Structure and Base-Derivative Correspondence in Bantu Affix Ordering

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Introduction

The Mirror Principle and Cyclic Concatenation

(1) **The Mirror Principle [MP]:** "Morphological derivations must directly reflect syntactic derivations (and vice versa)." (Baker 1985)

- The MP is usually implemented via cyclic morphological concatenation:

(2) Procedure for cyclic concatenation

Step 1: Attach the first affix that combines with the root.
Step 2: Attach the next affix that combines with the root. (repeat)

Introduction

Morphological Templates

- One *prima facie* challenge to the MP and cyclic concatenation is morphological templates:

(3) **Morphological Templates:** Morphemes always appear in a particular order, regardless of structure/scope.

- A famous example is the CARP template in Bantu (Hyman & Mchombo 1992:350, Hyman 2003b:247, Good 2005, *a.o.*).

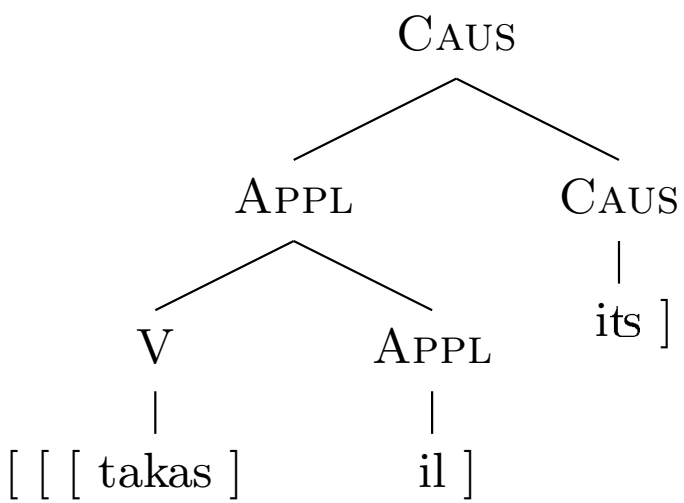
(4) **CARP template:** Causative-Applicative-Reciprocal-Passive

Introduction

CARP: Causative and Applicative in Chichewa

- The only way to form a Causativized Applicative (5) in Chichewa (Mchombo 2004) is in accordance with the CARP template (6a).

(5) Causativized Applicative



(6) a. **CARP order ✓**
takas-its-il-
stir-CAUS-APPL-
'cause to [stir with]'

b. **Mirror/Cyclic order ✗**
**takas-il-its-*
stir-APPL-CAUS-
intended: 'cause to [stir with]'

(Hyman 2003b:248)

⋆ Patterns like this tell us that cyclic concatenation can't be the whole story.

Introduction

Goals of this talk

- The goal of this talk is to resolve this tension between the Mirror Principle and morphological templates.
- The solution is to allow structure to influence the derivation without employing a literally cyclic model.

Introduction

Components of the framework

- Order is determined *in the phonological component* primarily by the interaction between two constraint types:

  1. Alignment constraints (McCarthy & Prince 1993), whose ranking is dynamically tied to structure via the "Mirror Alignment Principle" (Zukoff 2022).

     ↪ **Mirror Principle**

  2. Bigram morphotactic constraints (Ryan 2010) favoring arbitrary templatic orders.

     ↪ **Morphological templates**

- Further structure-dependent aspects of CARP can be explained using Base-Derivative correspondence/faithfulness (Benua 1997, *a.o.*).

Roadmap

1. **Introduction**

2. **Asymmetric Compositionality**
   Interpretive asymmetries between CARP forms and non-CARP forms

3. **Suffix Doubling in Chichewa**
   Restricted suffix doubling and associated asymmetric compositionality

4. **Overapplication opacity in Nyakyusa**
   Unexpected application of phonology in CARP forms dependent on structure

5. **Conclusion**

Asymmetric Compositionality in Chichewa

Causative and Reciprocal in Chichewa

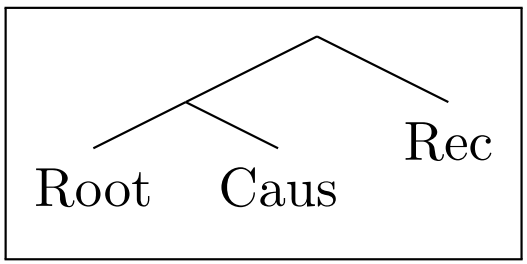
- We'll start by considering forms with Causative and Reciprocal.

(7) a. Causative ⇔ /its/
b. Reciprocal ⇔ /an/
c. $\sqrt{tie}$ ⇔ /mang/

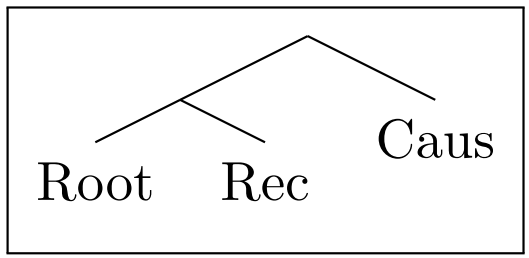
- Chichewa allows both structural combinations of these two morphemes, yielding distinct interpretations:

