Copy affixes in Kiranti

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Abstract

I argue that affix copying in Kiranti languages is the result of defective prosodic structure in the representation of specific morphemes. Since the copying process in Kiranti is neither true phonological copying to avoid marked structure nor reduplication to realize certain morpho-syntactic features, its formal account is particularly interesting for the question of how to model (phonological) copying and (morphological) doubling in phonology and/or morphology (Kawahara 2007, Inkelas 2008, Saba Kirchner 2010).

1. Introduction

For some cases of copying or doubling of phonological material, rather straightforward motivations can be identified. In Washo (1), for example, a prosodically defined portion of base segments is copied to realize certain morpho-syntactic features. In Hocank (2), on the other hand, a segment is doubled to avoid a phonologically marked structure.

(1) *Washo (Winter 1970, Yu 2008)*

Base		Plural
sukuʔ	'dog'	**suku**ku**ʔ**
bokoŋ	'snore'	**boko**ko**ŋ**

(2) *Hocank (Miner 1993)*

Underlying		Surface
ʃ-wapox	'you stab'	ʃ**awa**pox
ʃ-ruxuk	'you earn'	ʃ**uru**xuk

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This paper investigates copying processes in Kiranti languages that are apparently less straightforward with respect to their motivation. In (3), a first illustrating example from Athpare is given. The phonological content of certain agreement suffixes appears multiple times on the surface. I argue in this paper, that this copying process can be characterized neither as sole realization of certain morpho-syntactic features as in (1) nor as repair to avoid otherwise phonologically marked structure as in (2).

(3) *Copying in Athpare (Ebert 1997)*
   a. lems-u-ŋ-ʦi-e [lemsu**ŋ**ʦi**ŋ**e]
      'I beat them.' (past)
   b. lems-i-t-ŋa [lems**iti**ŋa]
      'She will beat us (excl.).'
   c. lems-u-m-ʦi-t-ŋa [lemsu**m**ʦi**m**ʦi**m**ma]
      'We (excl.) will beat them.'

Copying in Kiranti is morpheme-specific in that it is triggered by certain affixes. In the typology of copying/reduplication processes, the Kiranti copying pattern hence has an interesting intermediate status. Since copying always occurs in the presence of certain affixes, it is apparently similar to instances of (morphological) fixed segmentism reduplication, where realization of a fixed segmental portion is always accompanied by copying/reduplicating base segments (Alderete et al. 1999).

There are several additional restrictions on affix copying in Kiranti that make it interesting for a theoretical discussion: for one, copying is strictly local since only segments adjacent to the triggering morpheme can ever be copied. In addition, there are restrictions on copying that refer to the morphological affiliation of segments. *First*, only affix material and never stem segments can be copied and, *second*, there is a dispreference for copying only parts of morphemes and a strong preference for copying entire morphemes.

In this paper, an OT-account for Kiranti copying is proposed that is based on the assumption that copying is the general phonological repair operation of segment fission. This phonological repair is triggered either by phonotactic markedness constraints or by empty prosodic structure (Saba Kirchner 2007, 2010). An argument is made for a CONTIGUITY constraint referring to the morphological affiliation of elements. The constraint predicts the preference for copying entire morphemes, which has two different effects in Kiranti copying

patterns: either copying of more than the expected minimum of segments becomes optimal even if this results in a phonologically marked structure, or copying is blocked if fission of all segments that form a morpheme would result in a segment string that is too large. A second related restriction is that one of the copy-triggering morphemes in Kiranti contains a segment that has a fixed syllabification requirement and may not be resyllabified into another syllable position, even if this would avoid additional markedness problems. It is argued that such a restriction straightforwardly falls out in a theory where segment fission can be triggered by morphemes that contain empty prosodic structure. The restrictions that require copying of entire morphemes on the one hand but fixed syllable position of certain affix material on the other result in a somehow paradoxical situation in Kiranti, where so many segments undergo fission that additional segment fusion becomes optimal to avoid phonotactic markedness violations. This Duke of York-like effect is shown to follow straightforwardly in the present OT-account.

The paper is structured as follows: The empirical generalizations about Kiranti copying are presented in section 2. The theoretical account assuming that copying is fission is presented in section 3. In both sections, nasal copying (2.1 and 3.2) is discussed before syllable copying (2.2 and 3.3).

In section 4, the consequences of Kiranti copying for the alternative more standard BR-correspondence-theoretic OT account are discussed. It is shown that especially the preference to copy entire morphemes and the fixed syllabification of one of the copy-triggering morphemes are not easily predicted under the standard assumption of correspondence relations between only base-reduplicant and input-output. Finally, the fact that both copy patterns can cooccur and feed each other reveals the complex morpheme-specific machinery necessary under a BR-correspondence account. I conclude in section 5.

2. Data: Copying in Kiranti

There are around 30 Kiranti languages (Tibeto-Burman), spoken in the Eastern hills of the Himalayas, mainly in Nepal (van Driem 2001, Opgenort 2005). This paper discusses two different copying processes: nasal copying (section 2.1) is attested in a number of different Eastern Kiranti languages in basically the same form, whereas syllable copying (section 2.2) is unique to the Eastern Kiranti language Athpare. Since both these processes can be found in the suffix

string of the verbal agreement paradigm, some background information about agreement in Kiranti is given before we turn to the actual copying processes.[1]

Verbs in Kiranti agree for person and number. The affixes might also be specified for what one might term 'case', i.e. the status of marking features of the subject of a transitive verb (=A), the object of a transitive verb (=P), or the single argument of an intransitive verb (=S). The relevant person and number categories are given in (4) together with their decomposition into binary features that will be used to describe the 'meaning' or marker specification for all affixes in the following. As can be seen, first person is divided into inclusive and exclusive and there is a three-way number distinction between singular, plural, and dual.[2]

(4) *Morpho-syntactic categories and their decomposition in binary features*

Category	Binary features	Category	Binary features
1s	+1,−2,−3,+sg,−pl	2s	−1,+2,−3,+sg,−pl
1pe	+1,−2,−3,−sg,+pl	2d	−1,+2,−3,−sg,−pl
1pi	+1,+2,−3,−sg,+pl	2p	−1,+2,−3,−sg,+pl
1de	+1,−2,−3,−sg,−pl	3s	−1,−2,+3,+sg,−pl
1di	+1,+2,−3,−sg,−pl	3d	−1,−2,+3,−sg,−pl
		3p	−1,−2,+3,−sg,+pl

Some of the suffixes that are (in this form or as a cognate) crucial in the following discussion are given in (5).[3]

[1] Complete paradigms for all languages under discussion together with additional morphological and phonological background information can be found in the wiki of the research project 'Hierarchy Effects in Kiranti and Broader Algic' under http://proalki.uni-leipzig.de/wiki/Main_Page. This resource is especially well-suited for morphological analysis and has a 'colourizer' tool that can visualize all occurrences of a marker or a certain morphological feature in a paradigm.

[2] A=agent, P=patent, s=singular, d=dual, p=plural, Ns=non-singular (i.e. dual or plural), e=(1.person)exclusive, i=(first person)inclusive, Pst=past, NPst=non-past, Pos=positive, intr=intransitive. Note that 'A' and 'P' are taken to be abstract labels for 'subjecthood' and 'objecthood' (remaining unspecific about alignment and the ca se system of the language).

[3] The segmentation into affixes and their respective meanings in (5) is the result of my own analysis and differs slightly from the one given in Doornenbal (2009) or Gvozdanović (2004). The affix list is given in the standard Distributed Morphology (Halle & Marantz 1993) notation where context features (=morpho-syntactic features that must be present for the marker to be inserted but are not realized by the marker) are given after a slash. Note also that affixes are not fully specified; this is expected under a theoretical account where more specific markers block less specific ones (e.g. Halle & Marantz 1993, Harley & Noyer 1999). The distribution of /-tsi/ in Bantawa (and many related languages) is such that two hypotheses for its specification are

(5) *Some relevant affixes: Bantawa*

-u	↔	[+3,P]	-m	↔	[–3,+pl,A]
-ka	↔	[+1,–2]	-tsi	↔	[–sg]
-ŋ	↔	[+1,+sg]			

The order of agreement suffixes is basically fixed and follows the hierarchy P(atient) ≫ A(gent) ≫ N(umber) ≫ P(er)s(on). There are interesting deviations from this hierarchy-governed order. One is the 'reordering' of the non-singular marker /-tsi/ in dual-3 contexts, where it surfaces before the P(atient) marker /-u/. As is argued in Zimmermann (2015), this follows from the demand to mark the agent prominently. With this morphological background, we can now turn to the two copying processes in the agreement suffix strings.

