Affix Copying in Kiranti

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1.   The Phenomenon

(1)   *Athpare*   (Ebert, 1997)

    a.   lems-u-ŋ-e
          beat-3.P-1.A-Pst
          'I beat it'

    b.   lems-u-ŋ-ci-ŋ-e
          beat-3.P-1.A-Non.Sg-1.A-Pst
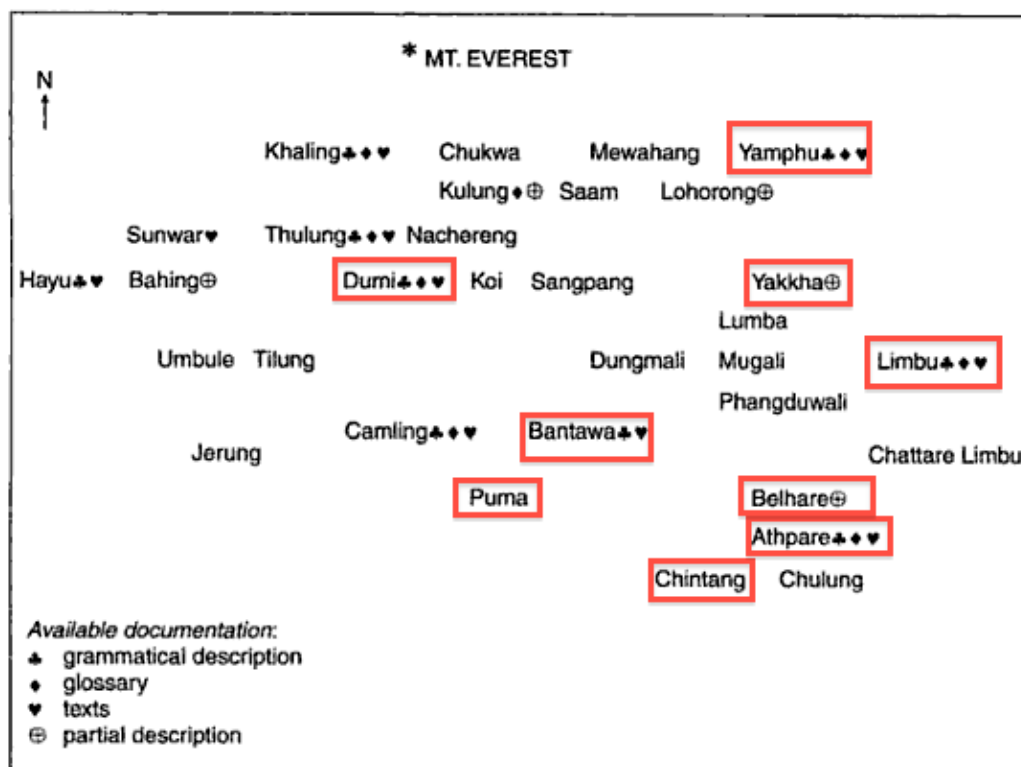   'I beat them'

= An affix surfaces more than once although the morpho-syntactic features it realizes are only present once
= 'semantically unmotivated affix doubling' (Ryan and Schuh, under preparation)

- • Copying can be found in various Kiranti languages (Tibeto-Burman, eastern hills of the Himalayas, mainly Nepal)

(2)   *Examples: Kiranti languages with Copying*   (Ebert, 2003)

> Claim:
> The affix copying is true **phonological copying**, triggered by the presence of **prosodic templates**.

1.1. Verbal agreement in Athpare (Past)

- the Kiranti language Athpare (Ebert, 1997) adds several agreement markers to a transitive verb: person, number and case are marked for agent (A) and/or patent (P)

(3)   *3.Non-singular objects: past*   (Ebert, 1997)

A\P	3d/p	
1s	-u-ŋ-**ci**-ŋ-e	[uŋciŋe]
1de	-a-ci-u-ŋ-e	[acuŋe]
1di	-a-ci-u-e	[acue]
1p	-u-m-**ci**-m-e	[umcime]
2p	-u-m-**ci**-m-e	[umcime]

(4)   *Morphemes involved*

-u   ↔   [P,−1,−2,+3]
-ŋ   ↔   [A,+1,−2] / _ +3
-ci   ↔   [−sg]
-e   ↔   [+past]
-m   ↔   [A,+pl,−sg,−3] / _ +3

- a nasal affix preceding /-ci/ surfaces a second time after it

A phonological trigger for the copying?