(8) Permissible structures with Caus and Rec

a. *Reciprocalized Causative*



b. *Causativized Reciprocal*



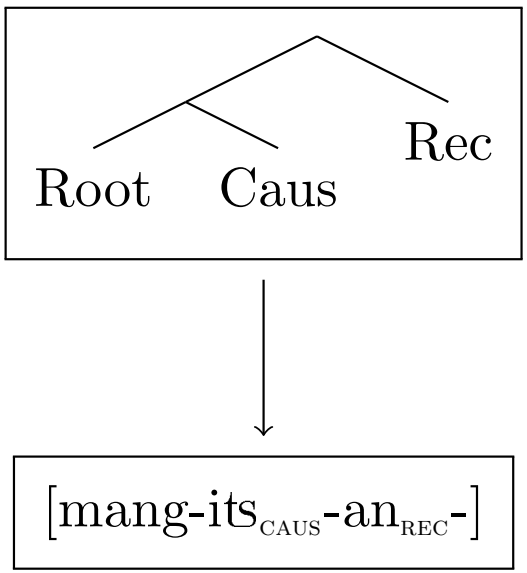
Asymmetric Compositionality in Chichewa

Mirror Orders

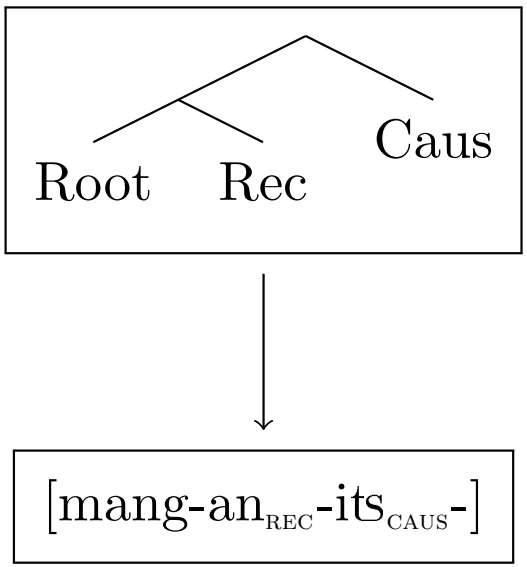
- The orders expected via MP / cyclic concatenation are grammatical:

(9) Cyclic/mirror mappings permissible

a. *Reciprocalized Causative*



b. *Causativized Reciprocal*



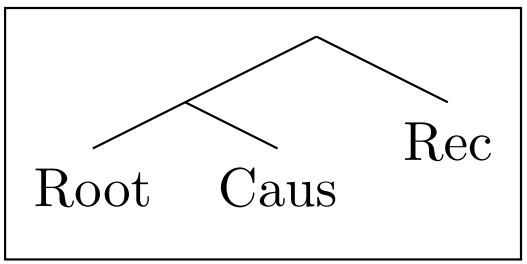
Asymmetric Compositionality in Chichewa

CARP Orders

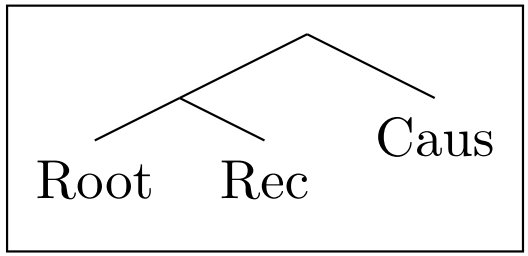
- The Causativized Reciprocal can alternatively have the order [Root-Caus-Rec].
  → This violates the Mirror Principle, but obeys the CARP template.

(10) CARP-obeying, Mirror-violating mapping permissible

a. *Reciprocalized Causative*



b. *Causativized Reciprocal*



CARP

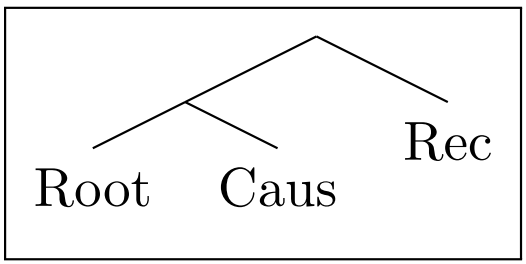
Asymmetric Compositionality in Chichewa

No Anti-CARP Orders

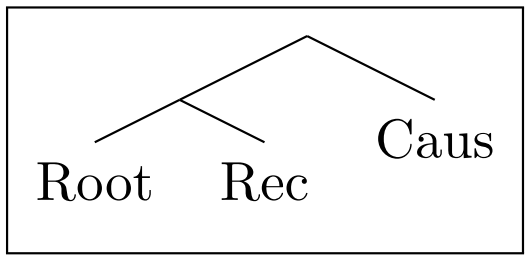
- The Reciprocalized Causative *can't* have MP-violating order [Root-Rec-Caus].
  → Only CARP can induce MP violations.

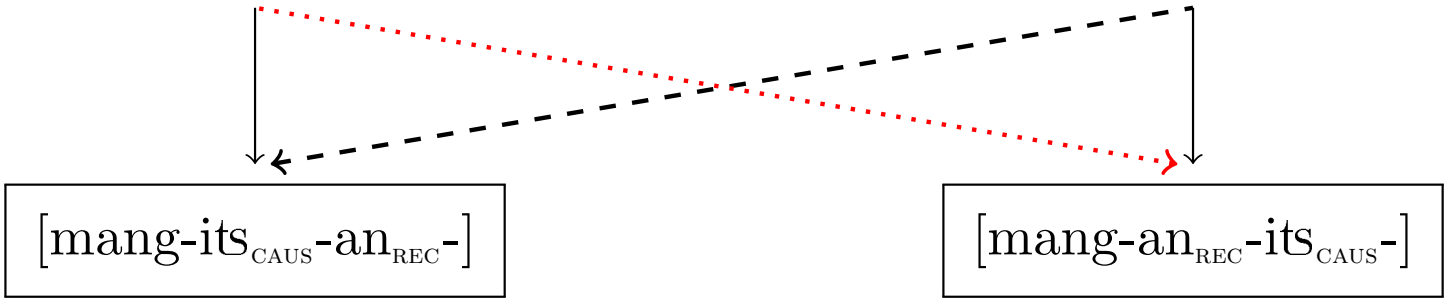
(11) No Anti-CARP mappings

a. *Reciprocalized Causative*



b. *Causativized Reciprocal*





CARP **Anti-CARP**

Asymmetric Compositionality in Chichewa

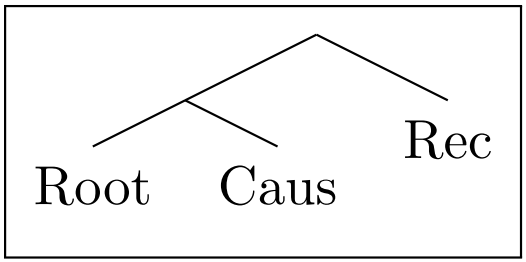
Asymmetric Compositionality

- Hyman (2003b) calls this state of affairs "**asymmetric compositionality**".
  - Structures whose MP orders violate CARP are linearly ambiguous.
  - Orders that obey CARP are structurally/semantically ambiguous.

→ Order-structure pairs that violate both CARP and MP are not allowed.