2.1. Nasal copying

The nasal copying process is illustrated in the following mainly with data from Bantawa, a Central Kiranti language spoken in the Bhojpur district in Eastern Nepal (all data in the following are from Doornenbal 2009). In (6), some forms of the transitive verb 'to take' are given. If not specified otherwise, all Bantawa forms in the following are from the non-past positive paradigm. On the left side of the table, the abstract underlying representations for the affixes are listed and on the right side, the phonetic surface forms. It can easily be seen that in the non-singular object forms, some affixes or parts of some affixes appear twice on the surface (marked in boldface). There are some more alternations between underlying and surface forms that are irrelevant for the following discussion. These include stem allomorphy and a predictable alternation for the affix /-tsi/ that surfaces as [tsi] before /-ŋ/ and /-m/ and as [tsi] elsewhere. The combination /tsi + u/ is predictably realized as [tsu] to avoid adjacent vowels.

plausible: it is either a general non-singular marker (cf. (5)) that is generally absent in non-third person plural forms or there are two homophonous markers /-tsi/, one being a dual marker and the second a non-singular marker restricted to the context of third person patients. In this paper, one underspecified /-tsi/ is assumed. This choice, however, is not crucial for anything that follows.

(6) *Bantawa: Nasal copying*

A\P	3s		3Ns	
1s	kʰat-u-ŋ	[kʰat:uŋ]	kʰat-u-ŋ-tsi	[kʰat:uŋtsɨŋ]
1pe	kʰat-u-m-ka	[kʰat:umka]	kʰat-u-m-tsi-ka	[kʰat:umtsɨmka]
1pi	kʰat-u-m	[kʰat:um]	kʰat-u-m-tsi	[kʰat:umtsɨm]
2p	ti-kʰat-u-m	[tikʰat:um]	ti-kʰat-u-m-tsi	[tikʰat:umtsɨm]

As was already mentioned above, this type of copying occurs in various related Kiranti languages in a nearly identical form. Example (7) lists some 1s-3Ns forms from the relevant languages that show this copying pattern.

(7) *More nasal copying in Kiranti (surface forms)*

	Language	1s-3Ns		
a.	Bantawa	kʰat:uŋtsɨŋ	'I will take them.'	(Doornenbal 2009)
b.	Belhare	lureŋtsʰiŋ	'I told them.'	(Bickel 1998, 2003)
c.	Limbu	huʔruŋsiŋ	'I taught them.'	(van Driem 1987)
d.	Puma	kʰaŋŋuŋtsʌŋ	'I will see them.'	(Bickel et al. 2010)
e.	Yakkha	piŋtsiŋa	'I gave them.'	(Schackow 2014)
f.	Yamphu	kʰaksuŋʤiŋ	'I saw them.'	(Rutgers 1998)

A first possible hypothesis to explain the data in (6) and (7) is that this is not copying at all but the surfacing of (parts of) morphemes. Some possible alternative segmentations and/or morpheme specifications that explain the surface effect we observed in (6) are given in (8). In contrast to the marker list in (5) that assumes a non-third person plural agent marker /-m/ and a first person marker /-ŋ/, two different morphemes are assumed for these two contexts, depending on whether a third person non-singular argument is present or not. In all these alternative analyses, the marker specifications are hence suspiciously similar and the second marker is only distinguished from the first by the assumption of additional context features. Under (8a) two homophonous markers /-ŋ/ and /-m/ with different morpho-syntactic feature specifications are assumed. This analysis would complicate the assumptions about affix order in Bantawa. Given the hierarchy P ≫ A ≫ N ≫ Ps that can be observed elsewhere in the paradigm, both marker pairs /-$ŋ_1$/ & /-$ŋ_2$/ and /-m_1/ & /-m_2/ are expected to be adjacent to each other. The possible segmentation in (8b) assumes the complex markers /-ŋtsɨŋ/ and /-mtsɨm/.

Under this segmentation, the absence of /-tsi/ as a marker for object number is mysterious and needs an independent explanation. The segmentation in (8c) assumes a discontinuous circumfixal morpheme that is typologically unusual since the two parts of the suffix do not surface on different sides of the stem but on different sides of another suffix. Finally, all these alternative segmentations share the economy problem that morphemes with rather similar form and function are assumed.

(8) *Alternative marker specifications/segmentations*

a.	-ŋ$_1$	↔	[+1,+sg]	-m$_1$	↔	[−3,+pl,A]
	-ŋ$_2$	↔	[+1,+sg] / __+3,−sg	-m$_2$	↔	[−3,+pl,A] / __+3,−sg
b.	-ŋ	↔	[+1,+sg] / __+3,+sg	-m	↔	[−3,+pl,A] / __+3,+sg
	-ŋtsiŋ	↔	[+1,+sg] / __+3,−sg	-mtsim	↔	[−3,+pl,A] / __+3,−sg
c.	-ŋ	↔	[+1,+sg] / __+3,+sg	-m	↔	[−3,+pl,A] / __+3,+sg
	-ŋ…ŋ	↔	[+1,+sg] / __+3,−sg	-m…m	↔	[−3,+pl,A] / __+3,−sg

A second possible hypothesis is that this is true phonological copying that is solely triggered by the demand to avoid a marked structure, absolutely parallel to the Hocank example in (2). A reasonable exlanation seems to be that the copied nasal avoids an otherwise open final syllable. This is not implausible from the perspective of general markedness and there are arguments in the optimality-theoretic literature for a constraint FINAL-C demanding that prosodic words must end in a consonant (McCarthy 1993, Ito & Mester 2009).

The obvious problem with this assumption is that there is also non-final copying as in (9a). The avoidance of an open syllable word-medially cannot be plausibly analysed as markedness avoidance since it goes against the universal principle that codas are marked. Moreover, it is not the case that all final open syllables are avoided. As can be seen in (9b), there is no copying of a nasal to avoid the open final affix syllable /ka/.

(9) *Bantawa: Absence of copying after /-ka/*

a.	k^{h}at-u-m-tsi-ka	[k^{h}at:**um**ts**im**ka]	*[k^{h}at:**um**ts**imkam**]	(1pe–3Ns)
b.	k^{h}at-u-m-ka	[k^{h}at:umka]	*[k^{h}at:**umkam**]	(1pe–3s)
	ni-k^{h}at-in-ka	[nik^{h}at:inka]	*[k^{h}at:**inkan**]	(3–1pe)

We can hence conclude that the multiple surface occurrences of nasals in Bantawa are indeed the result of a copying operation and that this copying operation is not truly phonologically triggered. In what follows, several

additional empirical generalizations about the copying pattern are fleshed out before we turn to the theoretical account.

First, the copying is bound to the presence of the number marker /-tsi/. This is another generalization that we can already conclude from the absence of copying in the data in (9). No copying ever takes place in similar contexts in the absence of /-tsi/ where, for example, only the person marker /-ka/ follows the plural marker /-m/.

Another generalization is that not just any (nasal) segment that precedes /-tsi/ is copied. Example (10) shows some forms where /-tsi/ is directly adjacent to a stem and no copying ever occurs. Crucially, copying is absent even when the stem ends in a nasal consonant, which is shown with some examples from the intransitive verb /kon/ 'to walk' (10b). We can hence conclude that nasal copying is restricted to affix segments.

(10) *Bantawa: No copying of stem segments*

a.	kʰat-tsi-u	[kʰattsu]	*[kʰa**t**tsu**t**]	(1di–3s)
	kʰat-tsi-u-ka	[kʰattsuʔa]	*[kʰa**t**tsu**t**ka]	(1de–3s)
b.	kon-tsi	[kontsi]	*[ko**n**tsi**n**]	(1di/3d.intr)
	ti-kon-tsi	[tikontsi]	*[tikon**n**tsi**n**]	(2d.intr)

Another generalization is that the copied affix segment is always directly adjacent to /-tsi/. The data in (11) to (13) show that no nasal affix consonant that is separated from /-tsi/ by another affix vowel is ever copied. The fact that Yamphu (12) and Limbu (13) show in principle the same type of nasal copying after /-ʤi/ and /-si/ was shown in (7).

