the language. Kurylowicz (1935:254), connecting the aorist form ākhyat with cāyati⁶³, derives the forms from *kh₁i-: *keh₁i-, arguing that both the aspirated segment in ākhyat and the long vowel in cāyati can be explained as the result of a laryngeal segment. The coloring of the laryngeal, however, is problematic. Based on a correspondence he posits between the Greek form tērēō ‘I watch over’ and the Sanskrit root, Kurylowicz reconstructs the form *keh₁y-. On the other hand, h₂ is generally believed to have been responsible for the aspiration in Iir. *pathas ‘path’ < *pnt-h₂-os, attested in the Av. form pathō. It is possible that both *h₁ and *h₂ aspirated an immediately preceding consonant, but it seems like an unnecessary complication of the theory to posit a second aspirating laryngeal on the basis of one cognate set. Regardless of the quality of the laryngeal, however, the evidence indicates that a root of the form *k^weh_xy- can be reconstructed.

An analysis involving laryngeal metathesis such as the one suggested for the forms rirīhi, jihīte, and suṣvati would provide the step necessary to create a form ending in a laryngeal out of the form *keh₁i-. Unfortunately, the defensibility of such an analysis is not altogether clear. One problem with applying the analysis is the fact that the reduplicated forms attested in the earliest stages of the language do not always (or even usually) show a zero-grade form of the root. Zero-grade forms such as cikīhī (2nd sing. imperative) certainly do occur; possibly the reduplication first occurred in these forms, then a new root *ci- was abstracted on the basis of such

⁶³ A verb root khyā- ‘see’ is attested with present tense forms khyāsi, khyāti, etc; the present tense forms, however, are attested no earlier than Epic Sanskrit, suggesting that these forms resulted from reanalysis of zero-grade forms such as ākhyat and the past passive participle khyātā-, both of which are attested in Vedic.

forms, and conjugated in the same way that a root such as ji- 'conquer' was conjugated. The proliferation of roots in Sanskrit which had been abstracted from the same original root *keh_xi-, such as the set of forms based on a root khyā- 'see' (perfect forms and aorist forms based on this root are attested in Vedic, according to Whitney (1885:33), although present-tense forms are not attested until Epic Sanskrit) and the numerous forms based on cāy- 'note,' suggest that even in the earliest stages of Sanskrit numerous new roots had been abstracted from the various forms created from the root *keh_xi-. The proliferation of new roots may have been due to the fact that the various forms of the original root had been subject to so many different phonological rules that the derived forms were no longer readily analyzed as stemming from the same root. Certainly on semantic grounds ci- must be connected with both cāy- and khyā-; on phonological grounds, however, the root ci- must be the result of reanalysis, since *keh_xi- would result in Sanskrit in cāy- in e-grade forms, khyā-⁶⁴ in unmetathesized zero-grade forms, and unattested **cī- in metathesized zero-grade forms. Perhaps the reduplicating root ci- was abstracted out of forms in which laryngeal metathesis and reduplication had taken place. In the absence of stronger evidence that such reanalysis actually did take place, however, such speculation remains unproven.

Another member of Class III in Sanskrit is the form jīgharti from ghr- 'drip, sprinkle, moisten.' Pokorny connects this form with ghṛtam 'ghee.' The forms may also be related to Gk. χρίω 'salve' and to Lith. griėti, griėju 'skim off cream.' Watkins (1985:23) reconstructs both a derived form *ghrēi- and a derived form ghrēu- as

⁶⁴ The source of the long vowel in khyā- is not clear. No present-tense forms are attested prior to Epic Sanskrit; clearly the present paradigm was created on analogy with pre-existing forms such as the aorist and the perfect. The most reasonable explanation is that speakers extracted a root *khyā- on the basis of zero-grade forms; since, however, no roots with short final -a- existed in Vedic (at any rate, none are attested), the root was reanalyzed as khyā-, with long final ā-, and forms were created in the later language based on this root.

well as the root *gher- 'scrape.' The existence of two suffixed forms which show a long *-ē- suggest that a root of the form *ghreh₁i- may perhaps be reconstructed. Since the semivowel *-i- was an affix in the proto-language, perhaps a non-affixed form of the stem was abstracted; the reduplicated forms in Sanskrit could be built on the form *ghreh₁-.

It is significant that the forms attested in Sanskrit based on roots which ended in the sequence -h_xU- are, with the exception of forms based on ci-, all forms in which the root would have been in the zero grade. The forms suṣvati (3 pl.) from su-, ririhi (2nd singular imperative) and raridhvam (2nd pl. middle imperative) from rā-, jīhīte (middle), jīhīta (3rd sing. mid. injunctive), jīhīṣva (2nd sing. mid. imperative), and jīhītām (3rd sing. mid. imperative) from hā-, and pipīte and apipīta from pā- are the attested forms⁶⁵. Each of these forms filled the conditions necessary for laryngeal metathesis to apply. The attested reduplicated stems must have corresponded to unreduplicated stems, also in the zero-grade, which were laryngeal-final; the reduplicated forms were then created based on these laryngeal-final stems. Although caution is necessary when making an argument based on patterns of attestation, at the very least the attested forms are congruent with the theory that the presence of a final laryngeal was responsible for the creation of the reduplicated forms.

The data cited above make a strong argument for the claim that reduplication was due primarily to root- or stem-final laryngeals. If the forms had been reduplicated in response to some semantic need, this skewed distribution of reduplicated stems would be inexplicable. Explaining the distribution as due to coincidence stretches the bounds of credibility. In the context of this chapter, however, the pattern of reduplication observed in these stems becomes understandable. Reduplicated

⁶⁵ The forms are taken from Böhlingk and Roth (1855).

stems were created which corresponded to those stems which were laryngeal-final due to the operation of Winter's rule.

The next group of forms belonging to Class III is that group comprised of set forms in which the final laryngeal was not consistently part of the root. In these cases, the stem in question sometimes shows a final laryngeal and sometimes does not. The final laryngeal may have been part of the root, but it may also have been a laryngeal affix; it is difficult to point to any semantic value attached to the laryngeal if it is reconstructed as an affix, but, on the other hand, since the laryngeal is not consistently part of the root, reconstructing it as part of the root is not completely satisfactory either.

One member of this group is fyarti from the root ṛ- 'go'. The precise reconstruction of this root has not been agreed upon by scholars; Beekes (1969:38), basing his reconstruction of the form of the root in the proto-language on the Greek cognate form orouō, suggests a form *h₃rh₃-eu-:

The prothetic vowel, indicated by comparison with Lat. ruo, can be explained by a laryngeal; the word is considered to be related to ónumi whose root is *h₃er-, so that *h₃reu- seems obvious. However, the form *h₃reu- would have given *oreu-, not orou-. Schwyzler compares koloúō keleúō.. If Lith. kálti 'forge, hammer' is related to koloúō (Frisk, I 897), this indicated a disyllabic root (*kolh-). In that case a basic form *klh₃-eu-> kolou- would be conceivable for koloúō. In the same way keleúō could be based on *klh₁-eu-; here, however, a laryngeal cannot be pointed to. This would give rh₃-eu- (or *h₃rh₃-eu-) for orouō, but there is no indication of such forms...

Beekes does not consider the forms ónumai and orouō to be related to the form eréthō; he reconstructs a different root for the latter form, claiming that it 'allows of an analysis *h₁redh- just as much as of the non-committal connection with ónumi

(with a root *h₃er-)' (p. 36). Rix (1976:209) posits the root *h₃er- for the verb órumai; he does not, however, explicitly discuss the coloring of the initial laryngeal. Chantaine (1968:366), on the other hand, claims that eréthō and órumi both come from the same root, as does Bader (1980). Bader argues for an initial *h₁, as well as a final laryngeal enlargement. She justifies the initial segment on the basis of such forms as Lat. ruo, Hitt. arwai-, Skt. mve; both initial and final laryngeal are justified on the basis of eréthō:

La plus claire de ces formes grecques est érechō (avec son doublet erethizō) "exciter, provoquer", transitif, pour lequel on posera une formation en -ho de *h₁(e)r-h₁-, avec degré de la racine ambigu (plein ou zéro), mais traitement -e- après -r- (et non sonante-voyelle longue) de la partie élargie (cf. l'homonyme "ramer", erētēs, etc., pour ce traitement, avec, cependant, dans ce dérivé, un degré plein *h₁er-h₁- qui semble assuré par le correspondant skr. arī-tr-a). Hors de ce présent en -thō, ere- peut apparaître dans des formes intransitives...

