Circumscriptive morphemes*

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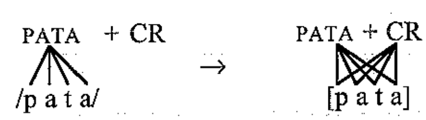
The aim of this paper is to present evidence for a hitherto unrecognised type of morpheme: a haplologizing reduplicant, dubbed a 'circumscriptive morpheme' here. Unlike standard reduplicants, these morphemes coalesce with phonological material instead of copying it. Circumscriptive morphemes are shown to be essential in accounting for morphologically-induced lengthening and reduplicative infixation in the Polynesian language Maori. Other potential applications – as in parsing-out circumscription, truncation, and subtractive morphology – are also discussed.

Some morphemes have no phonological material underlyingly. There are different types of such morphemes, differing in terms of their surface content. One sort remains empty in the output – **zero morphs**. First person subject agreement in English is a zero morph: e.g. *sing* /sɪŋ/ + 1st person agreement → [sɪŋ]. **Reduplicants** are another sort; McCarthy & Prince (1995b) argue that reduplicants are entirely devoid of underlying phonological content (also see Urbanczyk 1996). Their output form results from copying, and their size from general constraints on prosodic form.

The aim of this paper is to argue that another type of underlyingly empty morpheme exists. Like a reduplicant, this morpheme adopts output phonological material. Unlike a reduplicant, though, it **coalesces** (i.e. merges) with another morpheme's segments instead of copying them. This sort of morpheme will be termed 'circumscriptive' due to the similarity of its effects to those of the circumscription operation of McCarthy & Prince (1990, 1995a) (see section 2.3). A circumscriptive morpheme (CR) is shown schematically in (1i). This is compared to a reduplicant (RED) in (1ii).

1. (i) Morpheme:

Phonological Material:



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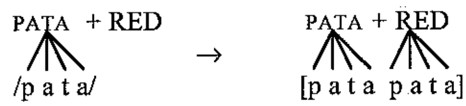
(ii) Morpheme:

Phonological Material:



As shown, both the circumscriptive morpheme CR and the reduplicant RED adopt output phonological material. The difference is that CR merges while RED copies. A formal account of CR set within Optimality Theory is given in section 1.

Another difference between CR and RED is that the effects of RED are directly visible. In comparison, the concatenation of CR with /pata/ results in output [pata], with no visible change (just like a zero morph). Even so, CR can be indirectly visible in some contexts, namely when it coalesces with only part of the stem it attaches to. For example, if CR coalesces with only the last CVCV sequence of [pataka], this introduces a morpheme boundary – CR's left edge – into the middle of the string. Effectively, *pataka* is partitioned into [pa] and CR-affiliated [taka]. Processes that refer to morpheme boundaries can make this partition visible. For example, if a PrWd boundary is required at the left edge of every morpheme, this would effectively split *pataka* into two PrWds: [{pa}{taka}] (a PrWd boundary appears before [t] since this is the left edge of CR). Morphological operations can also make CR visible. If a morpheme hypothetical *ba* attaches to the left edge of CR in *pataka* it would appear to infix, producing *pabataka*.

Two phenomena in the Polynesian language Maori are explained by employing a circumscriptive morpheme. In section 2.1, lengthening in certain plural forms (e.g. *wahine* 'woman' → *wa:hine* 'women') is shown to result from the partial coalescence of a circumscriptive morpheme with a root and its attendant affect on PrWd formation. In section 2.2, the placement of reduplicative infixes (e.g. *pakini* 'pinch' → *pa:kinikini* 'pain') is argued to depend upon the presence of circumscriptive morphemes. Reasons why these phenomena are best explained by invoking circumscriptive morphemes are given in section 2.3.

The potential for circumscriptive morphemes to explain other phenomena (e.g. subtractive morphology, truncation, size-conditioned allomorphy) is discussed in section 3.