(11) *Bantawa: No non-adjacent copying*

kʰat-na-tsi	[kʰatnatsi]	'I will take you two.'
	*[kʰat**n**atsi**n**]	

(12) *Yamphu: No non-adjacent copying (Pst, Pos; Rutgers 1998)*

kʰaks-a-u-ŋ-ma-ʤi	[kʰaksuŋmaʤi]	'We (excl.) saw them.'
	*[kʰaksuŋ**m**aʤi**m**]	

(13) *Limbu: No non-adjacent copying (Pst, Neg; van Driem 1987)*

mɛ-n-huʔr-mʔna-si	[mɛnhuʔmʔnasi]	'We (excl.) didn't teach them.'
	*[mɛnhuʔmʔ**n**asi**n**]	

In all the examples so far, a nasal consonant was copied. It is in fact impossible to prove that there is an additional ban against copying non-nasal consonants.

If we assume the restrictions shown so far that only affix segments directly adjacent to /-tsi/ are ever copied, there is no context where we ever expect copying of a non-nasal affix consonant. The only other additional generalization is that the /-tsi/ never triggers copying of its own consonant [ts]. As can be seen in (14), no copying applies if there is no affix-consonant adjacent to /-tsi/.

(14) *Bantawa: No copying of a non-nasal*

		Copy stem	Copy 'itself'	
k^{h}at-tsi-u-ka	[k^{h}attsuʔa]	*[k^{h}attsutʔa]	*[k^{h}attsitsʔa]	(1de–3s)
k^{h}at-tsi-u	[k^{h}attsu]	*[k^{h}attsut]	*[k^{h}attsitsu]	(1di–3s)

A final interesting criterion is the question of whether only entire affixes or also parts of affixes can be copied. As can be seen in (15) and (16), copying can affect a single nasal consonant from a larger suffix string in Bantawa and Limbu: only the final consonant from /-ŋaŋ/ and /-oŋ/ is copied. This argument of course crucially hinges on the morpheme segmentation that is assumed. An alternative segmentation where the suffixes /-ŋaŋ/ and /-oŋ/ are segmented into smaller parts is given next to the tables. Under this analysis, the copying again only affects a single monoconsonantal affix. However, the segmentation is suboptimal since it involves multiple exponence (e.g. /ti-k^{h}at-ŋa$_{+1,+sg,SP}$-ŋ$_{+1,+sg}$-tsi$_{-sg}$/)

(15) *Bantawa: Partial affix-copying*

A\P	1s	
2d	ti-k^{h}at-ŋaŋ-tsi	[tik^{h}atŋa**ŋ**tsi**ŋ**]
3d	i-k^{h}at-ŋaŋ-tsi	[ik^{h}atŋa**ŋ**tsi**ŋ**]

Alternative:
-ŋa ↔ [+1,+sg,SP]
-ŋ↔ [+1,+sg]

(16) *Puma: Partial affix-copying (Pst, Pos; Bickel et al. 2010)*

A\P	1s	
2d	tʌ-tsind-oŋ-tsi	[tʌtsindo**ŋ**tsʌ**ŋ**]
3d	pʌ-tsind-oŋ-tsi	[pʌtsindo**ŋ**tsʌ**ŋ**]

Alternative:
-o ↔ [+1,+sg,SP]
-ŋ ↔ [+1,+sg]

In Yakkha and Yamphu, on the other hand, copying of only parts of suffixes is apparently excluded. As can be seen in (17b), no copying of a nasal directly preceding /-ʤi/ can be observed in Yamphu when this nasal is part of a longer

suffix string as the non-past marker /-ʔin/. Copying of a nasal that constitutes a morpheme on its own, however, is attested (17a).[4]

(17) *Yamphu: No partial affix-copying (Npst, Pos; Rutgers 1998)*

a.	kʰaŋ-ʔin-u-ŋ-ʧi	[kʰaŋʔinuŋʧiŋ]	'I will see them.'
b.	kʰaŋ-ʔin-ʧi	[kʰaŋʔinʧi]	'We all will see them.'
		*[kʰaŋʔi**n**ʧi**n**]	

Finally, in Yakkha (Schackow 2014), copying of only the final nasal of the suffix /-nen/ is blocked (18b) although /-ʦi/ triggers copying of a preceding nasal that is a morpheme on its own (18a). The absence of copying in (18b) cannot be due to a preference to avoid adjacent nasals since nasal-nasal-sequences are attested and, for example, created in the copying pattern (18a).

(18) *Yakkha: No partial affix-copying (Npst, Pos; Schackow 2014)*

a. tum-meʔ-ŋ-ʦi-u-ha	[tummeŋʦuŋna]	'We both (excl.) will understand him.'
b. tum-meʔ-nen-ʦi-ha	[tummeʔnenʦina]	'I will understand you.'
	*[tummeʔne**n**ʦi**n**na]	

As in Bantawa and Limbu, a subsegmentation of the two markers is of course theoretically possible, but even more dispreferred in Yakkha and Yamphu. The marker /-ʔin/ occurs in all non-past forms in Yamphu and Yakkha and /-nan/ occurs consistently in all 1-2 contexts in all paradigms of the language; the putative markers /-ʔi/ & /-n/ and /-ne/ & /-n/ respectively would hence have identical feature specifications.

Table (19) summarizes all the positive evidence that can be found in the Kiranti languages with nasal copying for the different criteria discussed above: (i.) Copying is morpheme-specific and can only be found after the non-singular marker /-ʦi/ (19-MoSp), (ii.) only affix segments are copied (19-AffS), (iii.) only nasal consonants are copied (19-NasS), (iv.) only consonants that directly precede the triggering affix /-ʦi/ are copied (19-AdjS), and (v.) parts of affixes can be copied (19-PaAf). The final criterion is the only one where the Kiranti languages with nasal copying differ: The '☺' in (19) marks languages where a criterion is fullfilled and the '☹' languages where it is not fulfilled. The '–' marks contexts where decisive evidence is absent. This is the case for the

[4]The non-past marker has several allomorphs, one being [ʔindʰ] before vowels. It is hence reasonable to take /ʔindʰ/ as the underlying representation that predictably reduces to [ʔin] before consonants. For the nasal copying, we hence expect in any case an [n] adjacent to /ʦi/.

PaAf criterion for languages where there simply never is a longer suffix string containing a nasal that directly precedes the triggering /-tsi/. A generalization whether parts of affixes are copied is hence impossible to make.

(19) *Nasal copying in Kiranti: Empirical summary*

	MoSp	AffS	NasS	AdjS	PaAf
Bantawa	☺	☺	☺	☺	☺
Puma	☺	☺	☺	☺	☺
Limbu	☺	☺	☺	☺	☺
Athpare	☺	☺	☺	☺	–
Chamling	☺	☺	☺	☺	–
Belhare	☺	☺	☺	☺	–
Chintang	☺	☺	☺	☺	–
Yakkha	☺	☺	☺	☺	☹
Yamphu	☺	☺	☺	☺	☹

2.2. Syllable copying in Athpare

Yet another copying process can be found in Athpare, a language of the Southeastern Kiranti area (all data in the following is taken from Ebert 1997). It can easily be observed if one compares the non-past and past paradigms that are both marked with a tense suffix: /-e/ can be found throughout all past forms and /-t/ can be found in the corresponding non-past forms.[5] In the non-past forms in (20a), we see that an additional syllable follows the /-t/ that is absent in the corresponding past forms (20b). This additional syllable consists of copied rhyme material of the affix segments preceding the /-t/: either only an affix vowel or a preceding affix vowel and its coda.[6]

[5] Both markers are independently interesting with respect to affix ordering: the /-e/ follows all agreement suffixes, whereas the /-t/ precedes person agreement but must never be adjacent to the stem. This latter restriction explains contrasts like /Σ-$\mathbf{i}_{\text{SP–3+pl}}$-**t**-**ŋa**$_{+1–2}$/ (2/3-1pe) and /Σ-**ŋa**$_{+1–2}$-**t**/ (2s/3s-1s).

[6] Note that Athpare also shows additional phonological alternations: whenever /-tsi/ precedes /-u/, the first vowel of the vowel cluster is deleted resulting in [tsu]. Adjacent nasal consonants undergo place assimilation that can be observed in, for example, 1pe-3 contexts where underlying /ŋ/ is realized as [m] if it is preceded by an /m/.