Forms such as órumai and orouō, she claims, are the result of o-vocalism. Bader's analysis seems the most reasonable; it recognizes the semantic link between eréthō and órumai and permits the derivation of both forms from the same root. If the root began with the o-coloring laryngeal, as Beekes suggests, then both *h₃er- and *h₃or- would give the same result. If, however, the initial segment was h₁, then forms with both e-vocalism and o-vocalism would result, since the e-coloring laryngeal did not affect *o.

Bader's treatment of the final laryngeal as an enlargement rather than as part of the root is less convincing. In the Benvenistean framework she assumes, the final laryngeal cannot be treated as part of the root because tri-consonantal roots are not permitted. As a consequence, she treats the laryngeal as an extension and claims to find a stative value associated with it. In the absence of other forms containing the

same link between $*\underline{h}_1$ - and stativity, her argument is less than convincing. If, however, roots with more than two consonants are permitted, another analysis is possible: the root may have been $*\underline{h}_1\text{er}\underline{h}_1$ -, with the final laryngeal disappearing either as the result of phonological alternation in the proto-language or simply as the normal development of a laryngeal in certain positions. Cowgill (1965:147) states that in Greek the normal development of a laryngeal word-medially after non-syllabics was for the laryngeal to be lost before vowel-initial suffixes but to be retained and vocalized before consonant-initial suffixes. As evidence, he cites bélos 'missile' from $*\underline{g}^w\text{el}\underline{h}_1$ -os and bólos 'a throwing' from $*\underline{g}^w\text{ol}\underline{h}_1$ -o- beside bélemnōn 'missile' with the laryngeal vocalized as e before a consonantal suffix. If Cowgill's argument is correct, then there is no difficulty with positing a root of the form $*\underline{h}_1\text{er}\underline{h}_1$ -, with final laryngeal which is lost in certain appropriate contexts and vocalized in certain other appropriate contexts, such as between consonants.

Another case in Sanskrit in which ambiguity exists as to whether the final laryngeal was part of the root or was a separate affix is the form bībharti. The root $*\underline{bher}$ - found in bībharti is also present in Gk. phérō 'I bear,' Lat. fero, OCS. bero, and many other languages. These forms do not indicate the presence of a laryngeal. Chantraine (1968:1191) points to several other forms that do show the presence of a laryngeal, such as Skt. bharītra 'arm', bhārīman-'supporting', Gk. phérettron 'litter, bier,' and Lat. fericulum 'bier,' and interprets them as the result of adding a suffix $-\underline{h}_1$ - to the root $*\underline{bher}$ -; on the other hand, the root may also be reconstructed as $*\underline{bher}\underline{h}_1$ -, with a final laryngeal which is lost in certain contexts. The problem with the second analysis is that contexts in which a laryngeal segment is normally retained and vocalized, such as before a consonant-initial affix, do not consistently show a vocalized laryngeal (for example, Chantraine cites Gr. phére-tron and Skt. bharī-tra but Gr. phér-ma 'burden' and Skt. bhār-man 'burden'). The handful of set

forms cited above suggest at the very least that, if the laryngeal was in fact an affix, it at least occurred in several different forms. Perhaps a root with a final laryngeal was abstracted on the basis of those forms.

The next two groups of forms found in the reduplicating present class are those groups consisting of forms for which no final laryngeal can be reconstructed. The members of the first group are those roots which, although not reconstructible to laryngeal-final roots, nevertheless pattern with other *seṭ* roots in Sanskrit. The mere existence of *seṭ* forms for any given root is not evidence enough to reconstruct a final laryngeal for a root, since analogy almost certainly played a role in the creation of some *seṭ* forms. Within the framework of the theory outlined in this chapter, it is at least interesting to note that the roots pattern with the disyllabic roots in word-formation; perhaps their presence in the reduplicating class is another symptom of this patterning, and mildly supports the idea that final laryngeals were responsible for reduplication.

The form yayastu from the root yas- 'be heated' seems to belong to this group. In addition, a form of the verb, yéṣati, although classified as a Class I verb by both Whitney and Macdonell, clearly is the result of reduplication: *ya-ys-a-ti would give the attested form yéṣati. Cognate forms, such as Gk. záō 'I live, breathe' and Gmc. *jest > Eng. yeast show no trace of a final laryngeal. *Seṭ* forms of the verb such as yasita- (attested in the Brāhmaṇas) and yasitvā (cited by the native grammarians) exist. The root shows no trace of a final laryngeal; nevertheless, the root in Sanskrit patterns with *seṭ* roots.

The root vic-, vyac- 'extend,' is found in the Class III forms viviktás, vivyácat, and so on. Nothing points to the root ending in a laryngeal; several *seṭ* forms, such as vicita-, vicitvā, are mentioned by the native grammarians. Whitney (1885:166) notes that the form 'has a suspicious likeness to anc, ac + vi '; ac 'to bend', however,

also shows no trace of a laryngeal.

The Class III form jīharti from the root hr- 'take' is attested once in the Sūtras. Nothing in the cognate forms such as Gk. xorós 'dance' suggest the presence of a final laryngeal. The set form hárítum is, however, attested once in the R̥g-Veda; the earliness of the form may indicate that the root ended in a laryngeal in Proto-Indo-European. Too little evidence exists to judge exactly whether the root ended in a laryngeal or not.

The root vaś- 'be eager' is found in the Class III forms vaváksi and vivaśti. Nothing points to this root ending in a laryngeal; again, however, set forms of the verb are attested, such as vāśitā and vaśitr-.

The last group of forms belonging to the reduplicating class is made up of forms for which no final laryngeal can be reconstructed and which do not pattern with the set roots in the language. A number of these cases can be dismissed on the grounds that the reduplication of their stems can be shown to be due to analogy or other factors which render them ineligible to provide evidence concerning Proto-Indo-European reduplication.

The root nij- 'wash, purify' is attested in Vedic in one reduplicated second person imperative form niniktá. Nothing in Sanskrit and nothing in any cognate forms (e.g., OIr. nigim, Gk. nīzō 'I wash') suggests that the root originally ended in a laryngeal. Pokorny reconstructs a root *neig^w- for this form. Both Whitney and Monier-Williams suggest that the attested reduplicated form was based on a reduplicated intensive formation. The form would thus be the result of abstracting a reduplicated present root based on the existence of reduplicated intensive forms. A second possible explanation for the form exists. The Old Irish cognate nigid 'washes' has a corresponding reduplicated preterit, discussed in chapter 4; as I suggested earlier, it seems to be the case that if a form has a reduplicated stem in one

conjugation, it is more likely to create a reduplicated stem in other conjugations.

Another form possibly belonging to this category is the verb dídeśati from diś- 'point.' Nothing about this root points to an original laryngeal; the root in Proto-Indo-European seems to have been *deiǵ-. Whitney classes this form as a reduplicated present-tense verb, but suggests that it may be based on a perfect. Macdonell, on the other hand, classifies this form as a perfect subjunctive. In any event, the form seems to be built on a perfect rather than on the unreduplicated root.

Another verb belonging to this class is mamatsi, from the root mad-, mand- 'to be exhilarated, exhilarate.' Nothing about the root suggests that it originally contained a laryngeal. The root is interesting, however, in that, according to Mayrhofer (1986:170) it is one of the few forms for which a PIE *-a- can be reconstructed; based on the Sanskrit forms and such possible cognates as Lat. madere, the root is reconstructed as *mad-. As I suggest in chapter 4, such roots almost certainly had corresponding reduplicated perfect stems in Proto-Indo-European. Once again, a reduplicated stem in one tense was created on analogy with a reduplicated stem in another tense.

