

Local cooperation between phonological elements instead of non-local grammar adjustment: An argument against Cophonology by Phase theory

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Doubly morphologically conditioned phonological alternations

Doubly morphologically conditioned phonological alternations (=DMP)

A phonological process that only applies if at least two morphological or lexical context features are present.

(1) Plural umlaut in German

- | | | | | |
|----|-----------------------------------|----------|------------|------------|
| a. | zo:n [♯] -ə [♯] | zø:̩.nə | son-PL | 'sons' |
| | ra:t [♯] -ə [♯] | ʀɛ:̩.tə | council-PL | 'councils' |
| b. | tʀo:n-ə [♯] | tʀo:̩.nə | throne-PL | 'thrones' |
| | ma:t-ə [♯] | ʀɛ:̩.tə | steward-PL | 'stewards' |

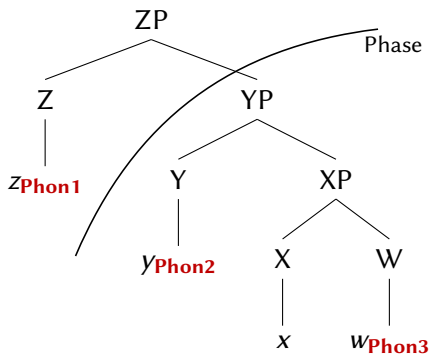
- * only a lexically arbitrary class of stems undergoes umlaut triggered by the plural suffix

DMP and Cophonology by Phase (=CbP)

(Sande and Jenks, 2018; Sande, 2019; Sande et al., 2020; Sande, 2020)

- * vocabulary entries can contain **constraint-weight readjustment** and hence change the base grammar
- * phonological evaluation applies within every **syntactic phase**

(2)



- * /y x w/ are evaluated: Phon2+3 adjust the base grammar
- DMP= multiple morphemes in a phase adjust the grammar and thus enable a process
- * e.g. German:
 - * PL-/ə/ adds weight to * [+bk]
 - * n selected by [♠] subtracts weight from IDENT-V

Cophonology by Phase: Locality prediction about DMP

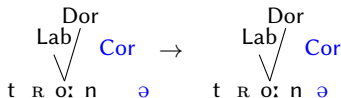
- DMP is predicted iff the two cooperating morphemes are within a phase
- blocking of DMP is predicted iff the two cooperating morphemes are not within a phase

DMP and a representational account (=Repr) (e.g. Lieber, 1987, 1992; Stonham, 1994; Saba Kirchner, 2010; Trommer, 2011; Bermúdez-Otero, 2012; Bye and Svenonius, 2012)

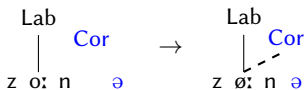
* two (or more) phonological elements cooperate to enable a process

(3) Example 1: Umlaut as a floating feature (Trommer, 2021)

a. No association: Fully specified stem-V

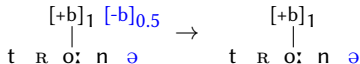


b. Association to underspecified stem-V

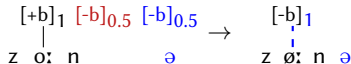


(4) Example 2: Weak floating features merge (à la Trommer, 2016; Rosen, 2016)

a. Weak floating [-bk]-feature deleted



b. Two weak features undergo fusion & surface



Representational account (=Repr): Locality prediction about DMP

- DMP is predicted if the cooperating phonological material is phonologically adjacent
- blocking of DMP is predicted if the cooperating phonological material is not phonologically adjacent

Two locality predictions and their falsifiability

Are the two DMP-morphemes

- * phonologically adjacent or not?
- * part of the same or a different phase?