(20) *Syllable copying triggered by /-t/*

a.	*Non-past*		b.	*Past*		
	-u-ŋ-t	[**uŋ.tuŋ**]		-u-ŋ-e	[u.ŋe]	(1s-3s)
	-u-m-t	[**um.tum**]		-u-m-e	[u.me]	(1pi-3s)
	-u-m-t-ŋa	[**um.tum:**a]		-u-m-ŋa-e	[um:e]	(1pe-3s)
	-i-t	[**i.ti**]		-i-e	[i.e]	(1pi.intr)
	-i-t-ŋa	[**i.ti.**ŋa]		-i-ŋa-e	[i.ŋe]	(1pe.intr)

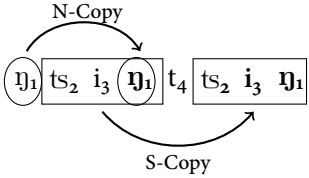
If we turn to contexts where the /-t/ is preceded by a /-tsi/, this picture gets more complicated (21a). Apparently, what surfaces is not the /-t/ suffix but two copies of [tsi] or [tsu] in case the /-tsi/ was followed by the third person object marker /-u/. Yet another unexpected surface alternation can be observed whenever a nasal is the onset of the affix syllable directly preceding the /-t/. As can be seen in (21b), only a [ʔ] is realized in the onset of the 'copied' syllable in those contexts.

The last three forms in (21a) are particularly interesting since they show the co-occurrence of syllable and nasal copying. The /-tsi/ triggers copying of a preceding nasal and if /-tsi/ is directly followed by /-t/, the whole syllable including the already copied nasal is copied. This interaction of the two copying processes is illustrated in (21).

(21) *Syllable copying triggered by /-t/*

a.	-tsi-t	[ts**i.**ts**i**]	(1di.intr)
	-tsi-t-ŋa	[ts**i.**ts**i.**ŋa]	(1de.intr)
	-tsi-u-t-ŋa	[ts**u.**ts**u.**ŋa]	(1de-3)
	-u-ŋ-tsi-t	[uŋ.ts**iŋ.**ts**iŋ**]	(1s-3Ns)
	-u-m-tsi-t	[um.ts**im.**ts**im**]	(1pi-3Ns)
	-u-m-tsi-t-ŋa	[um.ts**im.**ts**im:**a]	(1pe-3Ns)
b.	-ŋa-t	[**ŋa.**ʔ**a**]	(1s.intr)
	-na-t	[**na.**ʔ**a**]	(1-2s)
	-na-t-tsi	[**na.**ʔ**a.**tsi]	(1-2d)
	-na-t-ni	[**na.**ʔ**a.**ni]	(1-2p)

(22) *Interaction: Nasal and syllable copying*



A first important generalization about the copying in (21) is that it is not the minimal amount of affix segments that are necessary to constitute a well-formed syllable that is copied. The form *[tʂ**i**.t**i**], where only the affix vowel from the /-tʂi/ is copied, is perfectly fine with respect to all syllable structure restrictions of the language and mirrors the vowel-copying instances we saw in (20). However, [tʂitʂ**i**] surfaces instead. We can hence conclude that it is necessary to copy the whole affix string /-tʂi/ and that copying of only a single segment of an affix is excluded. Given this generalization, the data in (22a) could reasonably be explained by saying that the expected stop-affricate sequence in [tʂittʂ**i**] is avoided and the segments are merged into a single affricate given that the stop and the initial stop-component of the affricate are identical.[7] However, Athpare allows sequences of [Vt.tʂV] as is illustrated with forms like [alemtʂjettʂi] 'they both are beating us all' (Ebert 1997: 186) or some of the forms in (10). The absence of [t] in these contexts is consequently not expected from the general phonology of the language.

A second crucial generalization is hence that the /-t/ cannot be syllabified as coda, excluding *[tʂ**i**t.tʂ**i**]. If the /-t/ must remain in onset position and the entire affix string /-tʂi/ must be copied, the non-realization of /-t/ is straightforwardly expected since Athpare does not allow complex onsets *[tʂ**i**.ttʂ**i**]. To avoid the complex onset, the two segments [t] and [tʂ] are simplified into [tʂ]. The contexts in (21b) are completely parallel. If we take the assumption that only entire affixes can be copied for granted, we expect the sequence *[nat.na] for an underlying sequence /-na-t/. This sequence is phonologically unproblematic in Athpare as can be seen in, for example, the full form /k^{h}atnaʔa/ 'I will go' where the stem-final /t/ is indeed syllabified as coda preceding a nasal onset.[8] However, if the [t] must be syllabified in onset position, the complex onsets *[tna] and *[tŋa] are expected. These are impossible in Athpare and neutralized to [ʔa]. As is argued in more detail below (section 3.3), all these repair processes are taken to be segment fusion.

[7] The segment notated with <c> in Ebert (1997) is taken to be the affricate [tʂ] in the following. Although Ebert (1997) lists <c> as an alveo-palatal stop in the phoneme inventory (Ebert 1997: 13), the sound is given as [tʂ] in all the instances where a phonetic transcription is given in the grammar. This is also consistent with the descriptions of the affricate [tʂ] in the closely related Greater Yakkhan languages Belhare (Bickel 2003) and Yakkha (Schackow 2014).

[8] Voiceless stops in coda position are unreleased in Athpare and hence difficult to distinguish from the glottal stop, e.g. in [k^{h}ap$^{\urcorner}$ma] ~ [k^{h}aʔma] 'go' (Ebert 1997: 14).

The two generalizations about entire morpheme copying and complex onset avoidance are briefly summarized in (23) as a three-step derivational process.

(23) *Full morpheme copying after /-t/*

Underlying	-tsi-t	-na-t	-ŋa-t
1. Full morpheme copying after /-t/:	tsitt**si**	nat**na**	ŋat**ŋa**
2. Syllabification with /-t/ as onset:	tsi.tt**si**	na.t**na**	ŋa.t**ŋa**
3. Fusion to avoid complex onset:	tsi.ts**i**	na.ʔ**a**	ŋa.ʔ**a**

As with the nasal copying, let us first explore the hypothesis that this might be a phonological repair operation triggered solely by phonotactic markedness. Indeed, there are some examples where the creation of this additional syllable avoids complex word-final consonant clusters (24a) or where the copying creates an open syllable and avoids a coda consonant (24b).

(24) *Copying to avoid marked structure?*

	Surface form		Without copying
a.	[lemsuŋtuŋ]	'I will beat him'	*[lemsuŋt]
	[lemsuŋtsiŋtsiŋ]	'I will beat them'	*[lemsuŋtsiŋt]
b.	[lemnaʔa]	'I/we will beat you'	*[lemnat]
	[alemtsitsiŋa]	'You will beat us two'	*[alemtsitŋa]

Crucially, however, syllable copying is not a general repair strategy available to repair all otherwise closed syllables. There are forms like [a.lem.sum.tum] 'We (incl.) beat him' that are not repaired via copying to *[a.lem.su.mu.tum] or *[a.le.me.su.mu.tu.mu]. Both these hypothetical forms optimize the syllable structure through additional copying operations and avoid all closed syllables. Together with the other crucial observation that syllable copying only applies in the non-past paradigm in the context of the /-t/, we can once again conclude that this is indeed a morpheme-specific process.

In the examples in (20) and (21), only the suffix string was given, without any preceding stem. This simplification was possible since syllable copying only ever affects affix material, absolutely parallel to nasal copying. As can be seen in (25), the final stem consonant is never copied, even if it is syllabified as onset of the affix syllable that is copied.[9]

[9] This is even more interesting if we recall the ordering properties of /-t/ (cf. footnote 5) – whenever /-t/ is expected to appear directly after the stem, reordering applies and /-t/ surfaces

(25) *No copying of stem material*

a-lems-u-t	[alemsutu]	*[alemsutʂu]	'You (sg) will beat him.'
a-khat-i-t	[khaditi]	*[khaditti]	'You (pl) will go.'

2.3. Summary: Copying in Kiranti

The two copying processes can be summarized as follows: *first*, affix (nasal) consonants that directly precede /-tʂi/ and its cognates are copied into a position after /-tʂi/ in various Eastern Kiranti languages, and *second*, an additional syllable is created after the non-past marker /-t/ consisting of copied affix material preceding the /-t/ in Athpare. In both copying processes, we saw a preference for copying entire morphemes. First, there was evidence that nasal copying in Yakkha and Yamphu is blocked if the nasal is only part of an affix. And, second, syllable copying in Athpare always targets whole morphemes. Crucially, this latter restriction may even result in situations where the affix /-t/ cannot be realized faithfully itself since copying of the entire morpheme results in an otherwise marked phonological structure. A second factor which results in non-faithful realization of the /-t/ is the impossibility to syllabify it as the coda of the preceding syllable.