1.0. Circumscriptive morphemes as haplologizing reduplicants

The aim of this section is to examine the nature of circumscriptive morphemes. I will show that they are not something new, but rather are morphemes that undergo a combination of two well-attested morphological operations: reduplication and morphological haplology.

As pointed out in the previous section, circumscriptive morphemes are like reduplicants in that they depend on other morphemes for their output material. However, circumscriptive morphemes coalesce instead of copying. This latter property is found in haplologizing morphemes. Haplologizing morphemes merge with adjacent (near-)identical material. For example, the Japanese Classical predicative suffix -[ʃi] coalesces with stems ending in [ʃi]: e.g. *kanaʃi* 'sad' + *ʃi* → *kanaʃi*, **kanaʃiʃi* (cf. *ure* 'happy' + *ʃi* → *ureʃi*, **uʃi*, **ure*).[1]

The effect of both reduplication and haplology on the same morpheme can be seen in the example below:

2.	Input:	/pataka/ + CR
	Reduplication:	patakataka
	Haplology:	pa*taka*

The circumscriptive morpheme CR attaches to the morpheme *pataka*. CR reduplicates only part of the string, as indicated by the underlined taka (exactly how much CR will reduplicate is determined by various constraints, discussed in section 2). The two identical strings [taka] and [taka] then merge to form a single string [*taka*] (italics indicate coalescence). The resulting string is identical to the original /pataka/ on the surface, except that the substring [taka] now belongs to two morphemes – PATAKA and CR. The derivation above shows that CR is not an entirely new type of morpheme – it is simply the (hitherto unreported) combination of two different types of morphemes.

It remains to show how circumscriptive morphemes can be accommodated within Optimality Theory. An account of the circumscriptive morpheme's reduplicative aspect is given in section 1.1, while its haplologizing property is analysed in section 1.2.

1.1. CR and reduplication

Reduplicants contain no phonological material underlyingly (McCarthy & Prince 1995b); instead, they adopt it from other morphemes through a relation called 'correspondence'. Constraints regulate the correspondence relation between the reduplicant's phonological material and the string it copies – its 'Base'. For example, the constraint MAX-BR requires every element in the Base to have a corresponding segment in the reduplicant. Other constraints determine the size of the reduplicant – i.e. how much material the reduplicant copies (McCarthy & Prince 1995b, Urbanczyk 1996).

By way of example, the input [RED + /pata/] can result in the output [patapata] where RED's material is underlined; this is due to the requirement imposed by MAX-BR that every segment in the Base – in this case [pata] – have a corresponding segment in the reduplicant. In the case of an output such as [papata], size-related constraints – requiring that the reduplicant be a syllable –outrank MAX-BR. These size-related constraints are very general, basically relating types of morphemes to prosodic constituents (e.g. a root is required to be a PrWd in size, while an affix is ideally syllable-sized – see Urbanczyk 1996 for details). In the case of [papata], the reduplicant is designated an affix, and so ends up syllable-sized.

[1] For arguments that haplology involves coalescence and not deletion, see Stemberger (1981), Lawrence (1997), and de Lacy (to appear).

Circumscriptive morphemes can be explained in essentially the same manner: there is a constraint MAX-BCR that requires every segment in the Base to correspond to some segment in the circumscriptive morpheme. Just like reduplicants, size-related constraints can outrank MAX-BCR, so restricting its prosodic shape. This is shown to happen in Maori (see section 2.1).

At this point, a brief note must be said on the definition of 'Base'. McCarthy & Prince (1994:4) define the Base – the string that the reduplicant copies – as "the phonological material to which the reduplicant is attached." This definition must be altered in consideration of circumscriptive morphemes since the Base is not adjacent to CR's phonological material: it is the **same** as CR's material. The "Base" must be redefined as follows:

3. The Base of morpheme M is the nearest accessible string to M.
   (i) The "nearest accessible string to M" begins at the closest segment to M which is affiliated to a morpheme other than M.