The root sas- 'sleep,' found in the Class III form sasásti, has as its cognate Hitt. seszi, sesanzi. The form of the root does not point to a laryngeal. The root was exceptional in Proto-Indo-European in that it has the structure C_aeC_a-, with the same consonant beginning and ending the root and with no other consonant intervening; to my knowledge, the root is the only one in the proto-language to have this structure. The distribution of the root in Vedic is quite limited; Jamison (1982) notes that the root is only found in Vedic in the present tense, and argues for a suppletive relationship between sas- and another root meaning 'sleep,' svap-. Speaking of the reduplicated present form sasásti, she states:

A repeated YV mantra contains the curious form sasásti (TS) - sásasti (VS, MS). I have no explanation for this isolated form, unless forms of the root present such as duals sastás, sastám ... were misinterpreted as weak forms of a redupl. present...despite their divergence from expected redupl. forms in accent and grade of ending/suffix... A nonce full-grade sasas- could then be built to these forms. In any case the form is clearly artificial (pp. 12-13).

It has been suggested that the word may be drawn from nursery speech, which would account for its not obeying the usual phonological patterns of the proto-language. Reduplication is a well-known feature of nursery speech; the reduplication seen in this form may be due to the form's origin in baby talk.

The root bhas- 'devour' is found reduplicated in the form bábhasti and in its variant bápsati. No evidence points to the root *bhes- having an original laryngeal as part of the root. The situation is complicated, however, by the existence of numerous suffixed forms such as Skt. psáti and Gk. pséxō 'I brush, curry (a horse).' In fact, with the exception of the Sanskrit forms cited above, almost all attestations of this root in the daughter languages involve a zero-grade form of the root (*bhs-) with the addition of a laryngeal affix. Chantraine discusses such forms as pséxō and psēgma 'scrapings, shavings' and concludes,

Il y a entre psén et le présent secondaire psaíō le même rapport morphologique qu'entre knén et knáiō: c'est e le vocalisme primitif. De toutes ces formes, seul psén, qui peut s'analyser en *bhs-e-, cf. skr. psáti ... se prête donc en rigueur et à une comparaison et reçoit une étymologie: c'est une forme élargie d'une racine *bhes- "frotter, émettre"...

It is suggestive that the anomalous Skt. form bápsati, with its medial cluster-ps-, strongly resembles the other zero-grade forms with ps cited above. The exact morphological connection between bápsati, bábhasti, and psáti is obscure, and certainly

the form cannot be cited as evidence that the theory that final laryngeals were the driving force behind present reduplication is correct. The form bápsati, however, could be explained as a formation based on the stem *bhs-eh₂-; the unaspirated initial consonant would be due to an incorrect analysis of the initial segment underlying *bhs-eh₂-, rather than to an exceptional application of Grassmann's Law. The form bābhasti could then be due to analogy, since its form and meaning remained very close to that of *bhs-eh₂-. In the absence of stronger evidence for this sequence of events, however, this speculation remains no more than speculation.

The root mikṣ- 'mix,' found in the second imperative middle form mimikṣvá, is listed by Whitney (1885:120) as a reduplicating present verb. He notes, however, that the verb 'seems a desiderative formation to a simpler miś-'. Macdonell (1916:405), however, treats the verbal form as a perfect imperative rather than as a present imperative. Monier-Williams (p. 815) agrees with Whitney in classifying the form as deriving from an original desiderative formation. In any case, all three scholars agree that the reduplicated form is not a case of normal present-tense reduplication.

The root vr̥t- 'turn,' found in vavartti, the root sac- 'accompany,' found in sīṣakti, the root vac- 'speak,' found in vīvakti, the root vic- 'sift,' attested once in vivekṣi, the root hu- 'sacrifice,' found in the form juhoti, and the root pṛc- 'mix' found in the form piprghdī (2nd imperative), all trace back to forms for which no final laryngeal can be reconstructed in the proto-language. The forms remain as unexplained exceptions to the generalization that reduplicating present tense forms are based on laryngeal-final roots. Their presence in this class may be due to analogic forces; for example, the form piprghdī 'mix!' may be formed on analogy with mimikṣvá, which also means 'mix!' The root hu- 'sacrifice' may have fallen in with the reduplicated present-tense verbs because of its phonological resemblance to the

root hū- 'call,' which derives from the laryngeal-final proto-form *gheuh_x-. The forms may also be examples of reduplication used iconically in the proto-language; the Greek thematic reduplicated present-tense forms such as píptō 'I fall' and tíktō 'I beget' (which will be discussed later in this chapter) suggest that, in a very small number of cases, present-tense reduplication was used iconically in the proto-language.

At this point it is worthwhile to summarize the results of the analysis and reconstruction of the Sanskrit data. Twenty-six of the roots belonging to the reduplicating present tense class can be reconstructed to roots in the proto-language which either ended with a laryngeal or ended with a laryngeal-semivowel sequence which underwent metathesis, resulting in stems which ended in laryngeals. The roots which pattern with the seṭ forms even though they do not show evidence of final laryngeals, yas-, hr-, vic-, vyac-, and vas-, are not included in this total. If the roots found in the verbs ninikta, dīdeśati, mamatsi, sāsasti, and mimikṣvá, are eliminated from the data corpus, the result is a total of thirty-six forms belonging to the reduplicating class. The result can be stated as a percentage: 70% of the roots belonging to the reduplicating present tense class in Sanskrit can be reconstructed to roots ending in laryngeals. For the sake of comparison, of the roots belonging to the class the Sanskrit grammarians call Class VI, the class of verbal forms characterized by a stressed thematic vowel -á- affixed to the root to form the verbal stem, slightly less than 20% come from roots which originally ended in laryngeals. This percentage⁶⁶ seems to be roughly comparable to the percentage of verbal roots in Proto-Indo-European which ended in these segments, which is also roughly 20%. Even allow-

⁶⁶ The data on which the percentage of Class VI roots was based was taken from Whitney (1885) and analyzed in the same way that the Class III data was analyzed. The data on which the Proto-Indo-European percentage is based was obtained by counting 100 consecutive verbal roots from a starting point chosen at random in Pokorny.

ing for the uncertainty inherent in comparing percentages based on reconstructed roots, the difference between the percentage of laryngeal-final roots for which reduplicated stems are attested and the percentage of such roots in the proto-language as a whole is simply too striking to ignore.

At this point I would like to return to the question of whether the reduplicating-present tense class developed as a necessary means of deriving a present stem from an inherently aorist stem. The claim that Proto-Indo-European roots were inherently aorist or inherently present has by no means been accepted by all scholars. Gonda (1962), for example, notes that certain roots, 'e.g. **dō-* "to give"; **dhē-* "to place, set"; **g^uem-* "to go" form aorists in eastern, presents in western languages...We are, on the strength of these discoveries, justified in concluding that the verb system assumed... was to a considerable extent a fiction...' Gonda goes on to suggest that the verbal categories seen in Sanskrit and Greek must have developed during the pre-history of these languages rather than being present in the proto-language, so perhaps one could argue that the use of reduplication to derive present stems from the root-aorists also developed in the prehistories of Sanskrit and Greek once the distinction between root-aorists and root-presents had developed. The indefensibility of this line of argumentation becomes clear when the percentage of laryngeal-final roots which form present stems through reduplication is compared with the percentage of roots which form both root-aorists and reduplicated present stems. The two percentages are dramatically different.

As I mentioned earlier, the percentage of roots ending in final laryngeals which have reflexes in the Class III verbal category as listed by Whitney is roughly 70%. Whitney also lists all the roots for which root-aorist forms are attested (pp. 222-223). The percentage of these roots which make corresponding reduplicated present tense stems is less than 20%. Even allowing for the normal amount of uncertainty con-

cerning reconstructed roots, the difference between these two categories is quite striking. The correlation between final laryngeals and reduplication is much greater than the correlation between root-aorists and reduplication. It is simply impossible to claim that the reduplicated present stems arose primarily as a means of forming present stems from root-aorists.