3. Analysis: Copying as phonological repair

3.1. Theoretical background: Copying as fission

One theoretical 'landscape' of copying assumes two crucially different mechanisms for morphological reduplication as in Washo (1) and phonological copying as in Hocank (2) (for example, Kawahara 2007, Inkelas 2008). Phonological copying is either modeled as autosegmental spreading (e.g. Kawahara 2007) or string-internal correspondence (e.g. Inkelas 2008) whereas morphological reduplication is the result of an abstract RED-morpheme triggering BR-correspondence (e.g. Kawahara 2007) or morphological doubling (e.g. Inkelas 2008).

Another view is to assume that both morphological reduplication and phonological copying are the result of the same copying mechanism (=Theory of Minimal Reduplication, Saba Kirchner 2007, 2010). Copying is taken to be

unexpectedly after a person marker. From the perspective of copying, this reordering hence ensures that copying is possible.

a general phonological repair process comparable to epenthesis or deletion. What distinguishes morphological reduplication from phonological copying is then simply the reason why this repair process applies: either to fill an otherwise empty prosodic node with segmental structure (=morphological reduplication) or to avoid a phonotactic markedness violation (=phonological copying). Morphological reduplication is hence triggered by the presence of morphemes that contain empty prosodic structure in their representation, an assumption that straightforwardly implements the fact that reduplicants have a fixed prosodic size.

The main arguments for such a unified theory for copying/reduplication are, *first*, its theoretical economy and elegance through abandoning any mechanisms specific to a certain morphological context or process and, *second*, the fact that there are examples in the languages of the world where copying alternates with other types of non-concatenative exponence. For example in Kwak'wala (Saba Kirchner 2007, 2010, Bermúdez-Otero 2012) or Afar (Bye & Svenonius 2012) copying of segments alternates predictably with epenthesis. The Theory of Minimal Reduplication straightforwardly predicts such a state of affairs since the empty prosodic structure is not bound to any specific repair such as copying: it simply must be filled with material and every language chooses between the universally available phonological strategies for providing additional material in a specific phonological context.

One way to formally implement the copying mechanism is fission (Struijke 2000, Gafos 2003, Nelson 2003): one input segment is split up into two output correspondents under violation of Int (26). Tableaux (27) and (28) briefly sketch how the theoretical account for Washo and Hocank could look like in such a theory. In Hocank, a high-ranked markedness constraint *[CC penalizes complex onsets and Int is simply the lowest-ranked faithfulness constraint, predicting that fission of a vowel is the optimal strategy to resolve this markedness problem. In Washo, on the other hand, the plural morpheme is taken to consist of only an empty syllable node. MaxF (=MaxFloat, Wolf 2007) ensures that this floating node cannot be deleted and standard prosodic markedness constraints against syllable nodes that do not dominate any (segmental) material ensure that the syllable must be filled with segments. Low-ranked Int again predicts that fission is the optimal strategy to repair this otherwise marked structure.

(26) INT (=INTEGRITY; McCarthy & Prince 1995)
Assign a violation mark for every input segment with multiple output correspondents

(27) *Phonological reduplication*

$\int_1 + w_2a_3p_4o_5x_6$	*[CC	DEP	INT
a. $\int_1 w_2a_3p_4o_5x_6$	*!		
b. $\int_1 ə w_2a_3p_4o_5x_6$		*!	
☞ c. $\int_1 a_3 w_2a_3p_4o_5x_6$			*

(28) *Morphological reduplication*

$\sigma_a + \sigma_b\ \sigma_c$ (b$_1$o$_2$ k$_3$o$_4$ ŋ$_5$)	MAXF	DEP	INT
a. $\sigma_b\ \sigma_c$ (b$_1$o$_2$ k$_3$o$_4$ ŋ$_5$)	*!		
b. $\sigma_b\ \sigma_a\ \sigma_c$ (b$_1$o$_2$ ʔ ə k$_3$o$_4$ ŋ$_5$)		*!*	
c. $\sigma_b\ \sigma_a\ \sigma_c$ (b$_1$o$_2$ k$_3$o$_4$ k$_3$o$_4$ ŋ$_5$)			**

The proposal in this paper follows this assumption about copying as fission that can repair otherwise marked structure: either phonotactically illicit structure or empty prosodic nodes.

3.2. Nasal copying

Nasal copying is taken to result from an additional empty prosodic position in the representation for the /-ʦi/ suffix. More concretely, it is assumed that the segmental portion of this morpheme is followed by a mora (=μ) that does not dominate any segment. The fact that the copying process is morpheme-specific is hence a simple consequence of different underlying representations: the non-singular marker /-ʦi/ contains a floating μ and non-triggering suffixes like /-ka/ do not have an empty μ.

The grammar of Bantawa then ensures that copying is the unmarked repair strategy to fill this prosodic node with segmental material. The relevant constraints for such a grammar are given in (29). MAXμ and μ>S ensure that the μ may not simply be deleted (as in candidate (30a)) or remain without a segment that it dominates (as in candidate (30b)). The fact that epenthesis is a suboptimal strategy to provide segmental content for the μ is ensured by DEPS (in candidate (30c)). Fission of underlying segments as in candidate (30e) hence becomes optimal. It violates INT since an input segment has multiple output correspondents but this faithfulness constraint is too low to have an

effect (why the more specific version INT_A (29d) is relevant for Bantawa is explained below). Finally, the fact that only heteromorphemic elements can be copied follows from ALT (29e). This constraint excludes candidate (30d) where a (copy of a) segment with the same morphemic affiliation or 'colour' (van Oostendorp 2006) as the μ itself associates to the μ.

(29) a. MAXμ (McCarthy & Prince 1995)
Assign a violation mark for every input mora without a correspondent in the output.

b. μ>S
Assign a violation mark to every μ not dominating a segment.

c. DEPS (McCarthy & Prince 1995)
Assign a violation mark for every output segment without a correspondent in the input.

d. INT_A (cf. (26))
Assign a violation mark for every affix input segment with multiple output correspondents

e. ALT (=ALTERNATION; van Oostendorp 2007, 2012)
Assign a violation mark for every association line that links two elements of colour α that does not have the colour α.

(30) *Nasal copying in Bantawa: Fission to fill the empty μ*

μ_a μ_b μ_c u_1 + $ŋ_2$+ ts_3 i_4	μ>S	ALT	DEPS	MAXμ	INT_A
a. μ_a μ μ_b u_1 $ŋ_2$ ts_3 i_4				*!	
b. μ_a μ μ_b μ_c u_1 $ŋ_2$ ts_3 i_4	*!				
c. μ_a μ μ_b μ_c u_1 $ŋ_2$ ts_3 i_4 n			*!		
d. μ_a μ μ_b μ_c u_1 $ŋ_2$ ts_3 i_4 ts_3		*!			*
☞ e. μ_a μ μ_b μ_c u_1 $ŋ_2$ ts_3 i_4 $ŋ_2$					*

I assume that faithfulness constraints can be parametrized to only stem- or affix-material (cf. the overviews in Urbanczyk 2011 or Trommer 2010). Crucially, INT$_A$ in (29d) is only sensitive to affix material and is hence never violated if a stem segment has multiple output correspondents. The counterpart INT$_S$ is rather high-ranked in Kiranti and excludes any fission of stem-segments as is shown in (31). If no affix-segment precedes the /-tsi/, no copying can apply to fill the μ with a segment and it is deleted. Note that the autosegmental representations are abbreviated in the following tableaux and only the segmental string is given, the additional μ given as a superscript after the /-tsi/.

(31) *Nasal Copying in Bantawa: No stem fission*

$k_1o_2n_3$-ts_4i_5 $^{\mu}$	INT$_S$	μ>S	ALIT	DEPS	MAXμ	INT$_A$
a. $k_1o_2n_3ts_4i_5$ $^{\mu}$		*!				
☞ b. $k_1o_2n_3ts_4i_5$					*	
c. $k_1o_2n_3ts_4i_5n_3$	*!					