This definition allows the Base of a morpheme M to be the same as M's material if and only if that material belongs to some morpheme other than M. This is the case with circumscriptive morphemes since the string with which they coalesce belongs to another morpheme (illustrated in figure 1i). In comparison, the Base for reduplication is the adjacent string; the Base of a reduplicant cannot be the reduplicant's phonological string itself since that string belongs only to the reduplicant (illustrated in 1ii).

This definition is necessary to prevent self-copying in standard reduplication. If the "nearest accessible string to M" was always the same as the string that M dominated, all faithfulness constraints between the Base and M would be trivially satisfied. Reduplicants, then, would always consist of a maximally unmarked string in deference to markedness constraints – e.g. [ʔaʔa]. The condition that the Base belong to some morpheme other than the Reduplicant or CR prevents this type of vacuous self-copying.

With this emendation to the definition of "Base", the reduplicative aspect of CR can be handled in exactly the same way as standard reduplicants – there is no need to introduce new constraints into the grammar.

1.2. CR and haplology

As mentioned above, haplology is the coalescence of two (near-)identical strings from different morphemes. Haplology can be triggered by any relevant constraint that militates against structure (see de Lacy to appear:§4.3 for discussion). The anti-structure constraint *STRUC will be used here for the sake of concreteness (Prince & Smolensky 1993:25). The pressure to minimise structure outweighs the need to avoid coalescence. This latter requirement is effected by the constraint MORPHDIS (McCarthy & Prince 1995b):

4. MORPHDIS: "A segment cannot belong to more than one morpheme."

A number of other factors contribute to a complete account of haplology. For example, the fact that coalescence takes place instead of deletion is due to the high-ranking constraint MAX-IO; this constraint requires all input segments to be present in the output. A full account of haplology in these terms is presented in de Lacy (to appear), so will not be discussed further here.

When *STRUC outranks MORPHDIS, haplology takes place. This is illustrated below with the haplology of Japanese -*ʃi*, discussed above. Italics indicate coalesced segments.

5. Haplology

/kanaʃi + ʃi/	*STRUC	MORPHDIS
(a) kanaʃiʃi	xxxxxxxx!	
☞ (b) kana*ʃi*	xxxxxx	x x

Candidate (a) – a form without haplology – incurs a greater number of *STRUC violations than the haplologized candidate (b) because it contains a greater number of segments. While candidate (b) violates MORPHDIS because it contains two segment that have coalesced (i.e. the italicised *ʃi*), this is of no consequence due to MORPHDIS' low ranking. Candidates that employ deletion instead of coalescence (e.g. [kanaʃi]) are eliminated by the high-ranking MAX-IO, as discussed above. It is evident from inspecting the tableau above that in cases where there is no haplology, MORPHDIS must outrank *STRUC.

1.3. Circumscriptive morphemes in OT

With the constraints thus far mentioned, an analysis of circumscriptive morphemes in OT terms can be presented. A circumscriptive morpheme is one with output material which must correspond to another morpheme's material (MAX-BCR), but coalesces in order to minimise structure (*STRUC) even though this violates MORPHDIS. This is presented in the tableau below. Underlining indicates material that belongs to CR alone. Italics indicate coalesced material.

6. Circumscriptive Morphemes

/pata/ + CR	MAX-BCR	*STRUC	MORPHDIS
(a) pata<u>pata</u>		x x x x x x x x!	
☞ (b) *pata*		x x x x	x x x x
(c) pata	x x x x!	x x x x	

Candidate (a) is a non-haplologized form, hence it fatally violates *STRUC more than the coalesced forms (b) and (c). Of (b) and (c), (b) wins since MAX-BCR is fatally violated in (c) due to the fact that elements in the base [pata] do not have corresponding segments in CR.