	Repr	CbP
Adj ♦ SamePh	DMP	DMP
Adj ♦ DiffPh	DMP	No DMP
NoAdj ♦ SamePh	No DMP	DMP
NoAdj ♦ DiffPh	No DMP	No DMP

Main Claim

- * a representational account (Repr) that restricts the interaction between cooperating phonological elements by **phonological adjacency** makes the correct prediction about (un)attested DMP patterns
- * DMP is hence no argument for CbP (contra the claim in Sande (2020)) since the independently motivated concept of autosegmental locality is sufficient
- * CbP fails to correctly predict blocking of DMP if cooperating morphemes within a phase are phonologically non-adjacent
- * complex DMP patterns fall out in a theory adopting **gradient activation** of phonological elements

Plan

1. Introduction

2. Data: The locality of DMP

2.1 Ad♦Diff

2.2 NoAd♦Same

2.3 NoAd♦Same \rightarrow Ad♦Same

2.4 Summary of empirical arguments

3. A representational account for complex DMP: GSR

3.1 Background

3.2 A GSR account for Amuzgo

4. Conclusion

Data: The locality of DMP

Empirical evidence for phase-based locality in Sande (2020)

		Repr	CbP	Observed
Sacapultec	Adj SamePh	DMP	DMP	DMP
Guébie	Adj SamePh	DMP	DMP	DMP
	NoAdj SamePh	No DMP	DMP	DMP
Amuzgo	Adj SamePh	DMP	DMP	DMP
	NoAdj DiffPh	No DMP	No DMP	No DMP
	NoAdj SamePh	No DMP	DMP	DMP
Donno So	NoAdj SamePh	No DMP	DMP	DMP
Siouan	Adj SamePh	DMP	DMP	DMP
Amahuaca	Adj SamePh	DMP	DMP	DMP

*Excluded: Ende which involves three interacting elements/cophonologies

My arguments: Overview

(5) Underlying non-adjacency but surface adjacency

		Repr
Guébie	NoAdj SamePh Adj SamePh	No DMPDMP
Donno So	NoAdj SamePh Adj SamePh	No DMPDMP

(6) Non-adjacency on some but adjacency on other tiers

Amuzgo	NoAdj SamePh Adj SamePh	No DMPDMP
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(7) New data

German	Adj DiffPh	DMP	No DMP	DMP
Yine	NoAdj SamePh	No DMP	DMP	No DMP

Ad♦Diff

German plural umlaut (e.g. Wiese, 1996*a,b*, 2009; Féry, 1991; Trommer, 2021)

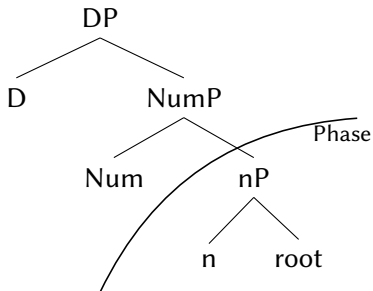
- * only a lexically arbitrary class of stems undergoes umlaut triggered by the plural suffix

(8) Plural umlaut in German

a.	zo:n [♯] -ə ^Q	zø:nə	son-PL	‘sons’
	ra:t [♯] -ə ^Q	RE:tə	council-PL	‘councils’
b.	tRO:n-ə ^Q	tRO:nə	throne-PL	‘thrones’
	ma:t-ə ^Q	RE:tə	steward-PL	‘stewards’

DMP in German plural: CbP ☹️

- (9) One possible DP-internal structure
(e.g. Ritter, 1991; Borer, 2005; Kouneli, 2020)



→ a number morpheme and a (lexical class of) noun stem(s) should never be able to cooperatively trigger a DMP

→ Adj ♦ DiffPh

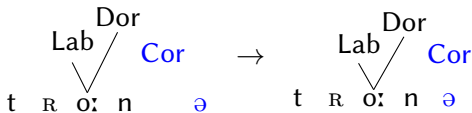
DMP in German plural: Repr ☺ (Trommer, 2021)

- * floating coronal feature triggers umlaut
- * it can only associate to adjacent vowels that are not already specified for a place feature: ^h-nouns are underspecified

(10) a. Umlaut for an underspecified ^h-noun



b. Umlaut blocked for a fully specified vowel



NoAd♦Same

Blocked DMP in Yine (Matteson, 1965; Lin, 1997; Zimmermann, 2013; Hanson, 2010)

- * an arbitrary class of suffixes causes deletion of a preceding vowel ^Q
- * only an arbitrary class of morphemes undergoes this deletion [♠]