Another crucial restriction on nasal copying is its locality: only an affix (nasal) consonant that directly precedes the /-tsi/ is ever copied. A crucial empirical observation in this respect is that all non-adjacent non-stem nasals are always part of an affix that is larger than the monoconsonantal /-m/ and /-ŋ/. The fact that non-local copying in such a context where, for example, /-na/ precedes /-tsi/ is excluded hence follows from the high-ranked LINEARITY (McCarthy & Prince 1995) constraint (32) that is specified only for homomorphemic elements, i.e. for elements that belong to the same morpheme.

(32) MLIN (Horwood 2002)
Assign a violation mark for every pair of elements i_w and i_x if
i_w corresponds to output o_w and i_x to output o_x,
i_w precedes i_x,
o_x precedes o_w, and
i_w and i_x are part of the same morpheme.

Copying of a nasal that is either the final or the only segment of an affix preceding the /-tsi/ does not induce additional violations of MLIN as can be seen in (33-i-b). General LINEARITY is violated twice in this candidate since the copied /ŋ$_1$/ follows /ts$_2$/ and /i$_3$/ – two elements that the corresponding input

element precedes. Since these two segments belong to another morpheme, however, no violation of MLin arises. Copying of only the initial consonant of a CV-affix, however, induces additional violations of MLin as can be seen in (33-ii-b). The copied /n_1/ now follows /a_2/ – an element of the same morpheme that it precedes in the input. Again, copying is blocked and the μ is deleted in the winning candidate (33-ii-a).[10]

(33) *Non-local copying and* MLin

	MLin	μ>S	*P]$_\sigma$	DepS	IntS	Maxμ	Lin	IntA
i. -ŋ$_1$ -ʦ$_2$i$_3$ $^{\mu}$								
a. ŋ$_1$ʦ$_2$i$_3$						*!		
☞ b. ŋ$_1$ʦ$_2$i$_3$ŋ$_1$							**	*
ii. -n$_1$a$_2$ -ʦ$_3$i$_4$ $^{\mu}$								
☞ a. n$_1$a$_2$ʦ$_3$i$_4$						*		
b. n$_1$a$_2$ʦ$_3$i$_4$n$_1$	*!						***	*

Note that this tableau also shows why MLin is necessary and the general gradient Linearity constraint is not sufficient to predict the locality restriction on copying: copying across /-ʦi/ always induces minimally two violations of Linearity and these violations are tolerated in case the nasal directly precedes /-ʦi/. Linearity must hence crucially be dominated by μ>S and Maxμ ensuring that copying happens in the first place. The increased number of violations for a non-adjacent nasal in (33-ii-b) is hence irrelevant.[11]

Recall that the generalization that only affix material and only adjacent

[10] Another possible candidate /ʦ$_2$i$_3$ŋ$_1$/ only undergoes reordering and associates the only output correspondent of the nasal to the affix μ (not violating Int$_A$ but violating Linearity twice). This structure is excluded by NoVacDock (Wolf 2007, Saba Kirchner 2010) ensuring that a (floating) affix μ can not simply associate to an underlying element, replacing a phonologically predictable μ. The copying candidate /ŋ$_1$ʦ$_2$i$_3$ŋ$_1$/ avoids a violation of NoVacDock since one nasal corresponding to /ŋ$_1$/ is dominated by another (presumably epenthetic) μ.

(i) NoVacDock(μ) (Saba Kirchner 2010: 49)
Informally: If a floating μ docks to a non-epenthetic segment, then a correspondent of that segment is also dominated by another μ.

[11] In a model using weighted constraints (Legendre et al. 1990, Pater to appear), such a threshold effect for non-local copying could in principle be predicted from a single Linearity constraint:

elements are ever copied were sufficient to exclude all contexts where copying of a non-nasal consonant is expected. This additional restriction would easily follow as an Emergence of the Unmarked effect predicted from high-ranked *P]$_\sigma$ (34): only unmarked sonorant codas are predicted to be copied into an otherwise empty coda position.

(34) *P]$_\sigma$ (cf. Botma & van der Torre 2000, van der Hulst 2008)
Assign a violation mark for every obstruent in coda position.

A final parameter that was discussed in section 2.1 was the copying of only full morphemes. In Bantawa, Puma, and Limbu, it was possible to copy only parts of morphemes but in Yakkha and Yamphu, there was at least some evidence that copying is blocked if only a part of a morpheme was expected to be copied. Such a restriction is enforced by the CONTIGUITY constraint (35) that penalizes pairs of segments affiliated to the same morpheme that are contiguous in the input but not in the output. In contrast to the standard morpheme CONTIGUITY versions that basically penalize morpheme-internal deletion or insertion (McCarthy & Prince 1995, Landman 2002), (35) is specifically formulated over all output instances of a segment and hence has crucial consequences for contexts where a segment has multiple output correspondents.

(35) MCNT (after Landman 2002)
For every input element X that is contiguous to Y and both belong to the same morpheme:
Assign a violation mark for every x (corresponding to X) in the output that is not contiguous to an y (corresponding to Y).

In candidate (36b), an affix nasal has multiple output correspondents in order to fill the otherwise empty μ. However, since this nasal is only a part of the morpheme /-oŋ/, MCNT is violated: there are output correspondents to input /ŋ$_2$/ and /o$_1$/ in the output but one instance of /ŋ$_2$/ is not contiguous to an /o$_1$/ – the morpheme /ts$_3$i$_4$/ intervenes. Contiguous affix copying in candidate (36c) is excluded since it requires an additional μ to host the additionally copied affix vowel.

crossing two segments is tolerated whereas crossing of more segments outweighs the need to fill the μ with copied material.

(36) *Blocked partial affix copying in Yamphu*

-ʔ$_1$i$_2$n$_3$-ʧ$_4$i$_5$$^{\mu}$	MCNT	μ>S	DEPS	DEPμ	MAXμ	INT$_A$
☞ a. ʔ$_1$i$_2$n$_3$ʧ$_4$i$_5$					*	
b. ʔ$_1$i$_2$n$_3$ʧ$_4$i$_5$n$_3$	*!					*
c. ʔ$_1$i$_2$n$_3$ʧ$_4$i$_5$ʔ$_1$i$_2$n$_3$			*!			***

In the three languages where we have evidence that partial copying of affixes is possible, MCNT is consequently lower-ranked. This constraint is also crucial in the discussion of syllable copying in section 3.3.

Table (37) summarizes the paramaters restricting the copying of nasals in Kiranti and how they follow in the analysis proposed above.

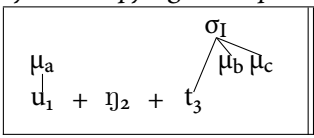
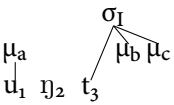
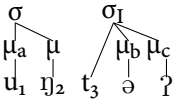
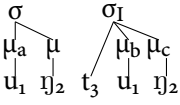
(37) *Summary: Theoretical implementation of the empirical findings*

Generalization	Account	Tableau
Morpheme-specific	/-tsi/ has floating μ	(30)
Only affix segments are copied	INTS ≫ MAXμ ≫ INT$_A$	(31)
Only local copying	MLIN ≫ MAXμ	(33)
No partial affix copying	MCNT ≫ MAXμ	(36)

3.3. Syllable copying

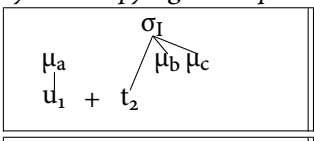
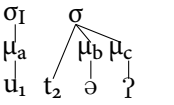
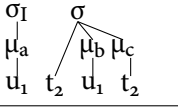
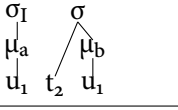
Absolutely parallel to the representation of /-tsi/, the non-past marker /-t/ in Athpare is taken to contain empty prosodic structure that must be filled with segmental material. In contrast to /-tsi/, however, the /-t/ contains two empty μ's that are integrated under a syllable node that also dominates the /-t/. This prosodic treelet is defective since the μ's do not dominate any segmental material. Since Athpare also employs nasal copying we analysed for Bantawa in section 3.2, the basic ranking of constraints is identical: DEPS ensures that no epenthetic segments fill these empty μ-positions and fission of affix segments becomes optimal. In (38), a copying context is optimized where the /-t/ is preceded by the suffixes /-u/ and /-ŋ/. Leaving the μ's without any segmental content (38a) is excluded by μ>S. Epenthesis as one possible strategy to fill the μ's with material (38b) is excluded by high-ranked DEPS and fission of the two affix segmen ts (38c) becomes optimal.