This ranking can be compared to that needed for standard reduplication. With MORPHDIS outranking *STRUC, standard copying reduplication results:

7. Reduplication

/pata/ + CR	MAX-BCR	MORPHDIS	*STRUC
☞ (a) pata<u>pata</u>			x x x x x x x x
(b) *pata*		x x x x!	x x x x
(c) pata	x x x x!		x x x x

As a final note, haplology is morpheme-specific – it is not a property derivable from phonological characteristics of a morpheme (Stemberger 1981).[2] This means that haplologizing and non-haplologizing morphemes can co-exist in the same grammar. Hence, reduplicants and circumscriptive morphemes can appear in the same language, as will be shown below.

In summary, since circumscriptive morphemes are haplologizing reduplicants, the same mechanisms that are used for reduplication and haplology can be amalgamated to account for them. There is no need to invoke any new constraints – all the necessary constraints have been proposed previously to explain entirely different phenomena (McCarthy & Prince 1995b).

2.0. Circumscriptive morphemes in Maori

The previous section presented a formal account of circumscriptive morphemes. The aim of this section is to give empirical support for their existence in natural language. Two phenomena in the Polynesian language Maori, spoken in New Zealand, are of particular interest. The first to be discussed (in section 2.1) is the formation of the plural of a restricted set of kinship terms. The second (section 2.2) is the placement of reduplicative infixes. Both will be shown to receive a straightforward analysis in terms of circumscriptive morphemes. In section 2.3, it will be argued that use of the circumscriptive morpheme is **necessary** – other accounts cannot achieve the desired result (see section 2.3).

2.1. Kinship plural formation

A restricted set of kinship terms in Maori undergo lengthening to form the plural (Williams 1971, Bauer 1993:354):

8.	matua	→ ma:tua	'parents'
	taŋata	→ ta:ŋata	'men, people'
	teina	→ te:ina	'younger siblings (same sex)'
	tupuna	→ tu:puna	'ancestors'
	wahine	→ wa:hine	'women'
	whaea	→ wha:ea	'mothers'

[2] In terms of the analysis above, this means that MORPHDIS must be relativised to specific morphemes (i.e. just those morphemes that haplologize).

It is evident from the data that the first vowel of each of the forms is lengthened to form the plural. However, there is another restriction: lengthening only applies to trimoraic stems.[3] Forms of other sizes do not so lengthen:

9.	(i) tama	→ tama, *ta:ma	'sons, nephews'
	koro	→ koro, *ko:ro	'fathers'
	(ii) taokete	→ taokete, *ta:okete	'brothers-in-law'
	mokopuna	→ mokopuna, *mo:kopuna	'grandchildren'

The possibility that the plural is formed by simply infixing a mora can be ruled out immediately: such an explanation fails to give any insight into why lengthening only affects trimoraic roots. In comparison, this restriction falls out if the plural is a circumscriptive morpheme.

The plural circumscriptive morpheme (CR) is suffixed to noun roots. However, there is a condition on CR: it must be a minimal word – i.e. bimoraic (see below for why this is so). Because of this, CR coalesces with only the last two moras of the stem. This is illustrated for *wahine* 'woman':

10.

While this result may seem rather innocuous, other phonological constraints affect this structure to produce observable effects.

In Maori, every morpheme that contains at least two moras forms a separate PrWd (see fn.4; for more detail see Biggs 1961 and de Lacy 1998). This condition is true for both roots and affixes. For example, the word *whakakite* consists of the causative prefix *whaka+* and the root *kite* 'see'. Since both morphemes are bimoraic, they form independent PrWds (marked by { }): [{whaka}{kite}].[4]

This fact about PrWd formation has consequences for the circumscriptive morpheme. Since it is bimoraic, CR must form a PrWd on its own. This means

[3] There are two four-mora words that undergo lengthening: *tuahine* → *tua:hine* 'sister (of male)' and *tuakana* → *tua:kana* 'older sibling (same sex)'. I treat these forms as exceptional – unlike most of the other lengthened forms, both are morphologically complex, consisting of *tua* and another morpheme. This lengthening may be seen as an idiosyncrasy of *tua* (see Krupa 1966 and Bauer 1993 for other Maori affixes that idiosyncratically lengthen). In any case, these are the only four mora forms that undergo lengthening. Lengthening to form kinship plurals is found in almost all Polynesian languages.