(12) Asymmetric compositionality

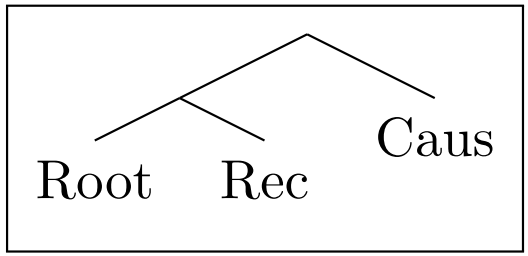
a. *Reciprocalized Causative*



[mang-its$_{\text{CAUS}}$-an$_{\text{REC}}$-]

CARP

b. *Causativized Reciprocal*



[mang-an$_{\text{REC}}$-its$_{\text{CAUS}}$-]

Anti-CARP

Asymmetric Compositionality in Chichewa

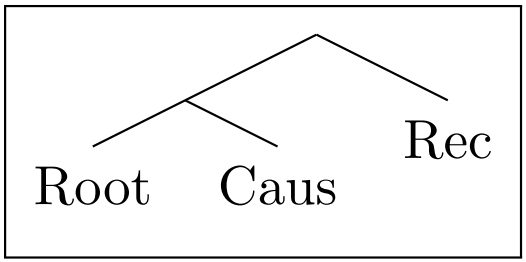
What do we need our theory to do?

- Our theory of morpheme ordering must derive two types of mappings:

(13) a. MP-obeying mappings, regardless of structure (solid lines)
b. CARP-obeying mappings, regardless of structure (dashed lines)

(14) Required mappings

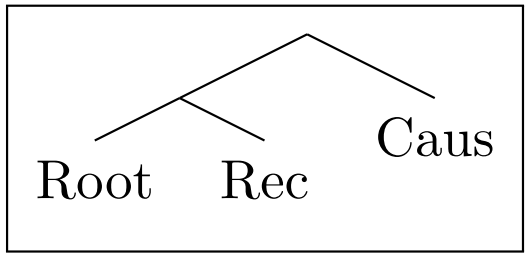
a. *Reciprocalized Causative*



[mang-its$_{\text{CAUS}}$-an$_{\text{REC}}$-]

CARP

b. *Causativized Reciprocal*



[mang-an$_{\text{REC}}$-its$_{\text{CAUS}}$-]

Anti-CARP

Asymmetric Compositionality in Chichewa

Proposal

⋆ There is no obvious way to do this using cyclic concatenation alone.

- I propose to account for these mappings through the parallel interaction of two types of constraints:

(15) a. Alignment constraints (McCarthy & Prince 1993)
↪ Responsible for MP orders when coupled with the Mirror Alignment Principle (Zukoff 2022)

b. Bigram morphotactic constraints (Ryan 2010)
↪ Responsible for CARP orders

- The alternations inherent to asymmetric compositionality are derived through variable ranking.

Asymmetric Compositionality in Chichewa

Alignment Constraints

- Alignment constraints (McCarthy & Prince 1993) demand that morpheme edges coincide with word edges.

(16) Align(Reciprocal, R; PWord, R) [Align-Rec-R]
Assign one violation for each segment intervening between the right edge of the exponent of Reciprocal and the right edge of the word.

(17) Align(Causative, R; PWord, R) [Align-Caus-R]
Assign one violation for each segment intervening between the right edge of the exponent of Causative and the right edge of the word.

- The relative ranking of alignment constraints on individual morphemes can determine relative order.

Asymmetric Compositionality in Chichewa

Deriving Chichewa's Mirror Principle behavior

- The two different orders of Caus and Rec correspond to the two different rankings of the alignment constraints:

(18) **Reciprocalized Causative** *mang-its-an-*

/mang$_{\text{ROOT}}$, its$_{\text{CAUS}}$, an$_{\text{REC}}$/	ALIGN-REC-R	ALIGN-CAUS-R
a. ☞ mang-its-an- [CR]		** (an)
b. mang-an-its- [RC]	*!* (its)	

(19) **Causativized Reciprocal** *mang-an-its-*

/mang$_{\text{ROOT}}$, its$_{\text{CAUS}}$, an$_{\text{REC}}$/	ALIGN-CAUS-R	ALIGN-REC-R
a. mang-its-an- [CR]	*!* (an)	
b. ☞ mang-an-its- [RC]		** (its)

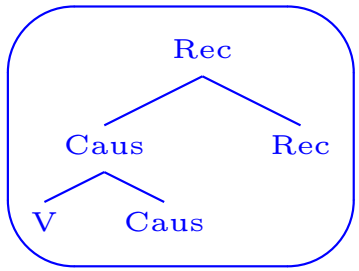
Asymmetric Compositionality in Chichewa

Deriving Chichewa's Mirror Principle behavior

- The two different orders of Caus and Rec correspond to the two different rankings of the alignment constraints:

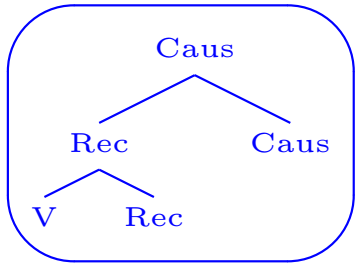
(18) **Reciprocalized Causative** *mang-its-an-*

/mang$_{\text{ROOT}}$, its$_{\text{CAUS}}$, an$_{\text{REC}}$/	ALIGN-REC-R	ALIGN-CAUS-R
a. ☞ mang-its-an- [CR]		** (an)
b. mang-an-its- [RC]	*!* (its)	



(19) **Causativized Reciprocal** *mang-an-its-*

/mang$_{\text{ROOT}}$, its$_{\text{CAUS}}$, an$_{\text{REC}}$/	ALIGN-CAUS-R	ALIGN-REC-R
a. mang-its-an- [CR]	*!* (an)	
b. ☞ mang-an-its- [RC]		** (its)



⋆ Alignment ranking directly correlates with structure in MP mappings:

(20) a. Rec c-commands Caus → ALIGN-REC-R ≫ ALIGN-CAUS-R (18)
b. Caus c-commands Rec → ALIGN-CAUS-R ≫ ALIGN-REC-R (19)

Asymmetric Compositionality in Chichewa

The Mirror Alignment Principle

- This interaction is fully general (Zukoff 2022) — cyclic concatenation can be recast using alignment rankings as follows:

(21) **The Mirror Alignment Principle (MAP)** (Zukoff 2022)

a. If a terminal node α *asymmetrically c-commands* a terminal node β, then the alignment constraint referencing α *dominates* the alignment constraint referencing β.

b. *Shorthand*: If α c-commands β → ALIGN-α ≫ ALIGN-β

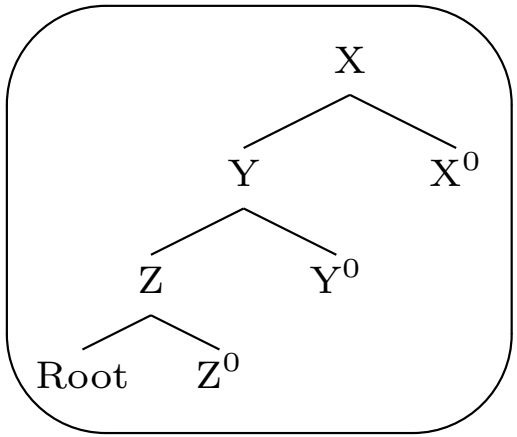
- This generates Mirror Principle ordering.

⋆ Note that this means that the relative ranking of alignment constraints can differ across different derivations, dependent on structural alternations.

Asymmetric Compositionality in Chichewa

The Mirror Alignment Principle: Architecture

Morphosyntax



⇓

Interface

MAP ranking: ALIGN-X-R ≫ ALIGN-Y-R ≫ ALIGN-Z-R

⇓

Phonology

/Root, X, Y, Z/		ALIGN-X-R	ALIGN-Y-R	ALIGN-Z-R
a.	Root-X-Y-Z	*!*	*	
b.	Root-Y-X-Z	*!	**	
c.	Root-X-Z-Y	*!*		*
d.	Root-Z-X-Y	*!		**
e.	Root-Y-Z-X		**!	*
f. ☞	Root-Z-Y-X		*	**

Asymmetric Compositionality in Chichewa

CARP and Bigram Morphotactic Constraints

- CARP mappings can be accounted for using "bigram morphotactic constraints" (Ryan 2010): constraints that prefer specific orders between pairs of morphemes.

- To generate the preference for, e.g., Caus-Rec orders over Rec-Caus orders:

(22) **Caus-Rec:** When exponents of Causative and Reciprocal are both present in the output, assign a violation if an exponent of Causative is not followed by an exponent of Reciprocal.

(23) **Rec-Caus:** When exponents of Causative and Reciprocal are both present in the output, assign a violation if an exponent of Reciprocal is not followed by an exponent of Causative.

(24) **Ranking:** Caus-Rec $\gg$ Rec-Caus

Asymmetric Compositionality in Chichewa

Bigram Constraints and Fixed Ordering

- If a derivation contained only these bigram constraints, it would select the CARP-obeying order, regardless of the underlying structure.

(25) **Generating the CARP order:** *mang-its-an-* (Caus precedes Rec)

/mang$_{\text{ROOT}}$, its$_{\text{CAUS}}$, an$_{\text{REC}}$/	Caus-Rec	Rec-Caus
a. ☞ mang-its-an- [CR]		*
b. mang-an-its- [RC]	*!	

- Some Bantu languages are rigidly CARP obeying. These languages would have invariably undominated bigram constraints.

Asymmetric Compositionality in Chichewa

Variable Ranking Generates Asymmetric Compositionality

- Asymmetric compositionality is derived through ranking variation:

(26) a. MAP $\gg$ Bigram $\Rightarrow$ MP order
b. Bigram $\gg$ MAP $\Rightarrow$ CARP order

$\rightarrow$ When the structure is "CARP-obeying", these two coincide.

$*$ The lower-ranked bigram constraint and the lower-ranked alignment constraint have no impact on the derivation, so they are omitted.

Asymmetric Compositionality in Chichewa

Variable Ranking with "CARP-obeying" Structure

- When Rec is structurally higher than Caus, MP-order is CARP-obeying.
  → The MAP constraint (ALIGN-**REC**-R) and the bigram constraint prefer the same output (CR), hence, no order variation.

(27) **CARP input:** Bigram ≫ MAP ⇒ *Output*: CR

[[[Root]Caus]Rec] /mang$_{ROOT}$, its$_{CAUS}$, an$_{REC}$/	**Bigram**	**MAP**
	CAUS-REC	ALIGN-REC-R
a. ☞ mang-its-an- [CR]		
b. mang-an-its- [RC]	*!	** (its)

(28) **CARP input:** MAP ≫ Bigram ⇒ *Output*: CR

[[[Root]Caus]Rec] /mang$_{ROOT}$, its$_{CAUS}$, an$_{REC}$/	**MAP**	**Bigram**
	ALIGN-REC-R	CAUS-REC
a. ☞ mang-its-an- [CR]		
b. mang-an-its- [RC]	*!* (its)	**

Asymmetric Compositionality in Chichewa

Variable Ranking with "CARP-violating" Structure

- When Caus is structurally higher than Rec, the MP-order is CARP-*violating*.
  → The MAP constraint (ALIGN-**CAUS**-R) and the bigram constraint prefer different outputs, hence, order variation.

(29) **Non-CARP input:** Bigram ≫ MAP ⇒ *Output*: CR

[[[Root]Rec]Caus] /mang$_{ROOT}$, its$_{CAUS}$, an$_{REC}$/	**Bigram**	**MAP**
	CAUS-REC	ALIGN-CAUS-R
a. ☞ mang-its-an- [CR]		** (an)
b. mang-an-its- [RC]	*!	