(11) DMP in Yine

(Hanson, 2010)

a.	p-nika [♠] -ni	pnikani	2SG-eat-ANTIC	'you eat'
b.	p-kawa [♠] -pa [♠] -ni [♠] -maka ^Q	pkawapan [∅] maka	2SG-bathe-ELV-ANTIC-FRUST	'Go to bathe'
c.	p-nika [♠] -li ^Q	pnik [∅] li	2SG-eat-3SG	'you eat it (masc)'
d.	n-heta [♠] -li ^Q	net [∅] li	1SG-see-3SGM	'I see him/it'
e.	n-heta [♠] -wa-li ^Q	netawali	1SG-see-IMPV-3SGM	'I'm still looking at it'

- * if DMP on linearly adjacent morpheme is impossible (12-e), it is blocked altogether; there is **no deletion for a non-adjacent** [♠]morpheme

Blocked DMP in Yine: CbP ☹️

- * apparent solution: /-wa/ IMPFV introduces a phase boundary

n	heta ^h	wa]	li ^h
1SG	see	IMPFV		3SGM

→ ~~NoAdj~~ → DiffPh

- * another ‘suffix zone 2: External aspect’ marker /tnaka/ REITERATIVE

(12) Another aspect marker participates in DMP (Hanson, 2010, 248)

n	hinka	na	tnaka ^h]	X	li ^h
1SG	shoot	CMPV	REIT			3SGM

ninkanatnakøli

- * /-tnaka/^h happily undergoes vowel deletion: there **can't be a phase boundary** between aspect+object marker: NoAdj → SamePh

→ CbP has no explanation why non-local DMP is blocked

Blocked DMP in Yine: Repr ☺

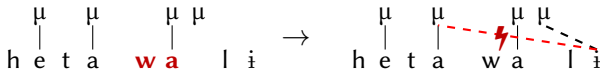
* whatever triggers deletion*, cannot cross the intervening vowel

*For illustration: Mora-less vowel usurping a mora;
following Zimmermann (2013)

(13) a. Vowel deletion under adjacency



b. Vowel deletion blocked by intervening vowel



→ NoAdj ↕ SamePh and blocking of DMP

Blocked DMP in German: CbP ☹ & Repr ☺

* /ə/-final nouns systematically block umlaut

(14) DMP blocked for /ə/-final nouns

$p^h a:t\overset{[a]}{\underset{[a]}{\text{ə}}}-\overset{[a]}{\underset{[a]}{\text{ə}}}$	$p^h a:t\text{ən}$	godfather-PL	‘godfathers’
$b\text{ɔ:t}\overset{[a]}{\underset{[a]}{\text{ə}}}-\overset{[a]}{\underset{[a]}{\text{ə}}}$	$b\text{ɔ:t}\text{ən}$	messenger-PL	‘messengers’

CbP If we revise the previous assumption and take it for granted that noun root/n and number features are in the same phase:

- ✿ we correctly predict DMP in the plural
- ✿ there is no explanation why non-local DMP is blocked (except assuming that all ə-final nouns are coincidentally don't have the $\overset{[a]}{\underset{[a]}{\text{ə}}}$ -cophonology)

Repr a vowel blocks linking of a floating COR-feature (Trommer, 2021)

→ NoAdj SamePh and blocking of DMP

NoAd♦Same → Ad♦Same

*‘The crucial challenge for a purely item-based approach is how to account for the locality domains of the cross-linguistic patterns discussed in §3, specifically (i) why should intervening phase boundaries block double conditioning?, and (ii) how should we account for **long-distance double conditioning** across multiple words and morphemes?’ (Sande, 2020, 487, emphasis mine)*

DMP in Donno So (McPherson, 2014; Heath, 2015; Sande, 2020)

* the definite and numeral don't trigger tonal overwriting

* but their **combination** does [N (Adj) Num (Adj)]^{LH} (15-c+d)

- (15) DMP tonal overwriting in Donno So (Sande, 2020, 238-239)
- | | | | |
|----|--|--|--------------------|
| a. | i ^H du ^L =gɔ ^H | dog=DEF ^α | 'the dog' |
| b. | i ^H du ^L ta ^L :ndu ^H | dog 3 ^α | '3 dogs' |
| c. | i ^L du ^L ta: ^L ndɔ ^H =ɔ ^H | dog 3 ^α =DEF ^α | '3 dogs' |
| d. | i ^L du ^L pi ^L lu ^L ta: ^L ndɔ ^H =ɔ ^H | dog white 3 ^α =DEF ^α | 'the 3 white dogs' |