- in the data above[1], the copying always generates nasal onset and avoids a hiat or deletion of a vowel to avoid a hiat

- but in comparable phonotactic contexts, no copying occurs to create an onset:
    1. e.g. /a-lem-a-ci-u-e/ ('You two beat him')   surfaces as [a.lem.sa.cu.e]
       instead of *[a.lem.sa.cu.ce]

       ➡ no non-nasal is copied

    2. e.g. /lem-na-ni-e/ ('I beat you.pl')   surfaces as [lem.na.ne]
       instead of *[lem.na.ni.ne]
       ➡ no nasal is copied after a morpheme other than /-ci/

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[1]We will see below that the copied segment is syllabified as coda in other contexts.

No isolated phenomenon

- this pattern can be found in other Kiranti languages as well, cf. the exemplifying overview in (5) for the 1sg–3Nsg context in different Kiranti languages

(5)   *More nasal copying in Kiranti (Surface forms)*

	1s–3d/p		
Bantawa	khatt-u-ŋ-ci-ŋ	'I took them'	(Doornenbal, 2009)
Belhare	lur-e-ŋ-chi-ŋ	'I told them'	(Bickel, 1998, 2003)
Puma	khaŋŋ-u-ŋ-cʌ-ŋ	'I see them'	(Bickel et al., 2010)
Limbu	huʔr-u-ŋ-si-ŋ	'I taught them'	(van Driem, 1987)
Yakkha	pi-ŋ-ci-ŋ-a	'I gave them'	(Schackow, 2010)
Yamphu	khaks-u-ŋ-ji-ŋ	'I saw them'	(Rutgers, 1998)

1.2. Verbal agreement in Athpare (Non-Past)

(6)   *3.Non-singular objects and intransitive: non-past*   (Ebert, 1997)

A\P	3s	3d/p	intr
1s	-u-ŋ-**t**-u-ŋ [uŋtuŋ]	-u-ŋ-ci-ŋ-**t**-ci-ŋ [uŋciŋciŋ]	-ŋa-**t**-ŋa [naʔa]
1de	-ci-u-**t**-ci-u-ŋa [cucuŋa]	-ci-u-**t**-ci-u-ŋa [cucuŋa]	-ci-**t**-ci-ŋa [ciciŋa]
1pe	-u-m-**t**-u-m-ŋa [umtumma]	-u-m-ci-m-**t**-ci-m-ŋa [umcimcimma]	-i-**t**-i-ŋa [itiŋa]
1di	-ci-u-**t**-ci-u [cucu]	-ci-u-**t**-ci-u [cucu]	-ci-**t**-ci [cici]
1pi	-u-m-**t**-u-m [umtum]	-u-m-ci-m-**t**-ci-m [umcimcim]	-i-**t**-i [iti]
2s	-u-**t**-u [utu]	-u-ci-**t**-ci [ucici]	-yuk [yuk]
2d	-ci-u-**t**-ci-u [cucu]	-ci-u-**t**-ci-u [cucu]	-ci-**t**-ci [cici]
2p	-u-m-**t**-u-m [umtum]	-u-m-ci-m-**t**-ci-m [umcimcim]	-i-**t**-i [iti]
3s	-u-**t**-u [utu]	-u-ci-**t**-ci [ucici]	-yuk [yuk]
3d	-ci-u-**t**-ci-u [cucu]	-ci-u-**t**-ci-u [cucu]	-ci-**t**-ci [cici]
3p	-u-**t**-u [utu]	-u-ci-**t**-ci [ucici]	-yuk [yuk]

(7)   *The relevant morpheme*
       -t   ↔   [–past]

- an additional (copied) syllable appears after /-t/

  – a syllable identical to the preceding syllable in case [t] fuses with the alvoelar voiceless stop [c]:
    e.g. [cu.cu] (=cu(t)cu)

– [t] is in the onset position of a syllable whose nucleus and coda are identical to the preceding syllable
e.g. [u.tu]

A phonological trigger for the copying?