(30) **Non-CARP input:** Bigram ≫ MAP ⇒ ***Output*: RC**

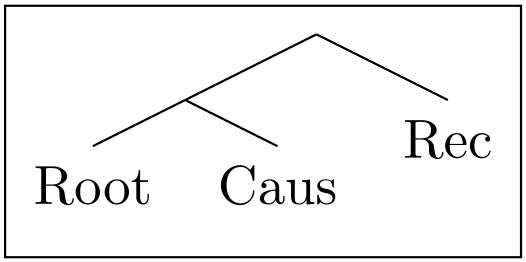
[[[Root]Rec]Caus] /mang$_{ROOT}$, its$_{CAUS}$, an$_{REC}$/	**MAP**	**Bigram**
	ALIGN-CAUS-R	CAUS-REC
a. mang-its-an- [CR]	*!* (an)	
b. ☞ mang-an-its- [RC]		*

Asymmetric Compositionality in Chichewa

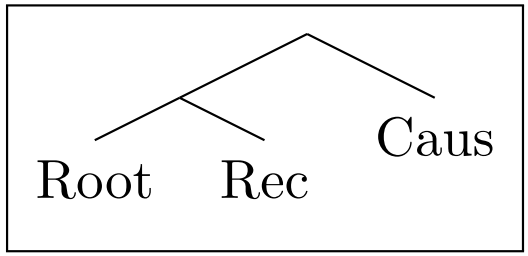
Local Summary

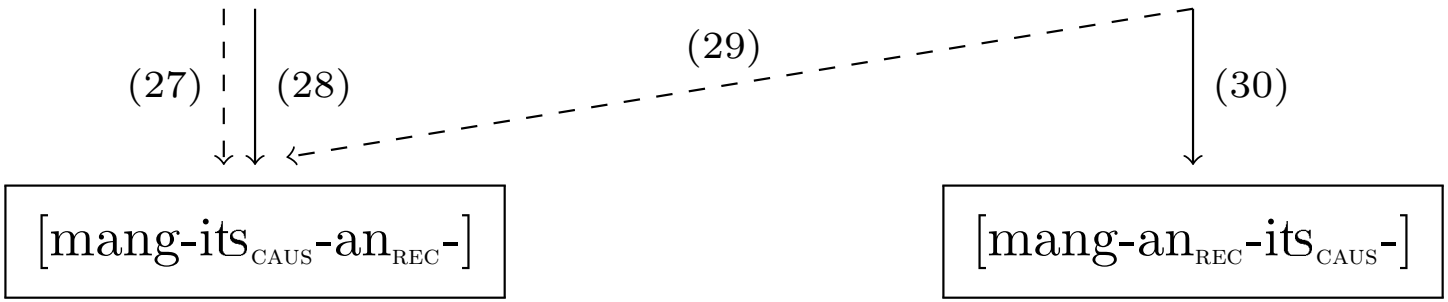
(31) Permissible mappings between structure and order

a. *Reciprocalized Causative*



b. *Causativized Reciprocal*





- CARP bigram [Caus-Rec] ranks higher ⇒ CARP order (dashed lines)
- MAP ranks higher ⇒ Mirror Principle order (solid lines)

  ↪ Only way to get CARP-violating order (30).

Asymmetric Compositionality in Chichewa

Local Conclusions

- Integrating MAP-based alignment + bigrams resolves the tension between Mirror Principle and morphological templates.
- Asymmetric compositionality falls out from the way that structure interacts with ranking variability.

- This approach requires parallel constraint interaction, partially dependent on structure.
- Cannot be replicated with cyclic concatenation.

Roadmap

1. **Introduction**

2. **Asymmetric Compositionality**
   Interpretive asymmetries between CARP forms and non-CARP forms

3. **Suffix Doubling in Chichewa**
   Restricted suffix doubling and associated asymmetric compositionality

4. **Overapplication opacity in Nyakyusa**
   Unexpected application of phonology in CARP forms dependent on structure

5. **Conclusion**

Suffix Doubling in Chichewa

Applicative and Reciprocal in Chichewa

- Unlike with the combination of Causative and Reciprocal, Chichewa does not allow the CARP-violating MP order for an Applicativized Reciprocal:

(32) a. **CARP order ✓**
mang-il-an-
tie-APPL-REC-
'tie each other for/at'

b. **Mirror order ✗**
**mang-an-il-*
tie-REC-APPL-
intended: 'tie each other for/at'

(Hyman 2003b:253)

(33) Applicative ⇔ /il/

Suffix Doubling in Chichewa

Fixed Ordering and Bigrams

- This is an instance of "fixed ordering" (Ryan 2010), as opposed to asymmetric compositionality.

- Fixed ordering can be generated by having the bigram APPL-REC invariably outrank the MAP alignment constraints.

(34) **APPL-REC:** When exponents of Applicative and Reciprocal are both present in the output, assign a violation if an exponent of Applicative is not followed by an exponent of Reciprocal.

Suffix Doubling in Chichewa

Deriving Fixed Ordering of Applicative and Reciprocal

(35) **CARP input:** Bigram ≫ MAP ⇒ *Output*: AR

[[[Root]Appl]Rec] /mang$_{\text{ROOT}}$, il$_{\text{APPL}}$, an$_{\text{REC}}$/	**Bigram**	**MAP 1**	**MAP 2**
	APPL-REC	ALIGN-REC-R	ALIGN-APPL-R
a. ☞ mang-il-an- [AR]			** (an)
b. mang-an-il- [RA]	*!	** (il)	

(36) **Non-CARP input:** Bigram ≫ MAP ⇒ *Output*: AR

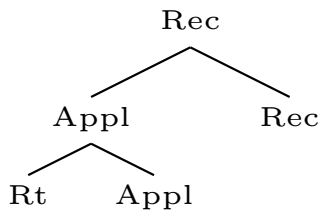
[[[Root]Rec]Appl] /mang$_{\text{ROOT}}$, il$_{\text{APPL}}$, an$_{\text{REC}}$/	**Bigram**	**MAP 1**	**MAP 2**
	APPL-REC	ALIGN-APPL-R	ALIGN-REC-R
a. ☞ mang-il-an- [AR]		** (an)	
b. mang-an-il- [RA]	*!		** (il)

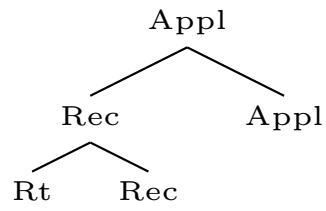
Suffix Doubling in Chichewa

Suffix Doubling

- There's one more licit output involving Applicative and Reciprocal:

(37) Permitted orderings of Applicative /il/ + Reciprocal /an/ in Chichewa





Single exponents				
a.	APPL-REC (CARP)	*mang-il-an-*	✓ (MP)	✓
b.	REC-APPL	*mang-an-il-*	✗	✗ (MP)
Doubled exponents				
c.	APPL-REC-APPL	*mang-il-an-il-*	✗	✗
d.	REC-APPL-REC	*mang-an-il-an-*	✗	✓

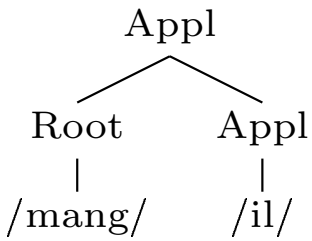
(Hyman & Mchombo 1992:351ff., Hyman 2003b:253ff.)