[4] In OT terms, this sort of system can be seen as the result of the constraints ALL-FOOT-LEFT "Every foot must be leftmost in a PrWd" outranking PARSE-σ "Every syllable must be associated to a foot". Together, these constraints prefer minimal PrWds – i.e. those consisting of a single foot and as few unparsed syllables as possible. The conditions on this desire for minimality are that PrWd boundaries must coincide with morpheme edges (perhaps a universal condition) and that feet must be binary, imposed by FTBIN (Prince & Smolensky 1993). Since PrWds must contain a foot and monomoraic feet are banned, it follows that the minimal acceptable PrWd must be bimoraic. This explains why monomoraic affixes are incorporated into PrWds instead of forming their own (also, they do not lengthen or delete due to high-ranking faithfulness constraints). See Hewitt (1992) for relevant discussion.

that a PrWd boundary is placed in the middle of *wahine*, effectively 'cutting it in two', prosodically speaking: [wa{hine}].

Due to other constraints on PrWd affiliation, the remnant [wa] is forced to form a PrWd on its own (see Biggs 1961, de Lacy 1998). However, since PrWds in Maori are minimally bimoraic (due to the constraint FTBIN – see fn.4), [wa] is forced to lengthen. This produces the attested output form with lengthening [{wa:}{hine}].

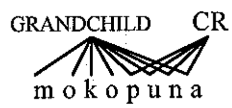
This explanation accounts for the fact that non-trimoraic stems do not lengthen. In bimoraic stems, CR coalesces with all available material:

11.

This form consists of a single PrWd – [{*tama*}]. Since there is no residue left after PrWd formation, there is no need to augment any PrWd, so lengthening does not take place.

Roots with more than three moras are represented below:

12.



CR must form a separate PrWd, resulting in [moko{puna}] and leaving the residue [moko] to form a PrWd: [{moko}{puna}]. Since [moko] is bimoraic, it already forms an adequate PrWd, so there is no need for lengthening.

In conclusion, lengthening in the plural is the result of PrWd formation, which is effectively a side-effect of the presence of a circumscriptive morpheme. Furthermore, the fact that the plural circumscriptive morpheme is necessarily bimoraic accounts for why lengthening is restricted to trimoraic roots alone.[5]

While Kinship Plural formation can be explained by invoking a circumscriptive morpheme, alternative analyses must be entertained.[6] An intriguing alternative is that the plural is actually a phonological requirement or constraint, not a morpheme *per se* (see Anderson 1992, Russell 1995). If plural formation is seen as imposing a requirement that words be fully footed (perhaps implemented by the constraint PARSE-σ within OT), the correct results emerge: (1) *wahine* must lengthen to *wa:hine* in order to avoid a stray unfooted syllable – i.e. [(wa:)(hine)], *[(wahi)ne], (2) *tama* does not lengthen since it is already fully footed (i.e.

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[5] Why is the plural CR bimoraic? As mentioned in section 1.1, size is a result of constraints relating morphological types to prosodic units. Following McCarthy & Prince (1995): (1) the plural CR is a Root, (2) the ideal size for a root is a PrWd, (3) the most optimal PrWd (due to ALL-FT-L and PARSE-σ) is bimoraic, therefore CR is bimoraic. See McCarthy & Prince (1995) and Urbanczyk (1996) for relevant discussion.

[6] Krupa (1966) claims that lengthening is due to allomorphy. So words such as *pakini* actually consist of two morphemes *pa+kini*. When an infix intervenes, the lengthened (suppletive) allomorph of *pa* appears. This approach does not explain why lengthening is restricted to trimoraic roots. It also necessitates the otherwise unmotivated analysis of many trimoraic roots as morphologically complex. See Keegan (1996) for an detailed critique.

[(tama)]), and (3) *taokete* does not lengthen since it is also fully footed (i.e. [(tao)(kete)].