5.2 The Greek data

5.2.1 Athematic verbs

The reduplicating present-tense verbs in Greek are much fewer in number than those in Vedic, and much more uniform in their form. Rix (1976:209) characterizes the class of athematic reduplicating verbs as consisting only of roots which had ended in a laryngeal (and consequently exhibit a long vowel in Greek) in Proto-Indo-European. He cites the four common verbs which belong to this class: tīthēmi, dīdōmi, hístēmi, and híēmi. Less common are the forms onínēmi and dízēmi. Chantraine (1945) adds to this list the forms dīdēmi, Dor. bībāti (3rd sing.), and hlēthi (2nd imperative). In addition, Chantraine cites several forms in which a nasal consonant has been inserted: Cretan kínxrēmi, corresponding to Attic kíxrēmi; pímplēmi, corresponding to Ski. pípami; and pímprēmi.

The first three of these forms, tīthēmi, dīdōmi, and hístēmi, have corresponding Sanskrit reduplicated forms: dádhāti, dádāti, and tīsthati. As has been shown, these forms undoubtedly came from roots which ended in a final laryngeal in the proto-language. The fourth common verb of this group, híēmi 'send,' can be traced back to the root *ieh₁-. Forms such as hēma 'javelin' point to a long vowel in the root. Comparing the aorist hēka with Lat. ieci, Chantraine (1968:459) argues for the reconstruction of a root *yeh₁-. The form híēmi could also be from *se-; Chantraine

rejects this etymology, however, preferring to derive the form from a stem *yih₁- *yeh₁-. Watkins (1985:79) reconstructs the same root.

One of the less common members of the class, onñēmi 'help,' seems at first glance not to fit the normal reduplicating pattern of copying an initial consonant or consonant cluster and prefixing it along with an -i- to the root. Cognates such as Skt. nāthá 'help,' however, suggest that the initial o was not present as a vowel in the proto-language. Cowgill (1965:153) analyzes the form as coming from *ni-neh₂-, with later accretion of a prothetic vowel accounting for the initial o-. Beekes (1969), however, argues for a root of the form *h₃neh₂-. Both Beekes and Cowgill are in agreement that the root ended in the final laryngeal -h₂. Chantraine, however, reconstructs a root *h₃en-, which alternates with a Theme II form *h₃n-eh₂-. Based on other Greek forms, such as Dor. ónāsis, the most reasonable reconstruction of the root is that given by Beekes: *h₃neh₂-.

The problem with this reconstruction is to determine exactly how the reduplication could have given the attested form. As Beekes (1969:130) points out, a reduplicated form *h₃ni-h₃neh₂-mi, with the sequence -i-h₃-, should have resulted in a lengthened vowel in Greek rather than the attested short i. Beekes offers a second alternative: the form could be a nasal present of the form *h₃n-n-eh₂-mi. This form, however, would have resulted in Gk. *onnēmi; such a form is not attested anywhere. Beekes concludes that the form 'seems to be a Greek formation, of which the example is not clear, however.'

Another possible explanation of the form is that the root-initial laryngeal was lost as part of a regular phonological process. Kuiper's theory concerning loss of laryngeal in the second syllable of reduplicated and compound forms could possibly account for the Greek form. If, in the reduplicated form *h₃ni-h₃neh₂-mi, the initial laryngeal was vocalized before laryngeals in other positions were affected in any

way, then the second -h₃- would be in the second syllable of the word, and, as the normal result of this phonological rule, would be dropped. The result of such a sequence of events would be the attested form onīnēmi.

Chantraine (1945) groups the middle form dīzēmai 'seek' with the class of present-tense reduplicating athematic verbs. He notes that the ē represents a former ā; following Frisk (1960:391), he reconstructs the reduplicated stem *di-dyā- as the original form, with the long vowel in Greek pointing to the presence of a laryngeal in the proto-language. This is the most straightforward analysis of the form, accounting both for the initial d- and the medial -ē-. Unfortunately, the analysis is not entirely unproblematic. If, as Frisk suggests, this form is related to zēlos 'eager rivalry,' then the original root may have been *yeh₂-, which is the form Watkins (1985:79) posits as the reconstruction of the root found in zēlos. Reconstructing the root *yeh₂- as the form underlying both zēlos and dīzēmai leaves unexplained, however, the initial d- in the verbal form. The most straightforward analysis is to posit *dyeh₂- as the root underlying dīzēmai and *yeh₂- as the root underlying zēlos.

Chantraine includes the form dīdēmi 'bind' in this group as well. The forms of the root found in Greek show an alternation between de- and dē-: -dēma in anádēma 'head-band,' diádēma 'fillet,' on the one hand, and desmós 'bond,' on the other hand. Chantraine (1968:270) derives this alternation from an alternation in the proto-language between *deh₁- and *dh₁-.

The form bībāti (Dor. 3rd per. sing.) comes from the Proto-Indo-European root *g^weh₂-. This root is also found in the Sanskrit reduplicated form jīgāti.

The form hīlēthi (2nd sing. imperative) 'be gracious' is cited by Chantraine (1945) as belonging to the class of reduplicated athematic verbs. The form of the root is, however, problematic. Pokorny gives the root *sel-, sel-: sīā- as the form in the proto-language, citing as cognates the forms Lat. sōlor 'comfort,' Germ. *sel- in

Goth. sel̥s 'useful.'. Chantraine (1968:462), however, is uncertain about this cognate set, and states merely that the imperative hlēthi could be either an athematic reduplicated present or a form based on a perfect *heīlāthi. Beekes (1969:245) suggests that the form éllathi could go back to a form *se-sla-thi, with *sla- going back to *slh_x-. Beekes adds, however, that forms such as Lac. hlēwoi present a problem for this analysis. Watkins (1985:57) reconstructs a root of the form *sel-, selh_x- with the meaning 'of good mood; to favor,' found in Gk. hilarós 'cheerful.' Perhaps the form hlēthi can be traced to this root as well.

One example of a reduplicated athematic present form which has a nasal consonant inserted is the Cretan kīnxrēti 'he needs.' Chantraine (1968:1275) cites *gher- as 'la moins mauvaise étymologie' for this form. Watkins (1985:22) derives the related Greek form xrē- 'it is necessary' from an extended form *ghrē-, perhaps also found in Germanic *grēduz 'hunger,' grēdagaz 'hungry,' as attested in Old English grædig 'hungry, greedy.' The reduplicated form may be based on this extended root.

Another example of a reduplicated athematic present with a nasal inserted is pīmplēmi 'fill.' The form was mentioned earlier as cognate with the Sanskrit reduplicated form pīparmi. The Proto-Indo-European root from which these forms are descended was *pelh₁-.

Another reduplicated form which shows a nasal is pīmprēmi 'burn.' The long -ē- suggests the presence of an original root final laryngeal. The forms prēsō (future) and éprēsa (aor.), also point to a final laryngeal. These forms permit the reconstruction of a root *preh₁-.

5.2.2. Reduplicated thematic stems

In addition to these athematic forms, Chantraine (1945) also cites a small number of thematic forms: gígnomai 'I become,' hízō 'I sit,' mímnō 'I stay,' píptō 'I fall,' tíktō 'I beget,' and ísxō 'I stop.' In contrast to the athematic reduplicated present stems, the reduplication serves to mark aspect in the thematic stems. Chantraine (p. 215) states,

La signification de ces thèmes peut bien se déterminer lorsqu'ils se trouvent en concurrence avec un présent de type différent. Ils sont employés lorsque le terme du procès verbal est envisagé. *a ménō* "rester" s'oppose *mímnō* "rester jusqu'au bout, attendre, attendre de pied ferme."

In the case of these thematic forms, reduplication clearly functions iconically; the forms seem to have a durative or stative aspect. Given this iconicity, it is not surprising that a number of the verbs which fall into this class did not end with a laryngeal in Proto-Indo-European. The verbs ísxō (from *segh-), tíktō (from *tek-), and hízō (from *sed-) show no trace of a final laryngeal. The forms píptō, from the root Mayrhofer (1986:135) reconstructs as *peth₁-, and gígnomai, from *genh₁-, show evidence for a final laryngeal.