(38) *Syllable copying in Athpare*

	INTS	μ>S	ALT	DEPS	MAXμ	INTA
						
a. 		*!*				
b. 				*!*		
☞ c. 						**

In case the preceding affix material consists of only a vowel, on the other hand, the copied syllable remains coda-less. This optimization is shown in (39). Since ALT ensures that another instance of /t_3/ cannot be integrated under the second μ and fission of stem segments is excluded by high-ranked INTS, the second μ cannot be filled and is deleted as in winning candidate (39c). This is abslutely parallel to the absence of nasal copying derived in tableaux (31) and (33): if there is no adjacent affix segment that can be copied, the μ is deleted.

(39) *Syllable copying in Athpare: Only vowel*

	INTS	μ>S	ALT	DEPS	MAXμ	INTA
						
a. 				*!*		
b. 			*!			**
☞ c. 					*	*

Now we can turn to the two additional contexts in (21) where more than a single vowel preceding the /-t/ was copied. The first crucial observation was that the whole morpheme /-tsi/ is copied. This is taken to be another effect straightforwardly predicted from MCNT (35): if one segment of a morpheme undergoes fission and this 'copied' segment is realized in a non-adjacent position, all other segments of this morpheme have to undergo fission as well in order to create another contiguous string of segments affiliated with this morpheme. This is illustrated in tableau (41): candidate (41a) induces a fatal violation of MCNT since one instance of [ts$_1$] is not contiguous to a [i$_2$]

A second important factor was the impossibility of the /-t/ to be syllabified as a coda consonant. In the present analysis, this is a direct consequence of the fact that the non-past morpheme is a defective prosodic treelet where the [t] is already associated to a syllable node as onset consonant. The underlying association to this syllable position is preserved due to the faithfulness constraint (40a), excluding candidate (41c). On the other hand, we know that complex onsets are impossible in Athpare (40b) and realization of the [t] in onset position and contiguous copying of the preceding /-tsi/ as in (41d) is hence impossible as well. The optimal repair strategy in such a context is fusion of the /-t/ with a copied instance of /ts/ as in winning candidate (40e). This ensures that all correspondents of /tsi/ are contiguous to the other segments of the morpheme and that /t/ is realized in its underlying onset position without creating a complex onset. This fusion induces an additional violation of UNIF (40c) since two output segments correspond to a single input segment. Since [t] and the affricate [ts] are nearly identical and only their specification for [±cont] differs, only a violation of low-ranked ID[CNT] is induced by fusion and all higher-ranked IDENT-constraints (ID[NAS] is only one exemplifying IDENT constraint given in (41)) are satisfied.

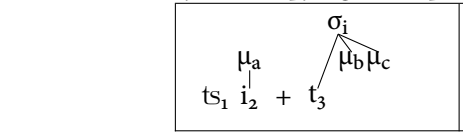
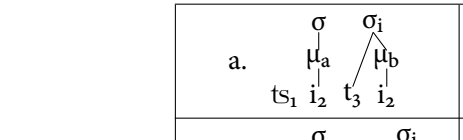
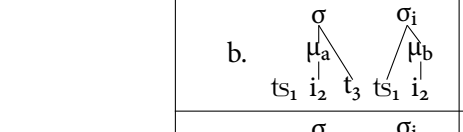
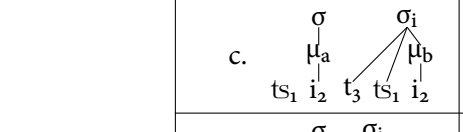
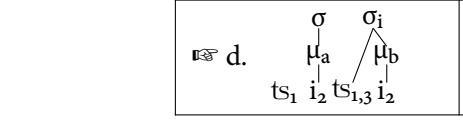
(40) a. MAX|$^{\sigma}_{S}$
Assign a violation mark for every association line between a syllable σ and a segment S in the input that lacks a corresponding association line between the corresponding syllable and segment in the output.

b. *[CC (Kager 1999)
Assign a violation mark for every complex onset.

c. UNIF (=UNIFORMITY; McCarthy & Prince 1995)
Assign a violation mark for every output segment corresponding to more than one input segment.

Tableau (41) hence illustrates the somehow paradoxical situation that MCNT demands fission of so many segments that fusion as a phonological repair becomes optimal. In a sense, the copy-triggering morpheme can hence be described as triggering its own destruction.

(41) *Syllable copying in Athpare: Fusion*

	*[CC	MCNT	INTS	ID[NAS]	MAXμ	MAX|σS	UNIF	INTA	ID[CNT]
a. 		*!			*			*	
b. 					*	*!		**	
c. 	*!				*			**	
☞ d. 					*		*	**	*

The analysis for contexts where the affixes /-ŋa/ or /-na/ precede the /-t/ is in principle identical to the one in (41): the whole affix string [ŋa] and [na] must be copied and the expected complex onsets *[tŋ] and *[tn] are avoided via segment fusion. In these contexts, the outcome of this fusion operation, however, is not as straightforward as in (41) where the [t] is identical to the first portion of the affricate [ʦ]. Fusion of /t/ and a nasal, on the other hand, implies a featural change for many feature dimensions for at least one of the two segments since only one of the two opposing feature values for [±voice], [±nasal], and [±son] can be realized. The choice for one or the other feature value is taken to be an Emergence of the Unmarked Effect preferring a voiceless stop over a nasal. Note that the IDENT constraints for all the relevant feature dimensions are ranked above the markedness constraints preferring a stop, which ensures that not all underlying nasals are neutralized to stops. In a context like (43), however, where an IDENT violation is unavoidable since the

fused segment cannot faithfully realize both specifications of the corresponding input segments, lower-ranked markedness constraints have an effect. Special in this respect is the place feature specification that is taken to be protected for every segment by a relatively high-ranked $\textsc{Dep}|^{S}_{F}$ constraint for association lines (42).[12] If this constraint is high-ranked, it follows that a fused segment that corresponds to two input segments cannot be associated to any place feature since any association to a feature induces a violation for $\textsc{Dep}|^{S}_{F}$. This effect is briefly illustrated with a partial autosegmental structure in tableau (43). If the onset consonant corresponding to both /t/ and /ŋ/ is specified for [Cor], a violation of $\textsc{Dep}|^{S}_{F}$ arises since /$ŋ_1$/ was underlyingly not associated to $[\text{Cor}]_c$. Fusion of [t] and a nasal hence results in a place-less glottal stop [ʔ] (42c). $\textsc{Dep}|^{S}_{F}$ has no effect for the fused segment resulting from [tʦ] since there is a higher-ranked markedness constraint that excludes a placeless affricate or [+cont] sound: in this case, a new association between the feature [Cor] and a segment is hence possible.

(42) $\textsc{Dep}|^{S}_{F}$
Assign a violation mark for every association line between a segment S and a feature F in the output that lacks a corresponding association line between the corresponding segment and feature in the input.

(43) *Syllable copying in Athpare: Nasal fusion*

	⋆[CC	$\textsc{Dep}|^{S}_{F}$	Unif
Dor$_a$ Cor$_b$ ŋ$_1$ a$_2$ + t$_3$			
a. Dor$_a$ Cor$_b$Dor$_a$ ŋ$_1$ a$_2$ t$_3$ ŋ$_1$ a$_2$	⋆!		
b. Dor$_a$ Cor$_b$ ŋ$_1$ a$_2$ t$_{1,3}$ a$_2$		⋆!	⋆
☞ c. Dor$_a$ ŋ$_1$ a$_2$ ʔ$_{1,3}$ a$_2$			⋆

[12] Athpare has processes of predictable (nasal) place assimilation that are taken to be standard autosegmental feature spreading. In these contexts, association lines between segments and place features are hence indeed inserted. It is assumed that the constraint triggering place assimilation is consequently higher-ranked than $\textsc{Dep}|^{S}_{F}$.

The crucial generalizations about syllable copying are hence that the whole preceding affix needs to be copied to ensure a contiguous instance of this morpheme, and that the /t/ may not be syllabified in coda position.