To distinguish the full-footing approach from the circumscriptive morpheme proposal, a form five moras in size is needed. This is predicted to lengthen under the full-footing account, but should stay the same in the circumscriptive account. Unfortunately, five-mora roots in Maori are rare, and no mono-morphemic kinship terms of this size exist. So, to decide between these approaches, evidence from another source is needed. Such evidence is found in reduplicative infixation, discussed in the next section.

2.2. Parsing-out infixation

Circumscriptive morphemes play a significant role in another part of Maori morphophonology: reduplication. Maori has six different reduplicative morphemes which vary in terms of shape and position (de Lacy 1996, Keegan 1996): reduplicants are either CV, CV:, or (C)V(C)V in shape; three are prefixes, and three infixes (the reduplicant is indicated by underlining):[7]

13. Prefixing reduplicants in Maori

Shape	Examples	
CV	peke 'limb'	→ pepeke 'hasten'
	pirau 'rotten'	→ pipirau 'decayed'
CV:	peke	→ pe:peke 'draw up limbs
	kanapa 'bright'	→ ka:kanapa 'gleaming'
(C)V(C)V	peke	→ pekepeke 'quick'
	tapahi 'cut'	→ tapatapahi 'cut to pieces'

14. Infixing reduplicants in Maori

Shape	Examples	
CV	pakini 'pinch, nip'	→ pa:kikini 'pain'
CV:	kapiti 'joined'	→ ka:pi:piti 'place side by side'
(C)V(C)V	pakini	→ pa:kinikini 'pain, ache'

The reduplicants shown above are not variants of a single morpheme – each is a separate morpheme.

The problem presented by Maori reduplicative infixes relates to their placement. Descriptively speaking, the reduplicant prefixes to the final two moras (i.e. (C)V(C)V sequence) of a root. At first, this might seem to suggest that the reduplicant prefixes to a final foot. In fact, this situation is found in another Polynesian language – Samoan (McCarthy & Prince 1986, 1993): e.g. [a(lófa)] → [alo(lófa)]. The problem with this explanation is that the head foot in Maori is usually **leftmost**: *pakini* is [(páki)ni], not *[pa(kíni)]. This means that there is no

[7] For a detailed discussion of reduplication in Maori see de Lacy (1996) and Keegan (1996). Meyerhoff & Reynolds (1996) claim that several reduplicants in Maori are suffixes, not prefixes. For arguments against this see de Lacy (1996) and Keegan (1996).

prosodic constituent in the base form to which the reduplicant can attach. If Maori reduplication involved prefixing to the head foot, *pakipakini* should result, not *pa:kinikini*.

To account for Maori in a manner similar to Samoan, a foot-sized constituent must be cut – or 'parsed' – out at the right edge of the root. For example, a foot is parsed out of [(páki)ni] at it's right edge, producing [pa(kini)]. Reduplicants then attach to this parsed-out foot, resulting in the attested [pakini(kini)].

Such a process is termed 'parsing-out circumscription' (McCarthy & Prince 1990, 1995a). The 'parsing out' operation relies on the creation of a constituent that does not arise from the constraints active in the language. In Maori, for example, the language's usual constraints create a foot at the left edge of a PrWd, while the parsing-out operation requires the opposite – a foot at the right edge. This is problematic in Optimality Theory since all the constraints in the grammar are in a fixed ranking; parsing-out circumscription seems to require an inversion of the ranking otherwise needed in the grammar.

The Maori case of parsing-out circumscription can be explained by using a circumscriptive morpheme, solving the problems posed for OT mentioned above. The circumscriptive morpheme (CR) responsible for the placement of infixes is identical in phonological shape to the Kinship Plural morpheme – it is a Root so it is bimoraic in size, and it attaches to the right edge of a word. For example, CR attaches to the root *pakini*, coalescing with the string [kini]. The result of this coalescence is that a morpheme boundary – i.e. CR's left boundary – appears **inside** the root *pakini*. This morpheme boundary serves as a locus of affixation for reduplicants: when they prefix to CR, they produce the output form [pakini*kini*].