Some words found in other Indo-European languages seem to be formally comparable to these Greek thematic forms. The Sanskrit verb pībati, for example, has been analyzed as a thematic stem; the medial -b- has been explained as the result of assimilation to the root-final laryngeal when the root was in the zero-grade. By and large, however, other languages do not exhibit classes comparable to the Greek reduplicated thematic class.

5.2.3. Forms with the suffix *-ske/o-

A group of reduplicated present verbs occur with the iterative suffix *-ske/o-; these forms and the corresponding Hittite reduplicated *-ske/o- verbs were discussed in detail in chapter 3. Chantraine (1945:224) cites the following forms as belonging to the group of Greek reduplicating -skō verbs: bibáskō 'go'; didráskō in the compound apodidráskō (Ion.) 'flee from'; bibróskō 'drink'; mimnéskō 'remember' (dor. mimnāskō); titróskō 'wound'; gignóskō 'know'; hom. kikléskō 'call'; hiláskomai 'appease'; didáskō 'teach.' Of these forms, only didáskō and possibly bibáskō 'go'; come from roots which did not end in a laryngeal. The remaining forms can be reconstructed to roots with final laryngeals.

The form mimnéskō is cognate with Skt. mányate (middle) and the Class III form mamandhī (2nd per. imperative). Earlier it was shown that the root in Proto-Indo-European was *mneh₂-.

The form didráskō, found in the compound form apodidráskō is cognate with the Skt. form dráti. The long ā in both forms leads Chantraine (1968:279) to reconstruct a root of the form *dr-e based on a root *der- which is also found in *dr-ew- (Skt. drávati) and in *dr-em (Skt. drámati). Whether the last two suffixed forms are in fact based on the same root or not and whether these forms are cognate with a stem *dr-e or not is highly questionable. If the Benvenistean restriction on root structure which led Chantraine to insist on a root of the form CVC- is eased, then the forms in long a surely allow the reconstruction of a root *dreh₂-.

The form bibróskō has as cognates the Skt. past participle gīrna- and Lith. girtas 'drunk'. On the basis of these forms, as well as the Gk. verbal adjective brōtos, Chantraine (1968:175) reconstructs a root of the form *g^werh_x- (with an unspecified final laryngeal). Beekes (1969:233-4) goes further and specifies *-h₃- as the final laryngeal.

The forms titrōskō 'wound' and tórein 'pierce' (inf.) are cited by Beekes (1969:178, 233) as pointing to a root of the form *terh₃-. The long ō gives evidence of a final laryngeal; furthermore, according to Beekes, the sequence -or- in tórein would have arisen as the normal development of a zero-grade form Rh₃- before a vowel.

The verb kiklěskō, a reduplicated form of kalēō, is found in Homeric Greek. Chantraine (1968:485) reconstructs a root of the form *kelh_x-, found in e-kále-sa, kalēō, kālēmi. Beekes (1969:235) is in agreement with Chantraine in reconstructing a root with a final laryngeal of the form *kleh₁-.

The form hiláskomai is related to the imperative hlēthi discussed earlier in this chapter. A root of the form *selh_x- is certainly a strong possibility as the ancestor of hiláskomai and hlēthi; given the many uncertainties associated with the two forms, however, the form with final laryngeal must be regarded as only a tentative reconstruction.

The forms bibáskō is cognate with bībāti and Skt. jīgāti, which have been shown to come from a root *g^weh₂-. bibáskō, however, seems to be based on the root *g^wem- rather than the root *g^weh₂-. Exactly what the relation was between these two roots is not clear. The form bibáskō, with the root *g^wem- and the suffix *-ske/o, is a perfect cognate for the Sanskrit verb gácchati 'he goes.' Given the clear etymological relation between bibáskō and bībāti, however, it is reasonable to suggest that the reduplication seen in bibáskō is partially due to the influence of bībāti and partially due to the association between reduplication and the *-ske/o suffix.

The one member of the -skō class of reduplicated forms which clearly is not the reflex of a proto-form ending in a laryngeal is didáskō. Chantraine (1968:278) suggests a theme of the forms *dñs- which is also attested in děnea 'plans' (n.). Pokorny (p.202) reconstructs a root of the form *dens- and relates Lat. densus to the group

of forms. Nothing about any of the cognate forms suggests the presence of a final laryngeal.

As I noted in chapter 3, in Greek a large percentage of these verbs thus are based on roots which ended in a laryngeal; in Hittite, on the other hand, no such skewed distribution is apparent. The tendency for reduplication to spread among the various stems based on the same root provides an explanation for the Greek pattern. By and large, other reduplicated stems for these roots are not attested in Greek. In Hittite, on the other hand, several of the reduplicated -ske- verbs had corresponding reduplicated forms: examples are hahhars- beside hahharsk- 'laugh' and pappars- beside papparsk- 'sprinkle.' The Hittite pattern makes it reasonable to suggest that some of the Greek forms corresponded to reduplicated present stems; since the present stems tended to be laryngeal-final, this root pattern became associated with reduplicated -ske- verbs as well, and may have spread to laryngeal-final roots which had not previously exhibited reduplicated present stems.

5.3. The shape of the reduplicating syllable in Proto-Indo-European

Determining the form of the reduplicated present in Proto-Indo-European raises a number of issues, such as the question of what the reduplicating syllable originally looked like, whether the verbs were usually thematic or athematic, and so on. The issue is not an easy one to decide. In Greek, the vowel of the reduplicating syllable is invariably -i-; the root varies between full grade and zero-grade. The thematic group of verbs, in which the root is in zero-grade, is the group which provides exceptions to the generalization that the reduplicated roots mostly ended in laryngeals, and is also the group of forms for which reduplication seems to serve an iconic function; the group includes such forms as ísxō (from *segh-), tíktō (from *tek-), and hízō (from *sed-), which show no trace of a final laryngeal. Whether this clear-cut dis-

inction between thematic forms, which clearly do show the iconic use of reduplication, and athematic forms, which clearly come from roots which ended in laryngeals, can be reconstructed to the proto-language or not is an open question.

The forms found in Vedic vary between those in which the reduplicating vowel and the root vowel are identical and those in which the reduplicating vowel is -i-. Most of the forms show the root in full grade; the forms pībati and tīṣṭhati, however, are thematic, with the root in zero grade, and the laryngeal lost. It would be tempting to argue, on the basis of the Greek and Sanskrit thematic forms, that thematic reduplication in Proto-Indo-European carried the morphological value of stativity. Unfortunately, the data are too scant to make such a strong claim.

A number of Vedic forms in which the vowel of both the root and the reduplicating syllable is identical correspond to Greek forms in which the reduplicating syllable contains -i-. The Skt. verbs dádāhāti and dádāti, which show the same vowel in the reduplicating syllable as in the root, correspond to Gk. tīthēmi and dīdōmi, which show -i- in the reduplicating syllable. Other Sanskrit verbs containing -i- in the reduplicating syllable correspond to Greek verbs which also exhibit -i-, such as the Doric form bībāti, which is cognate with Skt. jīgāti, and Greek hīstēmi, which corresponds to Skt. tīṣṭhati. The three Sanskrit verbs pībati, jīghrati, and tīṣṭhati are cited by Whitney (par. 671) as reduplicating forms which are conjugated at all stages of the language as if they contained the unreduplicated present stems tīṣṭha-, piba-, and jighra-. The forms have been reanalyzed and do not behave like normal reduplicating verbs. All three forms make their reduplicating syllable with -i- rather than by copying the vowel of the root.

Further evidence suggesting that i-reduplication was the original method of forming the reduplicated present stem is found in the shape of the few reduplicated present verbs attested in languages other than Greek, Sanskrit, and Hittite. Latin

bibō 'I drink' and Old Irish ibid, both based on the root *peh₃-, exhibit the vowel -i- in the reduplicated syllable. Similarly, Latin sistō 'I stand' also exhibits -i-. A form *didō has been reconstructed as underlying the Latin compound reddō; however, since the vowel of the reduplicated syllable is never attested in this form, it can offer no evidence one way or another.