The generalization that MCNT is active and triggers entire morpheme-copying is in fact different from the descriptive generalization given in Ebert (1997) where it is stated that 'only that part of the immediately preceding string of phonemes is copied which makes a good syllable' (p. 44, fn. 12). For sequences /nis-u-ŋ-ʦi-t/ 'I will see them', it is hence assumed that only the part /siŋ/ of the suffix is copied, resulting in /nis-u-ŋ-ʦi**ŋʦiŋ**/, which avoids the illicit complex cluster */nis-u-ŋ-ʦi**ŋ**ʦʦi**ŋ**/. However, it is immediately acknowledged that this generalization leaves forms like /-ʦi-t/ → [ʦiʦi] unexplained given that the sequence /Vt.ʦV/ is licit in Athpare (cf. the discussion below (39)). In addition, this generalization is not sufficient to explain why stem segments are systematically invisible for copying.

The high position of MCNT in the grammar of Athpare predicts the same blocking of nasal copying that was observed in Yakkha and Yamphu if a longer affix precedes /-ʦi/ (cf. tableau (36)). As already became clear in table (19), there is no way we can test this prediction in Athpare since there are no contexts where a longer nasal-final affix precedes /-ʦi/.

4. Alternative account: BR-correspondence

An alternative standard view of reduplication in OT is based on the assumption of BR-correspondence. A morpheme that triggers reduplication is taken to consist of the phonologically empty morpheme RED that establishes a new correspondence relation between the base and a reduplicant (McCarthy & Prince 1995).

Under this view, Kiranti affix copying would be taken to be an instance of morphological Fixed Segmentism Reduplication (=FSR). The non-past marker /-t/ and the /-ʦi/ are reduplicative morphemes that also contain segments that are realized in all contexts (Alderete et al. 1999, Zimmermann & Trommer 2011). At least two crucially different types of FSR are usually differentiated (McCarthy & Prince 1986/1996, Yip 1998, Alderete et al. 1999): *first*, patterns where the fixed segment is an Emergence of the Unmarked Effect and, *second*, those where the fixed segment cannot be epenthetic and hence must be affixal. The 'fixed segments' in Kiranti copying are clearly of the latter type given that /ʔ/ is

the place-less default consonant in Kiranti and that the two 'fixed segmentism' patterns [t] and [ʦi] co-exist in the copying processes of the language. An analysis of /-t/ as a reduplicative morpheme with a fixed segmentism is sketched in (44)[13]. The size of the reduplicant is restricted by Af=σ (=Generalized Template Theory McCarthy & Prince 1995).

(44) *Athpare syllable copying as FSR in correspondence theory*

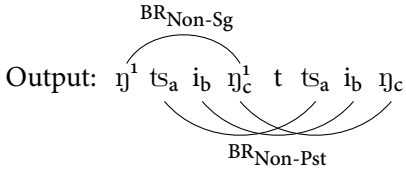
$l_1e_2m_3$-n_4a_5-t_6	MaxIO	Af=σ	MaxBR
a. $l_1e_2m_3n^a_4a_5n^a$	*!	*!	****
b. $l_1e_2m_3n^a_4a_5t_6n^a$		*!	*****
(☞) c. $l_1e_2m_3n^a_4a^b_5t_6n^aa^b$			****

Since every reduplicative morpheme establishes its own correspondence relation and the different BR-faithfulness constraints for these relations can be ranked differently, the co-existence of nasal and syllable copying and their interaction can in principle be predicted under such an account as well. An example of an analysis where two different reduplicative morphemes can co-occur and interact in words is given in Urbanczyk (1999) for double reduplication in Northern Lushootseed. There, it is acknowledged that it 'is a matter of some delicacy to determine what portion of the output functions as the base for each morpheme' (p. 518). The assumption in Urbanczyk (1999) is then simply that the base for a reduplicant consists of any segment following/preceding it in the output. For the copying in Kiranti, a crucial additional restriction is that only affix material may ever undergo reduplication, the base can hence not be determined by reference to linearity of segments alone. The correspondence relations for interacting nasal and syllable copying in Athpare would hence be as in (45). The different sizes of the two 'reduplicants' would then follow from different rankings of Max-$BR_{Non\text{-}Past}$ and Max-$BR_{Non\text{-}Sing}$ with respect to the markedness constraints determining the shape of an unmarked affix.

[13] Subscript numbers indicate IO-relations and superscript letters BR-correspondence. The winner is marked in parentheses since we know that onset fusion still needs to apply.

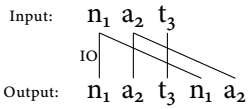
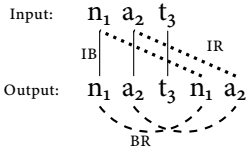
(45) *Nasal and syllable copying: Correspondence relations*

Input: ŋ + tsi RED + t RED



The most crucial difference to the present account for the phonological output structure is the nature of the 'copied' segments and their morphological affiliation. Under the present view that copying is fission, the additional segments are output instances of an input element and hence share the morphemic affiliation with that segment. This is a natural consequence of the assumption made explicit in the theory of 'morphological colours' that all elements that are part of the representation of a morpheme bear the affiliation or 'colour' of this morpheme and may never change this affiliation in the output (van Oostendorp 2006). The fact that 'copied' segments are instances of affix segments is the basic reason why MCNT has an effect on the size of the copied portion forcing it to be contiguous to the other elements that belong to that morpheme in the input. Under the alternative view that the copied element is not another instance of the same segment, the formulation of MCNT is not as straightforward. A reference to the morphemic affiliation of the copied elements is only possible in the full model of correspondence (46b) that includes IR-correspondence relations (McCarthy & Prince 1995). MCNT must then be formulated for this IR-relation in order to predict whole affix copying.

(46) *Syllable copying and correspondence relations*

a. Copying as fission	b. Full model of BR-Corr
	

The alternative account where two abstract RED-morphemes trigger affix copying in Kiranti hence relies on multiplying faithfulness constraints for

additional types of correspondence relations and crucially also on specifying BR-correspondence constraints to specific BR-relations that are established by a certain abstract RED-morpheme. This latter ingredient has some resemblance to morpheme-specific constraints (Pater 2000, Pater & Coetzee 2005, Flack 2007, Pater 2009, Mahanta 2012), an assumption that substantially increases the theoretical complexity and predictive power of an account.

In addition, the BR-correspondence account faces a severe undergeneration problem in its account for Athpare. It was shown in section 3.3 that the onset fusion effect is straightforwardly predicted under the assumption that the /t/ is underlyingly syllablified as onset of an otherwise empty syllable node. In a theory where the abstract RED triggers copying, however, this syllable position restriction remains mysterious. Of course, it is in principle possible to assume that RED triggers copying *and* /t/ is underlyingly syllabified as onset, but this is a complex superset-theory. If the fact that /t/ cannot be realized in onset position is an independent argument for the existence of prosodic structure in the input, then the additional assumption of the mysterious RED morpheme seems completely superfluous given that empty prosodic structure is marked and copying is one way to provide additional segmental material.

5. Conclusion

A close investigation of segmental copying in Kiranti languages reveals several interesting restrictions: *first*, the process is triggered only by specific affixes and *second*, only affix material is ever copied. *Third*, only affix material that is directly adjacent to the triggering affix is ever copied and *fourth*, there are two different repairs for avoiding the copying of only parts of morphemes: either no copying applies if the morpheme is 'too big' or copying of so much additional material applies that the additional phonological repair of segment fusion becomes optimal. This latter effect resembles a Duke of York effect: segments undergo fusion so that fission is possible. These morpheme contiguity effects were the main argument for proposing the new constraint MCnt demanding that *all* instances of a morpheme string in the output must be contiguous.

Whenever no adjacent affix segment precedes the triggering affix, copying is blocked. This is interesting from a typological perspective since many languages employ some alternative strategy if the preferred copying operation is unavailable. In Northern Lushootseed, for example, vowel epenthesis is

observed for CV reduplication if the stem vowel cannot be copied since it is either /ə/ or a long vowel (Urbanczyk 1999) and in Nakanai, a non-local vowel can be copied if this is the most sonorous one in the base (Kawahara 2007).

It was shown how all the restrictions on Kiranti affix copying straightforwardly fall out under the assumption that copying is segment fission that applies to fill otherwise empty prosodic nodes with segmental material. Especially insightful in this respect is the pattern of onset fusion in Athpare syllable copying. The fact that the /t/ must be realized in a specific syllable position can be understood as an independent argument for prosodic structure in the input – and that can easily trigger copying given the standard assumption that prosodic nodes must be filled with segmental material. The account hence predicts the morpheme-specific copying process in a purely representational account and without any morpheme-or construction-specific mechanisms (Pater 2009, Inkelas 2008).

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