Suffix Doubling in Chichewa

Structure and (Pseudo-)Cyclicity in Suffix Doubling

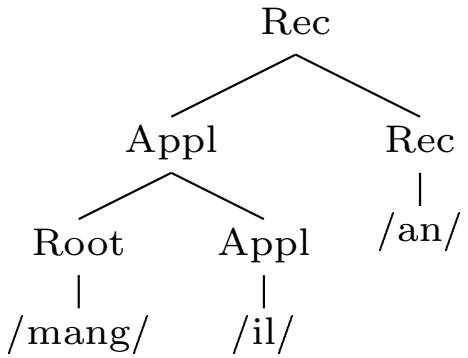
(38) **Applicative first structures**

a. APPLICATIVE *mang-il-*



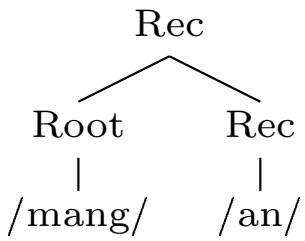
b. RECIPROCALIZED APPLICATIVE

mang-il-an-



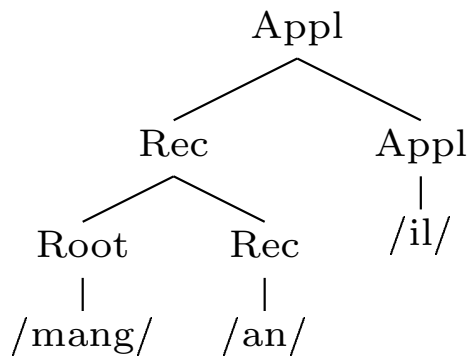
(39) **Reciprocal first structures**

a. RECIPROCAL *mang-an-*



b. APPLICATIVIZED RECIPROCAL

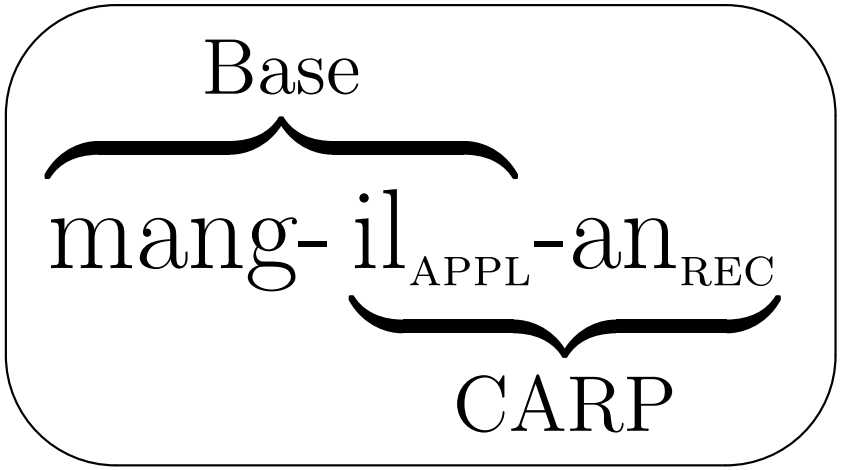
**mang-an-il-* → *mang-an-il-an-*



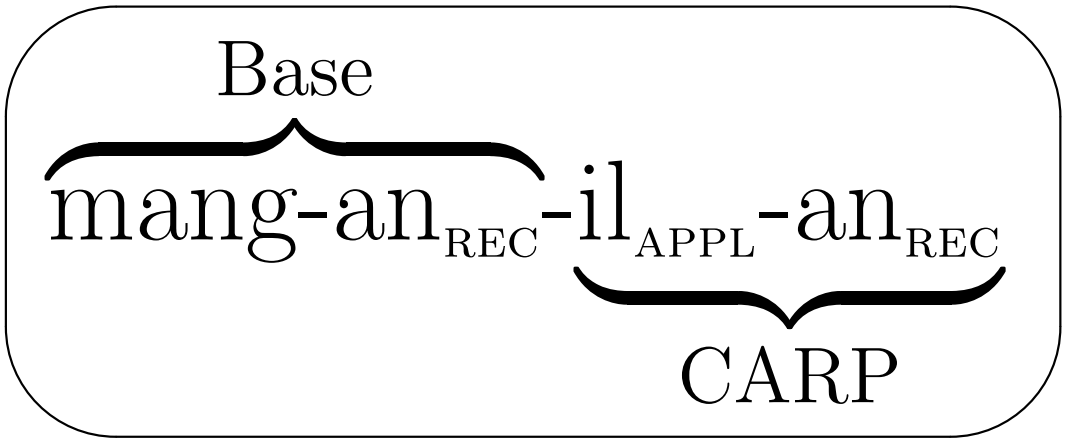
Suffix Doubling in Chichewa

Have your CARP and eat it too

(40) Reciprocalized Applicative



(41) Applicativized Reciprocal



Suffix Doubling in Chichewa

Analyzing Suffix Doubling

- Faithfulness to the base can be implemented using Base-Derivative Correspondence (Benua 1997): CONTIGUITY (McCarthy & Prince 1995).

(42) CONTIGUITY-BD: Assign one violation for each pair of segments which are adjacent in the base but not adjacent in the derivative.

- Doubling is penalized by an Input-Output constraint against splitting: INTEGRITY (McCarthy & Prince 1995).

(43) INTEGRITY-IO: Assign one violation for each segment in the input with multiple correspondents in the output.

⋆ Placing these two constraints in a variable ranking relation induces alternation between the doubling form and the simple CARP form.