The data above suggest that one of the methods of present reduplication in Proto-Indo-European involved *-i- as the vowel of the reduplicating syllable⁶⁷. When evidence from other sources is added to the situation, however, the picture becomes much less clear. One source of evidence is the tendency discussed in chapter 1: reduplicative systems tend to develop prespecified vowels. Furthermore, i is the reduplicative vowel par excellence, attested in reduplicative systems in languages as diverse as Tillamook and Yoruba. This evidence suggests that perhaps present-stem reduplication originally had vowel-copying reduplication, as suggested by Skt. dádhāti, rather than i-vowel reduplication, as suggested by Gk. títēmī.

A second possible source of evidence comes from Hittite: the group of reduplicated athematic mi-verbs discussed in chapter 3. The following forms are attested:

⁶⁷ The analysis proposed here of the form of reduplication in Proto-Indo-European is in accord with traditional analyses of these forms and disagrees with that proposed by Heller (1966). Heller suggests that the reduplicating syllable originally involved copying the initial consonant and final palatal laryngeal of a root. He derives such forms as Greek dīdēmi 'bind' from PIE *dH^y-deH^y-mi and tītēmī 'place' from *dhH^y-dheH^y-mi. Forms which exhibit the reduplicating vowel i but which do not show evidence for a root final palatal laryngeal can be explained, he claims, by the fact that suffixes involving h₂ and h₃ would result in the loss of the palatal laryngeal, making reconstruction of the final palatal laryngeal difficult. The flaws in a methodology which allows the dismissal of counter-examples to the proposed theory by hypothesizing affixes which have no basis for their reconstruction other than the need to explain the presence of final *-h₂ and *-h₃ in forms which the theory predicts should end in *-h₁ are too obvious to need discussion. Forms such as Gk. ἔξω (from *segh-), τίκτω (from *tek-), and ἵζω (from *sed-) show no trace of a final laryngeal of any sort. Nevertheless, the forms all show -i- as their reduplicating vowel. Heller would need to suggest affixes of the form *-gh-, *-k-, and *-d- to account for the Greek forms. Such an account would be nonsensical; the simplest and most sensible reconstruction is to state that the reduplicating vowel was *-i-.

hahhars- 'laugh (at),' hashass- 'open (?),' kukkurs- 'mutilate,' kukuss- 'trample (?),' kuskuss- 'trample,' pappars- 'squirt,' wawars- 'strip off,' and du(wa)ddu- 'manage well.' These forms all exhibit vowel-copying reduplication. If the forms are indeed cognate with the Greek and Sanskrit reduplicated presents, then they further suggest that present reduplication originally was vowel-copying.

Numerous pieces of evidence support reconstructing present reduplication as vowel-copying; such a reconstruction is supported by the Hittite data and is in keeping with the typological evidence discussed in chapter 1. The Greek data could be explained as the result of levelling; at some point, the vowel -i- came to characterize present reduplication. The forms bibō and sistō, on the other hand, support reconstructing i-reduplications. It is possible that the levelling process was underway early on, and was responsible for the vowel seen in bibō and sistō; the process would have proceeded through the lexicon in a form by form fashion. It is also intriguing to note that the two roots attested in these forms, *peh₃- and *steh₁-, are the only two roots which offer evidence of thematic reduplicated present stems. It is possible that these forms and the Greek thematic forms such as tīktō and pīptō ought to be taken together as a distinct class; the reduplicated vowel reconstructed for these forms is almost certainly *-i-⁶⁸. If this was the case, then perhaps the Greek athematic presents developed i-reduplication partly due to analogic pressure from the thematic presents.

A further complication to consider is the behavior of initial velar consonants in Sanskrit. As forms like jīgharti 'sprinkle' and jāhāti 'leave' show, the reduplicating

⁶⁸ Note that reconstructing *-i- as the prefixal vowel for these forms does not imply that when the roots first underwent reduplication they were already characterized by *-i-; it is possible that the vowel is itself the result of a levelling process. If such levelling took place, however, it must have happened early during the proto-language.

syllable based on a velar consonant shows a palatal consonant. If the reduplicating vowel was not originally **-i-*, the question arises of what caused the palatalization. In the case of forms like jīgharti we could simply say that the palatal consonant developed after the form developed *-i-*. In the case of a form like jāhāti, descended from the root **gheh₁-*, another explanation is necessary. It is probably the case that early on palatalization became a morphological process rather than a phonological one; forms with initial velar consonants reduplicated with palatal consonants whether or not the palatal was conditioned by the appropriate phonological environment. The fact that a form like jāhāti shows an initial palatal provides little evidence that the palatal was ever in a palatalizing environment. Still, the process of palatalization had to start somewhere; if, as I argued in chapter 4, perfects originally exhibited vowel-copying reduplication, and if presents originally exhibited vowel-copying reduplication, then accounting for the initial palatalization becomes a problem. The case for reconstructing vowel-copying reduplication for the perfect stem is strong; the case for reconstructing either vowel-copying reduplication or *i*-reduplication for the present stem is not. At this point the question of the original form of the reduplication present stem must be left open.

5.4. Possible Motivating Factors

A number of factors conspired to create the reduplicating present class. One of these factors was the analogical pressure exerted by the use of reduplication to mark the perfect tense. In chapter 4 I argued that perfect reduplication was originally only obligatory when, for some reason, a root did not exhibit the normal ablaut pattern of e-grade - o-grade - zero-grade. One set of forms for which the ablaut pattern would have been obscured are the laryngeal-final roots. The vowel-coloring effect of the laryngeals would have obscured e-grade vocalism; their behavior as resonants

would have obscured zero-grade vocalism. Reduplicated perfects were probably formed for some of the laryngeal-final roots as a consequence; these perfect stems exerted pressure on the present stems. The Sanskrit form based on a root with *-a-, mamatsi 'be exhilarated,' offers a parallel example.

The analogical pressure resulting from the obligatory perfect reduplication was not, however, the sole source of reduplicating present tense verbs. For one thing, the reduplicating present class spread to include even disyllabic roots ending with a laryngeal. Perfect reduplication would not necessarily have been obligatory for such roots, since the laryngeal would not have colored the root vowel as it would have in monosyllabic roots. For another thing, reduplicated present tense formations based on forms in which the stem ended in a laryngeal solely as the result of laryngeal metathesis are attested. As mentioned earlier, when a stem ending in the sequence -h_x- occurred in the zero-grade, the sequence metathesized. These metathesized forms were then in some instances reduplicated. Analogical pressure from the reduplicated perfect forms could not account for this behavior.

The fact that the laryngeals obscured the usual ablaut gradations in Proto-Indo-European may have contributed to the formation of the reduplicating present class in another way. Through reduplication, new ablaut patterns were created; in Greek, the result was an ablaut between long and short vowels.

In Greek, the athematic present reduplicated forms vary between forms with long ē, ā, and ō, and those with short e, a, and o. Chantraine (1945:210) states,

Ces présents ont des conjugaisons parallèles, et, du point de vue grec, anormales. Ils comportent l'alternance vocalique attendue avec le degré zéro (représenté par une voyelle brève reposant sur h₁⁶⁹ h₂, h

⁶⁹ Note that Chantraine uses schwas to represent the laryngeal segments.

les formes de racines *elip-, elipon-, elipon-*; *elip-, elipon-, elipon-*; *elip-, elipon-, elipon-*; *elip-, elipon-, elipon-* (par *elipon-*); *elipon-, elipon-*.

In Greek, the new ablaut pattern is due to the fact that each of the three laryngeals was vocalized as a different short vowel when they occurred interconsonantly; a difference between full- and zero-grade forms of the root was transformed into a distinction between long and short root vowel. The new ablaut series found in these forms correlated nicely with the ablaut series found in forms based on roots which contained resonants, such as *leíp-ō*, *'é-lip-on*, in which the full-grade forms of the root syllable were heavy and the zero-grade forms were light. The new ablaut series created by the athematic reduplicated forms thus fit in neatly with other ablaut patterns in the language. Its congruence with other patterns already present in the language contributed to the readiness with which the language adopted the reduplication.