DMP in Donno So: CbP ☺ & Repr ☺

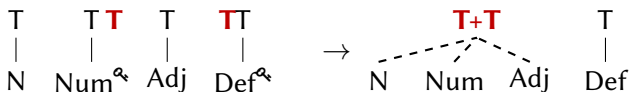
CbP ‘non-linearly adjacent triggers like Num and Def’ can co-trigger a DMP within the D-phase



Repr but the cooperating phonological material is indeed adjacent since it **overwrites all intervening material**



(16) Overwriting creates surface adjacency



DMP in Guébie (Sande, 2017, 2019, 2020)

- * some suffixes trigger full V-Harmony that only some stems undergo

(17) DMP in Guébie: Full V-Harmony (Sande, 2020, 466+467)

- a. bala^{3.3[♠]} =ɔ^{2.32[♠]} bɔlɔ^{2.32} ‘hit him’
 b. bala^{3.3[♠]} =e³ bale^{3.3} ‘hit me’
 c. sijo^{2.3} =ɔ^{2.32[♠]} sijɔ^{2.32} ‘wipe’

- * DMP (for some speakers) if [♠] and [♠] are separated by another suffix

(18)

e jɔl[♠]-ɔ=ɔ^{3.2.2[♠]}
 1SG.NOM ask-CAUS=3SG.ACC ‘ask’[♠] CAUS 3SG.ACC[♠]
 ‘I ask him’ (Sande, 2020, 467)

- cf. Donno So: Spreading & deletion of all intervening material ensures that the cooperating phonological material is **adjacent on the surface**

→ Adj ♦ SamePh

DMP in Amuzgu (Kim, 2016, 2018; Kim and Sande, 2020; Palancar, 2021)

Caution: Only a tiny fraction of the pattern (Kim, 2016; Palancar, 2021)

- * 1/2Ps are marked by tonal overwriting patterns which are specific to stem classes: DMP
- * 3Ps shows underlying stem tones

(19) Tonal overwriting in 1/2Ps in Amuzgu (Kim and Sande, 2020, 95)

	‘chew’.CPL	‘see’.CPL	‘arrive’.CPL
1SG	hndɛ ^L	hnd ^{i?} ia ^{HM}	t ⁱ hɛ ^L
2SG	hndɛɪ ^{HM}	hnd ^{i:} iaɪ ^L	t ⁱ hɛɪ ^L
3SG	hndɛ ^{MH}	hnd ^{i:} iaɪ ^{MH}	t ⁱ hɛɪ ^{MH}

Blocked DMP in Amuzgu

- * if a causative prefix is added, the tonal overwriting of 1/2Ps is blocked
- * in, for example, an incompletive prefix is added, the 1/2Ps tones still surface

(20) 1/2Ps tones blocked in the causative (Kim and Sande, 2020, 95)

	a. Underlying M: Ul tone		b. Underlying H: HM	
	‘run’.CPL	‘cause to run’.CPL	‘sleep’.CPL	‘cause to sleep’.CPL
1SG	hna ^M -nō ^{HM}	si ^H -na ^M -nō ^M	tsɔ ^L	si ^H -ki ^H -tsɔ ^{HM}
2SG	hna ^M -nōɪ ^{L+}	si ^H -na ^M -nōɪ ^M	tsuɪ ^{HM}	si ^H -ki ^H -tsoɪ ^{HM}
3SG	hna ^M -nō ^M	si ^H -na ^M -nō ^M	tso ^H	si ^H -ki ^H -tso ^H

Blocked DMP in Amuzgo: CbP ☺

* the causative introduces a phase boundary*; the incompleteive does not

(21) a. Blocked DMP

[**person features**^α (_{Ph} [Voice_{Caus} [**v**^α [verb root]]]]]

→ NoAdj ↕ DiffPh

b. DMP

[**person features**^α [Asp_{Incompl} [**v**^α [verb root]]]]

→ NoAdj ↕ SamePh

(*It doesn't in Guébie, cf. (18))

A problem for this CbP account

- * the causative has **person-specific** (non)effects on stems
 - ✿ stems with M, L+, HM, HL: underlying tones
 - ✿ stems with H, MH, H+: **HM in 1/2Ps**