- C-cluster are resolved
  e.g. [uŋtuŋ] instead of *[uŋt] (1s-3s)
  e.g. [uŋciŋciŋ] instead of *[uŋciŋt] (1s-3Ns)
  ➡ only 6 cases are of this kind

- open syllables are created
  e.g. [lem.na.ʔa] 'I beat you' instead of *[lem.nat]
  e.g. [a.lem.ci.ci.ŋa] 'You beat us two' instead of *[a.lem.cit.ŋa]
  but:
  e.g. [a.lem.sum.tum] instead of *[a.lem.su.mu.tum] or *[a.le.me.su.mu.tu.mu]
  ➡ no copying to generate open syllables in other contexts

1.3. Summary of generalizations

- two general patterns of copying in Kiranti

  - (affix-) **nasals** are copied around certain morphemes, mainly /-ci/ and its cognates

  - an (affix-) **syllable** is copied around /-t/

- although these copying operations may optimize the phonological structure, they cannot be regarded as general phonotactic repair operation since copying is blocked in the same phonotactic contexts in the absence of the triggering morpheme.
  → **morpheme-specific**

- no functional/semantic motivation

2.   The theoretical landscape: Doubling vs. Copying vs. Reduplication?

(8)   *The Dual Theory of Reduplication*

(Inkelas and Zoll, 2000; Kawahara, 2007; Inkelas, 2008; Haugen, 2009)

phonological doubling	morphological doubling
– motivated by phonological well-formedness conditions	– morpho-semantic motivation: affixation, compounding
– small phonological constituents are copied	– larger phonological constituents are typical (bimoraic)
– the closest constituent of a certain type is copied	– no locality restriction
– results from: 1.) epenthesis or 2.) templatic requirements	

- two different mechanisms and both are needed and capture empirical domains that are nearly complementary

- 'phonological copying' is subdivided even more clearly into two different operations in the 'Minimal Reduplication' approach by Kirchner (2010) (for discussion cf. e.g. Bermúdez-Otero (to appear); Bye and Svenonius (to appear) for discussion)

- he argues that all reduplication is per se emergent

(9)   *The Theory of Minimal Reduplication*   (Kirchner, 2007, 2010, to appear)

phonological reduplication	morphological reduplication	syntactic reduplication
– triggered by a marked structure that is encountered with many morphemes/their combination	– the underlying form of a morpheme creates a marked structure, e.g. a floating syllable	– spell-out of multiple links in a (copy) chain: phonological repetition of material from a single morpho-syntactic constituent

⇓   ⇓

copying as a phonological repair strategy that competes with epenthesis in repairing marked structure or filling empty prosodic nodes

vs. the standard correspondence-theoretic approach assuming BR-correspondence and RED to handle (morphological) reduplication

(10)   *Phonological reduplication: Cluster repair in Winnebago*   (Broselow, 2008; Kirchner, 2010)

underlying	surface	
hipres	hiperes	'know'
ʃ-wapox	ʃawapox	'you stab'
ʃ-ruxuk	ʃuruxuk	'you earn'

Where is the Kiranti Copying?

- No semantic/functional motivation for doubling the morpho-syntactic features can be identified
  ➡ no morphological doubling (I)/syntactic reduplication (K).

- although it is a local operation that is restricted to proximate elements and it only affect prosodic units, there is no general phonological optimization triggering the process
  ➡ no phonological copying as epenthesis (I) or phonological reduplication (K).

- the process is rather morpheme-specific
  ➡ **morphological copying** in Kirchner's sense

3. Analysis

3.1. Minimal Reduplication in more detail

- phonological copying as a standard phonological process as e.g. epenthesis

- **prosodic templates** in the underlying representation of morphemes can be the trigger for copying (=morphological reduplication)

- empty prosodic nodes are therefore assumed to be part of a morpheme: couched in the tradition of Prosodic Morphology (McCarthy and Prince, 1986/1996) assuming that nodes of the prosodic hierarchy exist as true entities and (parts of) morphemes on their own[2]

3.2. Copying in Correspondence Theory (McCarthy and Prince, 1995)

- reduplication/copying is understood as fission: one input segment is split up into two instances of itself in the output

- the indices marking input-output correspondence in Correspondence Theory indicate such a state of affair: one element with index $_x$ in the input, but two elements with index $_x$ in the output

(11)   INTEGRITY   (McCarthy and Prince, 1995)
    Assign a violation mark for every input segment that corresponds to more than one output segment.