In Sanskrit, similar new ablaut patterns were created. For a variety of reasons, Sanskrit was already developing a long-short ablaut gradation independent of the reduplicated forms. In reduplicated perfect forms of the verb, for example, the length of the root vowel was what distinguished a form such as the first person singular perfect form *cakára* from the third person form *cakára*. The long-short ablaut was in this case due to the presence of a laryngeal after the *-r-* in the first person form which blocked Brugmann's Law from applying. Furthermore, if, as Tischler (1981) argues, a true long **ā* which did not arise through the loss of a laryngeal alternated with a short **a* in reduced-grade forms, such an ablaut between a long vowel and a short vowel may have been present in Proto-Indo-European; in that case, the long-short ablaut pattern which developed due to Brugmann's Law would simply have extended a morphological pattern which was already present in the language.

The long-short ablaut pattern was also found in the thematic reduplicated forms such as tísthati. The present tense form of the root has a short -a-; it has been commonly analyzed as coming from Proto-Indo-European *sti-sth₂-a-ti. The aorist form of the verb, on the other hand, has long--ā-: ástthāt. Forms involving laryngeal-semivowel metathesis would also fit into this pattern.

Another new ablaut pattern was the variation between a long vowel (the result of *-e- followed by a laryngeal) and a schwa (-i-) in Sanskrit. Such an alternation can be seen by comparing the reduplicated present form of mā- 'measure', mimāte, with the participle mitá.

Another way in which the laryngeal consonants contributed to the creation of the reduplicating present class was by their disappearance. The loss of the laryngeals disrupted the Proto-Indo-European phonological system in numerous ways. One such disruption affected the canonical root structure. In Proto-Indo-European the structure of the many of the roots was CeC; the initial and final segments were consonants and the root vowel varied according to morphological factors. As mentioned earlier, the laryngeals obscured the root vowel variation by their coloring effects. When they vanished, they also disrupted the root structure system by creating monoconsonantal roots. Furthermore, their loss disrupted the structure of the typical verb stem. Present-tense verb stems were formed in a number of ways, such as via the thematic vowel, via the nasal infix, and so on; the most prevalent of these was the thematic vowel. As a result, most verb stems were bisyllabic. When the laryngeals were lost (or were in the process of being lost), after a period of hiatus, those stems which had previously been formed via the thematic vowel would become monosyllabic. Reduplicating these roots to form the verb stems restored the stems to the usual pattern of Indo-European verbs; that is, the reduplication created a stem which was biconsonantal. Furthermore, the reduplicated stem again had two syll-

ables. One could metaphorically describe the change as a way of "beefing up" the phonological "weight" of the form; a less metaphorical way of stating the same thing is that a monoconsonantal root was perceptually inadequate for the speakers of the language, so they used reduplication to create stems with longer duration.

The process of reduplicating a form to match a specific number of syllables is commonly found in child language acquisition. Schwartz et al. (1980) and Fee and Ingram (1982) examined children's use of reduplication. They discovered that although children varied in the degree to which they used reduplication, nearly all used it to some extent. Schwartz et al. (1980) compared the reduplicated forms the children produced with the adult lexical items the children were modelling their speech after, and discovered a strong correlation between adult polysyllabic forms and the children's reduplicated monosyllables. The generalization seemed to be that the children would try to match the number of syllables in the adult word, but could only do so by repeating the same monosyllable. The studies suggest that at an early age children have an awareness of prosodic templates (at least to the extent of knowing how many syllables a given word ought to have) and use the repetition of a given syllable to fill that template. For a given lexical item the child has acquired the syllabic template, but only enough segmental material to fill one syllable; he maintains the template by repeating the segmental material until he reaches the desired word length. Human beings thus seem to be innately disposed to reduplicate when they have insufficient segmental material to maintain a given prosodic template.

The reduplicative pattern seen in Kinande, discussed in chapter 2, is also relevant. As Mutaka and Hyman (1989) note, the usual reduplicative template in Kinande is bisyllabic; if a form has more than two syllables, it is truncated to form the reduplicative affix. If a form only has one syllable, however, that syllable is copied twice to make up the reduplicative affix: an example is e.n-da.n-da.n-daa 'a

real belly,' based on e.n-daa 'belly.' Speakers are clearly using reduplication to make a form fill a particular number of syllables.

The explanation of the observed pattern of the reduplicated present forms offered in this chapter assumes a specific model of the means by which the laryngeal segments vanished from the language. The model takes as its starting point the numerous phonological rules reconstructed to Proto-Indo-European in which a laryngeal segment alternated with zero in certain phonologically conditioned environments. Mayrhofer (1986:129 and following) cites numerous instances of such alternations. For example, all three of the laryngeals became zero when they occurred between *s* and a consonant. As was discussed earlier, the laryngeals may also have become zero when they fell in the second syllable of a compound form⁷⁰. Mayrhofer treats reduplicated present tense forms separately from compound forms, and finds sufficient evidence to reconstruct a rule $*h_1 \rightarrow$ zero in reduplicated present forms. He cites Gr. gĩ-gn-e-tai < $*gĩ-ğn-e-$ < $*gĩ-ğnh_1-e-$, Lat. gi-gn-i-t, Vedic ápiprata where -pra- < $*-ple-$ < $*-plh_1e-$. In addition, he notes that $*h_1$ became zero in end-stressed compounds and when it was part of the final element of a compound; h_1 may also have been lost in internal syllable before -i- (1986:140). The daughter languages added more environments in which laryngeals became zero; for example, Kuiper (1955) notes that the laryngeals vanished word-finally before a pause and before a following initial consonant in Vedic. Cowgill (1965:147) notes that in Greek, the laryngeals disappeared when they fell after a nonsyllabic and before a syllabic (as would be the case with *set* roots followed by a vowel-initial suffix). In general, as the daughter languages developed their tendency was to add more and more en-

⁷⁰ For a discussion of the material in Vedic, see Kuiper (1961); Beekes (1969:242-5) reconstructs the rule to common Indo-European. Mayrhofer (1986:129) is more cautious about reconstructing the rule to Proto-Indo-European.

vironments in which laryngeals vanished. A generative way of describing this development would be to call it rule expansion.

As the environments in which a laryngeal alternated with zero became more numerous, the root underlying a given set of forms would be subject to reanalysis. For any given root, an underlying laryngeal would be realized in three different ways: as a vowel interconsonantly, as zero in numerous environments, and as a consonantal laryngeal segment in some other environments. Eventually, simplification would occur; as it became more and more difficult to predict when a laryngeal would actually surface as a laryngeal consonant, the speakers would reanalyze the form to do away with the problematic laryngeal. The lexical entry for the root would no longer contain a laryngeal segment. Note that this process would proceed on an item-by-item basis; as the forms derived from each given root in which the laryngeal manifested itself as a zero became more numerous, that root would be simplified so that it no longer contained a laryngeal. Laryngeal loss would proceed by lexical diffusion just as other sound changes proceed by lexical diffusion. The loss of the laryngeals as a class would thus proceed very slowly; furthermore, the segments would vanish from one root at a time.

It is interesting to note that Beekes (1988) argues for a distribution of laryngeal segments in Avestan similar to that I have suggested for pre-Vedic and pre-Greek. In Avestan the segments seem to have collapsed into one segment. He finds (1988:83) that the reflexes of the laryngeals vary depending on their contexts between a consonantal reflex (probably a glottal stop), a vocalic reflex (-i-), and zero, in some cases with lengthening of the preceding vowel. Because of these varying reflexes, the paradigm of a form such as ru?an- 'soul' (1988:120) shows variation in the root: N.Sing. ru?ā, N. Pl. ru?ānah, but Acc. Pl. rūnas-ca, with loss of the laryngeal and lengthening of the preceding vowel. His evidence for this distribution

is metrical (see Beekes (1981) for a fuller discussion of the data). The fact that the system he argues for in Avestan resembles the system I suggest for pre-Vedic and pre-Greek lends plausibility to my hypothesis.