(22) Tonal overwriting in 1/2Ps blocked in the causative

	a. Underlying M: Ul tone		b. Underlying H: HM	
	‘run’.CPL	‘cause to run’.CPL	‘sleep’.CPL	‘cause to sleep’.CPL
1SG	$hna^M-n\tilde{o}^{HM}$	$si^H-na^M-n\tilde{o}^M$	$ts\tilde{o}^L$	$si^H-ki^H-tso^{HM}$
2SG	$hna^M-n\tilde{o}^{\uparrow L+}$	$si^H-na^M-n\tilde{o}^{\uparrow M}$	$tsu^{\uparrow HM}$	$si^H-ki^H-tso^{\uparrow HM}$
3SG	$hna^M-n\tilde{o}^M$	$si^H-na^M-n\tilde{o}^M$	tso^H	$si^H-ki^H-tso^H$

→ Person features have to be visible within the causative phase

Blocked DMP in Amuzgo: Repr

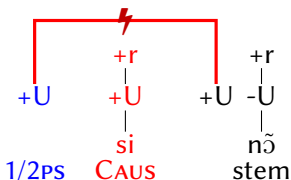
- * a **phonological blocking** effect:
 - ❖ the morphemes realizing 1/2Ps are floating tones prefixed in the outermost position
 - ❖ they are too weak to be realized on their own; they need to **fuse with another tone** to gain enough activity
 - ❖ CAUS prefix-V is associated to a fully specified tone that blocks interaction
 - ❖ INCOMPL contain underspecified tones* that allow interaction

*Tonal underspecification

- * sub-tonal features; e.g. [\pm Upper], [\pm raised]
(e.g. Yip, 1980, 1989; Pulleyblank, 1986; Snider, 1990, 1999; Hyman, 1992; Bao, 1999)
- strong evidence in the causative for natural classes formed by these since the causative affects the ‘upper’ and ‘lower’ tones differently

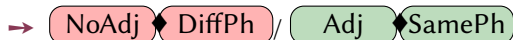
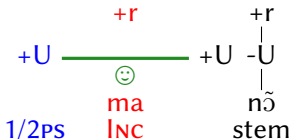
Blocked DMP in Amuzgo: Repr ☺

(23) Blocked DMP: Fully specified CAUS*




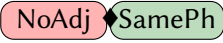
*Excluded: the CAUS has a floating tone of itself to trigger tonal changes on (some) stems

(24) DMP possible: Underspecified prefix



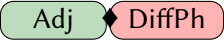


Summary of empirical arguments: In favor of Repr

* A problem for CbP:

- * German1: DMP that can be interpreted as 
- * Yine & German2: There is blocking of DMP in 

* No problem for Repr:

- * Donno So & Guébie: Apparent non-adjacent DMP patterns in fact involve **phonological surface adjacency**: 
- * Amuzgo: Apparent non-adjacent DMP pattern can be analysed as **adjacency on the relevant tier**: 
- * there is no instance of blocked DMP in 

A representational account for complex DMP: GSR

Cooperation and Gradient Symbolic Representations (=GSR)

(Smolensky and Goldrick, 2016; Rosen, 2016, 2018; Zimmermann, 2018*a,b*, 2019, 2021, 2020; Faust and Smolensky, 2017; Jang, 2019; Walker, 2019)

- * all linguistic symbols have **activity** that can **gradiently** differ
- * gradient activity results in gradient constraint violations
- * elements can be ‘too weak’ to surface on their own and **fusion** with another element is an option to **gain enough activity** to surface

(25) Deletion of a weak C

$b_{0.5}a_1$	DEP 20	MAX 10	UNIF 5	
a. b_1a_1	-0.5			-10
☞ b. a_1		-0.5		-5

(26) Strengthening via fusion

$b_{0.5}^a - b_{0.5}^b a_1$	DEP 20	MAX 10	UNIF 5	
☞ a. $b_1^a b_1^b a_1$			-1	-5
b. a_1		-1		-20

Cooperation in GSR: Japanese Rendaku (Rosen, 2016)

- * nouns in Japanese have different inclinations to trigger and undergo rendaku voicing in compounds
- **partially activated [+voice]** features at the edges of morphemes
- voicing only surfaces if fusion of adjacent [+voice] features results in an activation that crosses a certain threshold