- locality of the copying follows from LINEARITY demanding that the order of elements must not be reversed in the output

(12)   LINEARITY   (Mc Carthy, 2008)
    Let input = $i_1 i_2 i_3 \ldots i_n$ and *output* = $o_1 o_2 o_3 \ldots o_m$.
    Assign on violation mark for every pair i_w and i_y
        if $i_w \, \Re \, o_x$ and $i_y \, \Re \, o_z$,
        i_w precedes i_y,
        and o_z precedes o_x.

(13)   *Example: Copying in Correspondence Theory*

$p_1 a_2.t_3 i_4$	INTEG	LIN	
a. $p_1 a_2.t_3 i_4$			
b. $a_2 p_1.t_3 i_4$		*	(metathesis)
c. $p_1 a_2.p_1 a_2.t_3 i_4$	**	*	(local reduplication)
d. $t_3 i_4.p_1 a_2.t_3 i_4$	**	****	(non-local reduplication)

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[2]It therefore extends the typology of the various accounts where prosodic nodes constitute morphemes on their own triggering quantity-manipulating morphology as e.g. lengthening or gemination. Cf. for an overview and literature Trommer and Zimmermann (2010).

3.3. Nasal Copying

- the nasal copying is triggered by the presence of an empty root node that must be filled with the featural content of a segment[3]

(14) $[-sg] \longleftrightarrow$

$$
\begin{array}{ccc}
\text{c} & \text{i} & \\
| & | & \\
\bullet & \bullet & \bullet
\end{array}
$$

- this empty root node cannot be deleted due to MaxRt but may not be left unspecified neither due to (15)[4]

(15)   Specify
Assign a violation mark for every segment that lacks a specification.

- and it cannot be filled with epenthetic featural content due to Dep

- copying is therefore left over as strategy to fill it with segments under violation of Integrity and Linearity

- interestingly, the fact that this copied segment is a nasal does not follow from any general markedness requirements about segments in syllable positions but is a Derived Enviroment Effect (Lubowicz, 2002; Anttila, 2005; van Oostendorp, 2008)

- the constraint (16) demands that no elements belonging to the same morpheme may link if they are not already linked underlyingly
(it refers to the concept of morphological colours (van Oostendorp, 2006*a,b*): every morpheme bears a colour of its own that allows to identify all material belonging to this morpheme)

(16)   Alternation   (van Oostendorp, 2006*a*, 16)
If an association line links two elements of colour α, the line should also have colour α.

- and it is quite striking that only affix material is ever copied on those contexts and never stem material: due to the ranking of Contig sensitive to the domain of affix or stem

- ranking (16) higher than Linearity results in a situation where non-local copying is preferred over non-nasal copying

- that only nasals are copied into the empty root node position is therefore merely a coincidence: only nasals are affix consonants that appear in front of the /-ci/

- a final sidenote: that the copying applies forwards and no consonant following /-ci/ is copied follows if optimization and filling of the node applies before any other affix attaches: cyclic optimization (Kiparsky, 1985; Bermúdez-Otero, in preparation; Kiparsky, 2000; Bermúdez-Otero, 2010)

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[3]Cf. for example featureless root nodes in reduplicative affixes in Bermúdez-Otero (to appear).

[4]Cf. e.g. Bye and Svenonius (to appear). This is the general version of constraints demanding specifications for certain features, e.g. SegHead 'Every root node dominates a place feature.' (Ito and Mester, 1993) for place.

(17)   *Nasal Copying in Athpare*

$u_1 + \eta_2 + c_3\ i_4$	MaxRt	DepF	Alt	Spec	Integ	Lin
a. $u_1\ \eta_2\ c_3\ i_4$	*!					
b. $u_1\ \eta_2\ c_3\ i_4$				*!		
c. $u_1\ \eta_2\ c_3\ i_4$ n		*!				
d. $u_1\ \eta_2\ c_3\ i_4$ c_3			*!		*	*
☞ e. $u_1\ \eta_2\ c_3\ i_4$ η_2					*	**

3.4. Syllable Copying

- a syllable template in the representation of the triggering morpheme, as in (18) where the underlying representation for Athpare /-t/ is given