Suffix Doubling in Chichewa

Variation between Suffix Doubling and CARP for the Applicativized Reciprocal

(44) **Non-CARP input:** CONTIGUITY-BD ≫ INTEGRITY-IO ⇒ *doubling*

BASE: [mang-an-] ([[Root]Rec]) [[[Root]Rec]Appl] /mang$_{ROOT}$, il$_{APPL}$, an$_{REC}$/		APPL-REC	CONTIG-BD	INTEG-IO
a. mang-il-an- [AR]			*!	
b. mang-an-il- [RA]		*!		
c. mang-il-an-il- [ARA]			*!	**
d. ☞ mang-an-il-an- [RAR]				**

(45) **Non-CARP input:** INTEGRITY-IO ≫ CONTIGUITY-BD ⇒ *CARP*

BASE: [mang-an-] ([[Root]Rec]) [[[Root]Rec]Appl] /mang$_{ROOT}$, il$_{APPL}$, an$_{REC}$/		APPL-REC	INTEG-IO	CONTIG-BD
a. ☞ mang-il-an- [AR]				*
b. mang-an-il- [RA]		*!		
c. mang-il-an-il- [ARA]			*!*	*
d. mang-an-il-an- [RAR]			*!*	

Suffix Doubling in Chichewa

No variation for the Reciprocalized Applicative

- No variation for the Reciprocalized Applicative because all the constraints prefer the same order:

(46) **CARP input:** CARP/MP output (no variation)

BASE: [mang-il-] ([[Root]Appl])				
[[[Root]Appl]Rec] /$\text{mang}_{\text{ROOT}}$, il_{APPL}, an_{REC}/		APPL-REC	CONTIG-BD	INTEG-IO
a. ☞	mang-il-an- [AR]			
b.	mang-an-il- [RA]	*!	*	
c.	mang-il-an-il- [ARA]			*!*
d.	mang-an-il-an- [RAR]		*!	*!*

Suffix Doubling in Chichewa

Local Conclusion

- This shows that we can analyze certain cases of suffix doubling using similar technology to the basic CARP cases.

- **Crucial component:** Constraints tied to morphosyntactic structure.
  - Basic cases: MAP-based alignment constraints, whose ranking dynamically alternates according to structure.
  - Doubling case: Base-Derivative faithfulness constraint, whose effect varies depending on the structure it is tied to.

⋆ **Important take-away:**
Moving away from a purely cyclic architecture to a constraint-based implementation of ordering that is dynamically tied to morphosyntactic structure provides the flexibility to handle trickier phenomena.

Roadmap

1. **Introduction**

2. **Asymmetric Compositionality**
   Interpretive asymmetries between CARP forms and non-CARP forms

3. **Suffix Doubling in Chichewa**
   Restricted suffix doubling and associated asymmetric compositionality

4. **Overapplication opacity in Nyakyusa**
   Unexpected application of phonology in CARP forms dependent on structure

5. **Conclusion**

Opacity in Nyakyusa

"Transitive" Suffix in Bantu

- There is one more verbal extension that participates in the CARP system in some Bantu languages.
- In Nyakyusa (Persohn 2017), it has the form /i̱/ ([i̱,y]).
- I'll follow Good (2005:9ff.) in referring to this as the "transitive".
  - It is usually called the (short) causative.

Opacity in Nyakyusa

Properties of the "Transitive" Suffix

- In many Bantu languages, its reflex triggers some sort of palatalization on preceding segments (e.g. Hyman 2003a).

- It also participates in templatic ordering (e.g. Good 2005):

(47) **The "CARTP" template:** CAUS-APPL-REC-**TRANS**-PASS

→ This section will look at one particular interaction of these two properties in Nyakyusa, which results in opacity.

∗ This interaction is perhaps simpler than a lot of other similar interactions in this domain in the Bantu languages (Hyman 2003a,b), but hopefully it can serve as a model for how to start analyzing those harder problems.

Opacity in Nyakyusa

Transitive in Nyakyusa

- Transitive /-i̱/ induces spirantization of most preceding consonants:

(48) Transitive forms (Hyman 2003b:269, Myler 2017:105)

Basic verb		**Transitive verb**	
[sat-]	'be in pain'	[sa**s**-i̱-]	'give pain'
[gel-]	'measure'	[ge**s**-i̱-]	'try'
[ag-]	'run out'	[a**s**-i̱-]	'make run out'
[sok-]	'go out'	[so**s**-i̱-]	'take out'
[tup-]	'become thick'	[tu**f**-i̱-]	'thicken'
[olob-]	'become rich'	[olo**f**-i̱-]	'make rich'

(49) **Spirantization** (Hyman 2003b:269, Persohn 2017:85)

a. Coronals/dorsals:
/t,l,j,k,g/ → [s] / _ i̱

b. Labials:
/p,b/ → [f] / _ i̱

Opacity in Nyakyusa

Spirantization in Nyakyusa

- Assuming [f,s] uniquely are [+strident]:

(50) ***C$_{[-\text{strident}]}$i̯:** Assign one violation for each sequence of non-strident consonant followed by a superhigh front vocoid.

(51) **Ident[±strident]-IO:** Assign one violation for each segment in the output which has a different value of the feature [±strident] than its correspondent in the input.

(52) **Generating spirantization in the basic case**

/sat, i̯$_{\text{TRANS}}$/		*C$_{[-\text{strident}]}$i̯	Ident[±strident]-IO
a.	sat-i̯	*!	
b. ☞	sas-i̯		*

Opacity in Nyakyusa

Reciprocal in Nyakyusa

- Nyakyusa has the same /-an/ Reciprocal morpheme as Chichewa.

(53) Reciprocal forms (Persohn 2017:90)

Basic verb		**Reciprocal verb**	
[sek-]	'laugh (at)'	[sek-an-]	'make fun of each other'
[tuːl-]	'help'	[tuːl-an-]	'help each other'
[tit-]	'pinch'	[tit-an-]	'pinch each other'

- Reciprocal /-an/ can co-occur with Transitive /-i̧/.

Opacity in Nyakyusa

Templatic Ordering of Reciprocal and Transitive

- Nyakyusa has fixed ordering of Reciprocal before Transitive according to CARTP, regardless of scope (54c,d).