This explanation also makes a number of predictions in terms of prosodic structure. For example, CR must form a PrWd on its own, producing [pakini{*kini*}]. A PrWd boundary also falls at the left edge of reduplicants, forming [pa{kini}{*kini*}]. As in Kinship Plural formation, this leaves [pa] as a residue, which then must augment: [{pa:}{kini}{kini}]. This correctly predicts that the initial syllable of infixed trimoraic roots will lengthen.

A brief summary of Maori reduplicative infixation is presented below in a step-wise manner. This is intended as a descriptive aid only – it does not imply a serial analysis; reduplicative infixation can be handled in an entirely parallel fashion with the constraints mentioned above:

15.	Input:	/pakini/, CR, RED
	CR reduplicates:	pakinikini, RED
	CR haplologizes:	pa*kini*, RED
	RED prefixes to CR:	pa – RED + *kini*
	RED reduplicates:	pa – kini*kini*
	PrWd formation:	{pa}{kini}{*kini*}
	Augmentation:	[{pa:}{kini}{*kini*}]

This approach correctly predicts that there will be no lengthening in longer roots: e.g. *tarakina* 'bristle' → *tarakinakina* 'bristling', **ta:rakinakina*, **tara:kinakina*.

This is due to the fact that there is no need to augment the remnant *tara* since it is already bimoraic, and therefore an adequate PrWd.[8]

In summary, infixing reduplicants prefix to a circumscriptive morpheme in Maori. This explains the apparent contradiction that parsing-out circumscription presents: it is not the case that parsing-out circumscription requires a prosodic constituent that contradicts the active constraints of the language; instead, the 'parsed-out' prosodic constituent results from standard constraints on the relation between prosodic structure and morphemes – specifically CR. So, parsing-out circumscription – unlike standard circumscription – does not refer to a prosodic constituent but to a morphological one: the circumscriptive morpheme.

2.3. Alternatives eliminated

The aim of this section is to entertain some alternative analyses of Maori infixation. The aim here is to show that **phonological** accounts – those that appeal simply to phonological structure – are empirically flawed, so supporting an explanation that relies on the influence of morphemes, as in the approach advocated in this paper.

McCarthy's (1997:§5) approach to parsing-out circumscription employs constraints that require the circumscribed form to be prosodically similar to its paradigmatically related Base form. For this approach to work in Maori, an infixed form must be more faithful to its Base in some aspect of prosodic structure than its corresponding prefixed form is.

The problem with this approach is found in (C)V(C)V infixing reduplication. *Pakini* serves as an example:

16.	Base:	{(páki)ni}
	Prefixed reduplicant:	{(páki)} {(páki)ni}
	Infixed reduplicant:	{(pá:)} {(kíni)} {(kíni)}

The prefixed form is prosodically far more faithful to the Base than the infixed form. In terms of mora count, the infixed form is less faithful to the Base since it contains an extra mora in [ta:]. Foot structure in the infixed form is unlike that in the Base, whereas it is identical to the Base in the prefixed form. The prefixed form is also more faithful in terms of stress placement. In short, the prefixed form is more faithful to the Base than the infixed form in every prosodic aspect, so prosodic faithfulness cannot be used to motivate infixation.

Another approach is that infixation is due to the requirement that words be fully footed. This would correctly prefer the fully-footed infixed form [{(pá:)} {(kíni)} {(kíni)}] over the partially-footed prefixed form [{(páki)} {(páki)ni}].

However, this approach does not account for all the data. With CV reduplicants the infixed form is [{(pá:)} {ki{(kíni)}}], with one syllable unparsed

[8] Invoking PrWd structures makes predictions about stress placement and syllabification. For example, in the reduplicated form" *a:eheehe* the PrWd structure is predicted to be [{ a:} {ehe} {ehe}], with a syllable boundary between the two medial [e]'s. This is the attested syllabification, as shown by stress. See Biggs (1961), Bauer (1993) and de Lacy (1998) for a discussion of PrWd structure, stress, and syllabification in Maori.

into a foot. The corresponding prefixed form, in comparison, is [{(pápa)(kìni)}].[9] The point to note here is that the prefixed form has no unparsed syllables while the infixed form has one, showing that the full-footing approach incorrectly predicts that infixed CV reduplicants are impossible in Maori.