(18) $[\text{Npst}] \longleftrightarrow$
$$\sigma \atop t$$
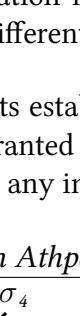
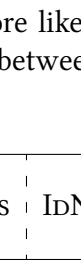- the /t/ is associated as onset (moraless) into an otherwise empty syllable template and this underlying association to the syllable position is protected by a MaxAss constraint as is the syllable itself by Maxσ

- this incomplete syllable must be filled with segmental material

- interestingly, not only the minimal number of segments that are necessary to create a syllable are copied:
  [a.lem.sum.tum] instead of *[a.lem.sum.tu] 'You (pl) beat him'

- that the copied syllable mirrors its preceding syllable (in e.g. having a coda) follows from string-internal correspondence (Hansson, 2001; Walker, 2000*a,b*)

  - high-ranked constraints demand correspondence between subsequent similar sounds/ structures in any output string = the driving force behind assimilation operations
    (string-internal correspondence is marked by superscripts in the following)

  - once this correspondence is established, IDENT-constraints demand featural identity between these corresponding output elements

  - extending the concept of segment-correspondence to higher prosodic units like the syllable (Zuraw, 2002; Yu, 2005; Inkelas, 2008) yields constraints like (19)
    (actually abbreviations for different IDENT-constraints on features)

- the fact that the empty syllable is filled with segments follows therefore not only from general syllabic wellformedness (Prince and Smolensky, 1993)

(19) a. IDENT-$\sigma\sigma$ (NUC) (=IDNUC)
           Assign a violation mark for every two corresponding syllables σ_1 and σ_2 in the output with different segments in the nucleus position.
      b. IDENT-$\sigma\sigma$ (CODA) (=IDCOD)
           Assign a violation mark for every two corresponding syllables σ_1 and σ_2 in the output with different segments in the coda position.
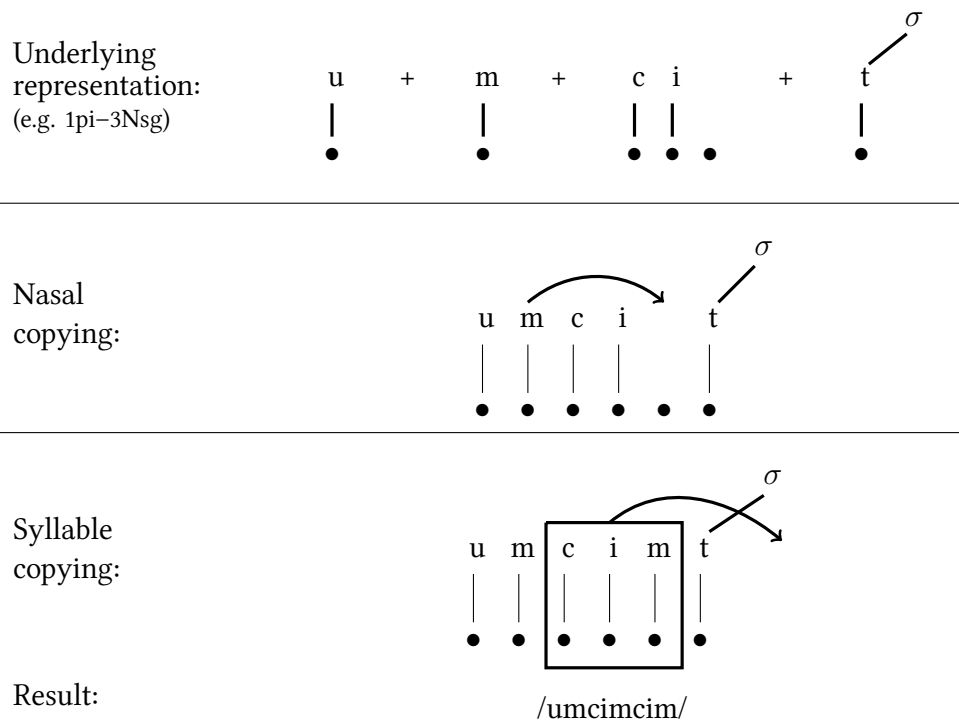
- in (20), the constraints establishing the correspondence between the syllables are omitted and it is taken for granted that syllables are more likely to correspond if they are closer together, i.e. without any intervening syllable inbetween