It is important to note that reduplication as a means of lengthening the stem of a monoconsonantal root need not have been invoked for that reason in each individual case. A more likely scenario is that, as the first few roots to lose their final laryngeals lost them, these roots reduplicated to maintain the canonical root structure of the language. If the loss of a given laryngeal segment took place by the route outlined above, then a logical correlary of this theory is that the roots which are used the most frequently would be the first ones from which the laryngeals would vanish. This would be predicted by the fact that roots which were used the most frequently would have the greatest chance of occurring in those environments in which the laryngeal was realized as zero. These roots would be reduplicated to conform to the canonical root structure. Later roots were reduplicated on the model of the first few roots, which served as lexical leaders; when a frequently used form such as *deh₃- was reduplicated in response to the threatened loss of its final laryngeal, other roots which also ended in laryngeals were reduplicated because of their resemblance to *deh₃-. Even the disyllabic roots fell, to some extent, into this pattern; the reduplication of these roots was due solely to the presence of a final laryngeal, and not to the vowel-coloring effects of the laryngeal or to its loss.

Kuiper's (1961) rule of laryngeal loss in the second syllable of reduplicated forms would have interacted with the process of laryngeal loss and the creation of the reduplicating present class in an interesting way. Because of the growing number of environments in which laryngeal segments were being lost synchronically, for each root it would become more and more difficult to abstract a final laryngeal. If the roots were reduplicated and their verbal forms fed into a productive

rule, however, the rule itself would provide a way for speakers to recover the underlying laryngeal segment. Perhaps in this way Kuiper's rule created a situation in which reduplication of roots in the process of losing their laryngeals prevented other synchronic rules affecting these segments from becoming opaque, offering speakers a way of recovering the underlying laryngeals.

The claim discussed in this chapter permits me to add several Sanskrit reduplicated present tense verbs to the class of evidence concerning Kuiper's rule of laryngeal loss. Kuiper (1961:25) noted that the verb pipṛtām (3. Du.) from the root pr- 'fill' exhibits loss of the laryngeal in the second syllable, stating "RS. pipṛtām (3. Du.), wozu der Singular pīparti usw. (statt *pi- prā-ti, pīmplysi) wohl sekundäre Analogiebildung nach bībharti : bibhṛmāh ist." The singular form seemed to him a later analogic formation rather than an instance of the loss of the laryngeal in the second syllable of this form. In light of the fact that the verbs jīgharti, sīsarti, pīparmi, tītarti, and possibly bībharti, which are all derived from roots ending in laryngeals in the proto-language, all show the same absence of the laryngeal segment in the singular verbal forms, claiming that this absence is due to analogy is unnecessary. I argue instead that this loss of the laryngeal is regular; these cases may suggest that Kuiper's rule can be extended to include loss of the laryngeal after consonantal r as well as after vocalic r. The roots, reduplicated because they ended in laryngeals, nevertheless lost the laryngeals in the reduplicated verbs.

This model of how the laryngeals were lost may perhaps account for the puzzling fact that, although the segments can be reconstructed to Proto-Indo-European, only one of the daughter languages, Hittite, actually contains laryngeal segments as part of its phonological inventory. The numerous phonological rules described above suggest that, at the latest point at which Proto-Indo-European could still be considered a single language, the laryngeals were already on their way out. The pro-

cess of loss, for whatever reasons, had already begun, and the daughter languages each continued the process.

At this point it is interesting to mention the paradox concerning the reduplicated present forms with which I began this chapter: that, although only a few reduplicated present forms could be reconstructed to Proto-Indo-European, in both Greek and Sanskrit the class had expanded so that it contained a considerable number of forms. The period of the rise of the class of reduplicated present forms coincided (albeit very roughly) with the period of the loss of laryngeal segments. Both processes had begun in Proto-Indo-European; both processes continued during the prehistory of Greek and Sanskrit. The time period involved is too great for it to be at all certain that the two developments overlapped; nevertheless, it is likely that in both Sanskrit and Greek the reduplicated present class developed during the period when laryngeals were gradually being lost.

The development described here is clearly compatible with the theory of reduplication developed by McCarthy and Prince (1986); details of the theory are discussed in chapter 2. In McCarthy and Prince's framework, copying and association are triggered when an empty prosodic template is affixed to a form. The development of present-tense reduplication was a little different: instead of a template being affixed to a base, an insufficient amount of segmental material was matched to a bisyllabic template. This mismatch between segmental material and prosodic template provides a formal account of the use of reduplication to create a bisyllabic stem. This formalized account is not really different from the analysis of child-language reduplication described above: if speakers are aiming at a certain number of syllables, but they don't have enough segmental material to fill all the syllables, they will reduplicate what material they do have to take up the slack. In all cases these processes are due to speakers somehow having a notion of what the shape of a

word "ought" to be.

5.5. Other issues

One issue not addressed in this chapter is the question of what connection, if any, exists between the laryngeal-final roots and the *hi*-conjugation in Hittite. As is well known, a surprising number of Proto-Indo-European roots which ended in laryngeals belong to the *hi*-conjugation rather than to the *mi*-conjugation; that is, their present singular forms show the suffixes *-hi*, *-ti*, *-i* rather than the suffixes *-mi*, *-si*, *-zi*. The *mi*-conjugation clearly continues the Proto-Indo-European athematic active present; it is also clearly cognate with the Greek *mi*-conjugation seen with reduplicated present stems. Exactly how the *hi*-conjugation arose is considerably less clear. The conjugation has been analyzed by Eichner (1975) as a descendent of the Proto-Indo-European perfect conjugation; by Cowgill (1979) as the descendent of a nominal verb formation, from which the Proto-Indo-European perfect also is descended; by Jasanoff (1979) as the descendent of an alternative present conjugation which existed alongside the *mi*-conjugation in the proto-language just as the *hi*- and *mi*-conjugations coexisted in Hittite; and by Kurylowicz (1979) as a causative descended from an original deponent. Given the lack of agreement among most Indo-European scholars about this question, I will not discuss the source of the conjugation in this chapter. Of course, the laryngeal-final roots may have been associated with the *hi*-conjugation for reasons other than those which were responsible for the genesis and development of the class.

In light of the connection I have argued for between final laryngeals and reduplication, and in light of the connection between these laryngeals and the *hi*-conjugation, it is extremely interesting to consider the relationship between the reduplicated presents and the set of partially thematic *hi*-verbs discussed in chapter 3.

The verbs are those which exhibit a thematic vowel in the singular but no thematic vowel in the plural; Oettinger (1979:496) notes that a surprising number of these verbs are reduplicated. He analyzes the forms as perfect stems of the shape Ce-CV(R)C-. He invokes the laryngeals to account for the presence or absence of thematic vowel: when the root was in the zero-grade, the laryngeal would have been immediately adjacent to the root-initial consonant, and hence would have been lost. As I argue in chapter 3, his analyzing these forms as perfect stems is not really convincing. It is, however, intriguing to note how many of the roots ended in laryngeals; possibly these forms should be related to the Greek thematic forms like $\pi\acute{\rho}t\bar{o}$. It is also interesting to note that, although Oettinger tries to connect the vowel of the reduplicative prefix with the -e- commonly reconstructed for the reduplicated perfect, the vowel attested most frequently for these forms is -i-.

A number of questions remain to be answered. For one thing, many of the reduplicated present forms had corresponding unreduplicated root aorist forms; the analysis proposed in this chapter does not explain why the aorist forms were not affected by the same factors as the present forms were. Another question has to do with the unreduplicated athematic forms such as $dh\acute{a}ti$; such forms are rare, but they are occasionally attested. Were they formed later than the reduplicated presents when the canonical verbal structure of the language had already been eroded by the wholesale loss of the laryngeals? Why were only some of the laryngeal-final roots subject to reduplication and not others? These issues remain unresolved.

Reduplication for morphological reasons such as stativity or durativity was a sporadic process in the proto-language. The later rise of reduplicated present classes in Sanskrit and Greek was due not to a morphological need to express one of these iconic values but to the presence of final laryngeal segments and their eventual loss. It is true that in cases where doublets of reduplicated and unreduplicated forms

resulted the reduplicated form would take an iconic value such as stativity or habituality; the reduplication, however, anteceded the iconic value. This analysis of the present tense reduplication found in Indo-European suggests that when trying to determine cross-linguistically if a grammatical process is iconic or not, it is necessary to distinguish between grammatical processes which express some semantic value and grammatical processes which arise in response to other factors.

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