There are other problems with this idea, as well. We know from Kinship Plural formation that one response to satisfy full-footing is lengthening. So, a root syllable could simply be lengthened to satisfy the full-footing requirement: RED + *pakini* → [{(pá:)}{(pá:)(kíni)}]. There is no need to employ infixation as well as lengthening; lengthening alone satisfies the full-footing requirement. In fact, it is **undesirable** to infix since this creates violations of other constraints on string-integrity (e.g. CONTIGUITY – McCarthy & Prince 1995b). In effect, a prefixed form with lengthening will harmonically bound (i.e. always be more optimal than) an **infixed** form (with concomitant lengthening). This means that the full-footing approach cannot motivate infixation; at best it can only account for lengthening.

In summary, alternative approaches – specifically those invoking faithfulness to a paradigmatic Base and those requiring full footing – do not account for the facts in Maori. Both these approaches are essentially phonological – they rely on phonological constraints to effect infixation. Their failure indicates that a phonological explanation is not correct for Maori; instead, a successful account requires a morphological component – i.e. the circumscriptive morpheme.

3.0. Extensions

As shown in the preceding sections, circumscriptive morphemes can be used to account for a variety of phenomena. Not only can they be used to account for a specific type of morphologically induced lengthening, but they also explain (at least some types of) parsing-out circumscription.

Circumscriptive morphemes have the potential to account for a wide variety of other phenomena. Apart from dealing with other cases of parsing-out circumscription (McCarthy & Prince 1990, 1995a, McCarthy 1997), other processes that crucially rely on the creation of a prosodic constituent (or – equivalently – impose a prosodic template) that cannot be formed by the active constraints of the language may be explained by using a circumscriptive morpheme. These include truncation , subtractive morphology (see examples in Anderson 1992:64-66), and size-conditioned allomorphy (see examples in McCarthy & Prince 1993:109).

Unfortunately, limitations on space preclude a full exploration of these issues. As a brief example, though, truncation may be seen as the preservation of a circumscriptive morpheme's segments and the elimination of all others. For example, if a bimoraic (i.e. Root) circumscriptive morpheme coalesced with the first two moras of hypothetical *pataka* then the remainder of *pataka*'s segments were unrealised, only *pata* would surface, producing truncation.

[9] Note that the prefixed CV reduplicant incorporates into the PrWd of the Base, as do all CV prefixes (Biggs 1961, de Lacy 1998). That monomoraic prefixes incorporate into a PrWd rather than adjoin is shown by stress: if the monomoraic Reduplicant adjoined to the PrWd, it could not be footed with the following material, forming *[{pa(páki)ni}].

As a final note, despite having the potential to account for a variety of phenomena, circumscriptive morphemes are highly restricted in form, and therefore in predictive power. Since their size is determined by general constraints on prosody-morphology relations, they have a limited set of sizes, effectively only a Minimal Word (if a root) or a syllable (if an affix) in size. This predicts that there will be no cases of parsing-out circumscription which attach to a 'foot and one syllable', or other such non-constituents.

4.0. Concluding Remarks

The aim of this paper has been to argue that a type of morpheme – dubbed 'circumscriptive' – must be recognised. One of the virtues of this approach is that no new constraints were introduced to account for the phonological characteristics of this morpheme – all have been proposed elsewhere to account for entirely different phenomena.

In short, the purpose of this paper has been to show that a type of morpheme that is entirely expected under current assumptions does indeed exist. After all, since both haplology and reduplication are phonological processes, how can haplologizing reduplicants – i.e. circumscriptive morphemes – be **excluded** from phonological theory in a principled manner?

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