- (27) GSR account of rendaku voicing (Rosen, 2016, 239+240)
- | | | | |
|----|--------------------------------|------------------------------|----------------|
| a. | kuma [+voice] _{0.4} | [+voice] _{0.225} te | kumade |
| | ‘bear’ | ‘hand’ | ‘rake’ |
| b. | yama [+voice] _{0.225} | [+voice] _{0.225} te | yamate |
| | ‘mountain’ | ‘hand’ | ‘mountainside’ |

Part(!) of Amuzgo DMP: Most frequent classes in Palancar (2021)

(28)

ul stem T:

1sg	2sg	3sg	class	N ⁰
HM	HM	H	77	85
HM	HM	HM	92	25
HM	HM	MH	80, 12	52+15
M	M	M	58	43
M	HM	M	54	18
HM	M	M	52	14
HM	HM	M+	79, 72	38+10
M	HM	M+	49	12
L+	L	L	85	37
HL	L	L	23	12
L+	M	L	81	12
HM	M	L	40	11
L+	HM	L+	62	17
L+	L+	L+	90	15

GSR account in a nutshell

(29) Underlying representation for 1sg and 2sg: (Weak) Floating tones

a. 1SG \leftrightarrow $L_{0.8}$ $H_{0.4}$ - - $M_{0.8}$

b. 2SG \leftrightarrow $H_{0.6}$ - - M_1

* the weak tones are not realized on their own; they are ‘too weak’ and must **gain additional activity by fusion** with another floating tone

* stems

❖ have floating tones (of different strength) that can undergo fusion with floating 1/2Ps tones

❖ have underlying tones of different strength that are immune to overwriting to different degrees

GSR account: Underlying representations

$L_{0.8}H_{0.4}M_{0.8}$ 1sg	$H_{0.6}M_1$ 2sg	3sg
HM	HM	H $H_1 M_{0.2}$
HM	HM	HM $H_1 M_1$
HM	HM	MH $H_{0.6} M_1 H_1 M_{0.2}$
M	M	M M_1
M	HM	M $H_{0.4} M_1$
HM	M	M M_1
HM	HM	M+ $H_{0.6} M_1 M_1$
M	HM	M+ $H_{0.4} M_1 M_1 M_{0.2}$
L+	L	L $L_{0.2} L_1$
HL	L	L L_1
L+	M	L $L_{0.2} L_{0.5}$
HM	M	L $L_{0.5}$
L+	HM	L+ $H_{0.4} L_{0.5} L_{0.5}$
L+	L+	L+ $L_1 L_1$

$M_{0.2}$ is needed to strengthen the 1Ps-M

$H_{0.4}$ allows realization of 2Ps-H but not yet of 1Ps-H

stem- L_1 is never overwritten by M_1 but $L_{0.5}$ is

→ predicts 39 of 42 contexts

*Abbreviation for sub-tonal $[\pm U]$ and $[\pm r]$.

Footnote: A CbP account for Amuzgo

- * apparently needs to rely on constraints like (30) to predict overwriting with so many different tonal melodies

- (30)
- a. HAVEHM!
 - b. HAVEMH!
 - c. HAVEM!
 - d. HAVEL!
 - e. HAVEL+! ..

→ general, language-independent constraints?

Conclusion

- * All instances of DMP can be analysed under **phonological locality** in a GSR account.
- * DMP patterns provide no argument for phase-based locality; adding to the repeated criticism raised against phase-based locality in phonology in general (e.g. Bonet et al., 2019).

Is CbP really unable to predict blocked DMP in NoAdj SamePh ?

- * maybe not: One might be able to give a phonological explanation (along the lines given here) for blocking within CbP
 (phonology already restricts the scope of DMP in, for example, the CbP account of Donno So in Sande (2020) where tone spreading within the phase needs to be restricted by prosodic domains)
- but we then have a **powerful super-set theory** where we first make domains excessively large (=the phase) to then make them smaller again (=phonology) where **the latter independently motivated mechanism is sufficient on its own** as long as there are no
 - * DMP patterns in NoAdj SamePh that cannot be explained via surface adjacency, or
 - * blocked DMP patterns in Adj DiffPh that cannot receive a phonological explanation

References

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