(54) Transitive and reciprocal (Myler 2017:105, citing Hyman 2000:9)

a.	[sob-]	'get lost (intr.)'	
b.	[sof-ị̱-]	'lose' (tr.)'	(Transitive)
c.	[sob-an-ị̱-]	'get each other lost'	(Transitivized Reciprocal)
d.	[sof-an-ị̱-]	'lose each other'	(Reciprocalized Transitive)

Opacity in Nyakyusa

Opaque Spirantization

- In the Reciprocalized Transitive (54d), we observe **spirantization** of the root-final C, *even though the trigger is not adjacent.*

(54) Transitive and reciprocal (Myler 2017:105, citing Hyman 2000:9)

a.	[sob-]	'get lost (intr.)'	
b.	[sof-ị-]	'lose' (tr.)'	(Transitive)
c.	[sob-an-ị-]	'get each other lost'	(Transitivized Reciprocal)
d.	[sof-an-ị-]	'lose each other'	(Reciprocalized Transitive)

Opacity in Nyakyusa

Asymmetric Spirantization

- Yet, in the Transitivized Reciprocal (54c), there is **no spirantization** of the root-final C, as we would have otherwise expected.

(54) Transitive and reciprocal (Myler 2017:105, citing Hyman 2000:9)

a.	[sob-]	'get lost (intr.)'	
b.	[sof-ị-]	'lose' (tr.)'	(Transitive)
c.	[sob-an-ị-]	'get each other lost'	(Transitivized Reciprocal)
d.	[sof-an-ị-]	'lose each other'	(Reciprocalized Transitive)

Opacity in Nyakyusa

Asymmetric Opaque Spirantization

- Two things to explain:

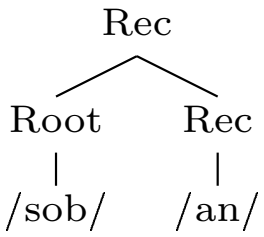
  1. Why *do* we get spirantization in the Reciprocalized Transitive?
  2. Why *don't* we get spirantization in the Transitivized Reciprocal?

Opacity in Nyakyusa

Structure and Opaque Spirantization

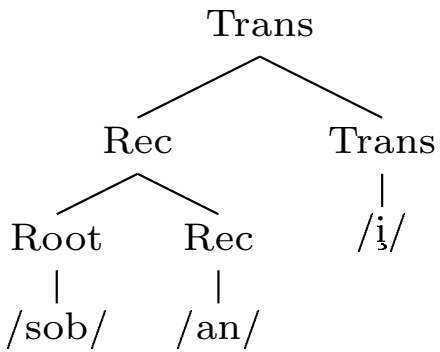
(55) **Reciprocal first structures**

a. Reciprocal *sob-an-*



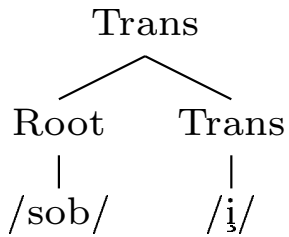
b. Transitivized Reciprocal

sob-an-ɨ-



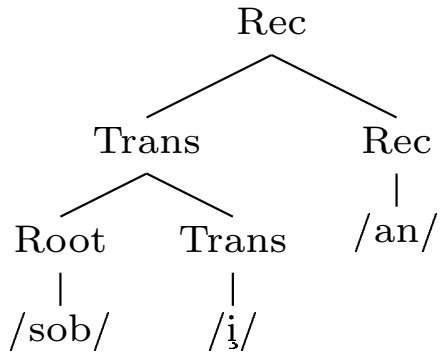
(56) **Transitive first structures**

a. Transitive *sof-ɨ-*



b. Reciprocalized Transitive

***sof-ɨ-an- → sof-an-ɨ-*



Opacity in Nyakyusa

Opaque Spirantization via BD-Correspondence

- This is cyclic overapplication, as was basically suggested by Hyman (2003b).
  ↪ Can be handled just like suffix doubling in Chichewa: BD-Correspondence.

- Overapplication of spirantization triggered by IDENT[±strident]-**BD**:

(57) **IDENT[±strident]-BD:** Assign one violation for each segment in the derivative which has a different value of the feature [±strident] than its correspondent in the base.

Opacity in Nyakyusa

Deriving Opaque Spirantization

(58) **Non-CARTP input:** opaque spirantization *sof-an-ɨ́-*

BASE: [sof-ɨ́-] ([[Root]Trans]) [[[Root]Trans]Rec] /sob$_{ROOT}$, ɨ́$_{TRANS}$, an$_{REC}$/	REC-TRANS	ID[str]-BD	*C$_{[-str]}$ɨ́	ID[str]-IO
a. sob-an-ɨ́- [RT]		*!		
b. ☞ sof-an-ɨ́- [RT]				*
c. sob-ɨ́-an- [TR]	*!	*!	*!	
d. sof-ɨ́-an- [TR]	*!			*

(59) **CARTP input:** no spirantization *sob-an-ɨ́-* (regular non-application)

BASE: [sob-an-] ([[Root]Rec]) [[[Root]Rec]Trans] /sob$_{ROOT}$, ɨ́$_{TRANS}$, an$_{REC}$/	REC-TRANS	ID[str]-BD	*C$_{[-str]}$ɨ́	ID[str]-IO
a. ☞ sob-an-ɨ́- [RT]				
b. sof-an-ɨ́- [RT]		*!		*
c. sob-ɨ́-an- [TR]	*!	*!	*!	
d. sof-ɨ́-an- [TR]	*!			*

Opacity in Nyakyusa

Local Conclusions

- BD-Correspondence generates restricted overapplication in the same way it generates restricted suffix doubling.
- This approach generates "cyclic" opacity without having to posit reordering or movement by drawing on insights of cyclic phonology/morphology without implementing a literally cyclic framework.

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Conclusion

Summary

- This talk examined three phenomena related to the CARP template:
  1. Asymmetric compositionality
  2. Suffix doubling
  3. Overapplication opacity

Conclusion

Conclusion

- In each case, indirect reference to morphosyntactic structure has played a crucial role in deriving an asymmetry.

  1. Differential ranking of alignment constraints driven by the MAP for asymmetric compositionality
  2. Different properties of bases connected by BD-faithfulness for doubling and overapplication.

⋆ Integrating templatic and non-templatic morphology requires indirect reference to morphosyntactic structure through parallel constraint interaction.

→ Morphological templates preclude cyclic concatenation without additional mechanisms.

Conclusion

Big-picture Takeaway

- Structure is crucial even in templatic morphology.
  - → The latter two cases involved fixed ordering where it is not obvious the Mirror Principle is in effect at all.

Thank you!

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