(20)   *Syllable Copying in Athpare*[5]

$u_1 + m_2 + t_3$ (σ_4)	MAXσ	MAXASS	IDNUC	IDCOD	DEP-S	INTEG
a. (σ: $u_1\,m_2\,t_3$)	*!	*				
b. (${}^I\sigma$: $u_1\,m_2$; ${}^I\sigma_4$: t_3)			*!	*		
c. (${}^I\sigma$: $u_1\,m_2$; ${}^I\sigma_4$: $t_3\,ə\,ʔ$)			*!	*	**	
☞ d. (${}^I\sigma$: $u_1\,m_2$; ${}^I\sigma_4$: $t_3\,u_1 m_2$)						**

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[5]Simplified syllabification: preceding stem material might be syllabified as onset as e.g. [a.lem.sum.tum] ('You (pl) beat him') from the stem /lems/. But cf. the above assumption that only affix material might participate in the copying and that IDENT-$\sigma\sigma$ (ONSET) is therefore irrelevant in this example.

(21)   *Interaction of both copying patterns in Athpare*

Underlying representation: (e.g. 1pi–3Nsg)	u + m + c i + t
Nasal copying:	u m c i t
Syllable copying:	u m c i m t
Result:	/umcimcim/

3.5. Discussion: A broader look on Kiranti and grammaticalization

- some more examples for copying can be found, e.g. in the progressive formation in Athpare

    - the progressive resembles a compound, is formed by suffixing /-gett/

    - in the present progressive, the full suffix string is only found after /-gett/ and only part of the suffix string between stem and /-gett/

    - this 'part' is always one syllable long

(22)   a.   khat-**ci**-get-**ci**-ŋa ('we (d) are doing')
         b.   m-a-nakt-**i**-gett-**i** ('he is asking you')
         c.   a-lept-**u**-**m**-gett-**u**-**m**-ci-m ('you (p) are throwing them')

- something similar in the perfect and with the perfect marker /-es(a)/ in Athpare

- in these examples, it is apparent that the copying-triggering suffixes originated as postverb in compound constructions that were grammaticalized as suffixes

- the apparent earlier stage of this development can be found in Chintang:

    - lexical stems can be compounded with 'v2' verbs and those have a prosodic subcategorization restriction: they can only attach to disyllabic hosts

    - regular stems (lexical stems and the rightmost syllable of bipartites) are monosyllabic: the stem must become 'bigger' and it is augmented by a regular inflectional suffix or, if there is none, an epenthetic element, creating a disyllabic foot (Bickel et al., 2007, 50)
    ➡ termed 'recursive inflection' by Bickel et al. (2007)

(23)   *Chintang*   (Bickel et al., 2007)
      a.   ko-ŋa-goĩ-ya-ʔã
             walk-1.Sg.S-Amb-1.Sg.S-Ex.Npst
             'I (will) walk around'
      b.   kos-i-gond-i-ki-ŋa-nɨŋ
             walk-Pl-Amb-Pl-Npst-Ex-Neg
             'We (pl.excl) don't walk around'

4. Conclusion

I presented an OT-analysis for the affix copying in Kiranti based on the assumptions that

➡ copying exists as general phonological operation and

➡ that it repairs a marked structure that is created through empty prosodic positions in the underlying representation of morphemes in Kiranti.

- this explains why only **prosodic constituents** (C, σ) are copied and not arbitrary sequences e.g. 'the first two segments'

- this analysis based on **phonological copying** is a general account that derives a broad range of phenomona like morphological reduplication or phonological reduplication from the same basic assumptions

- and the assumption of **prosodic templates** allows to analyse morphological reduplication in the very same vein as other types of non-concatenative morphology: attractive from a viewpoint of theoretical economy and empirically supported by the phenomenon of non-concatenative allomorphy (Zimmermann, 2010; Bye and Svenonius, to appear)[6]

- a crucial related question: What is the 'right' **order of morphemes**? Does the copying apply backwards or forwards?

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[6]'Generalized Nonlinear Affixation', cf. Bermúdez-Otero (to appear) referring back to the term 'Generalized Mora Affixation' by Trommer and Zimmermann (2010).

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