Anti-cyclic mutation in Stratal Containment

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Two dimensions of cyclicity

- Degree of accessibility:
  - Material from previous cycles is not accessible in any way ($\sim$ Spell-out)
  - Phonological material from previous cycles is accessible but its morphological provenience is not visible (Bracket Erasure, Morpheme Merger)
- Degree of preservation:
  - Non-integrated material is erased (Stray Erasure, Phonetization)
  - All phonological structure is preserved across cycles

Pesetsky (1979; 1985), Shaw (1980), Mohanan (1982), Kiparsky (1982; 2000), Pulleyblank (1986), Clark (1990), Jones (2014), Bermúdez-Otero (2011; 2012; 2014), Steriade (2012), Trommer (2011), Trommer and Zimmermann (2016)

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- **Goal of this presentation:**
  - **Present an argument for full preservation**

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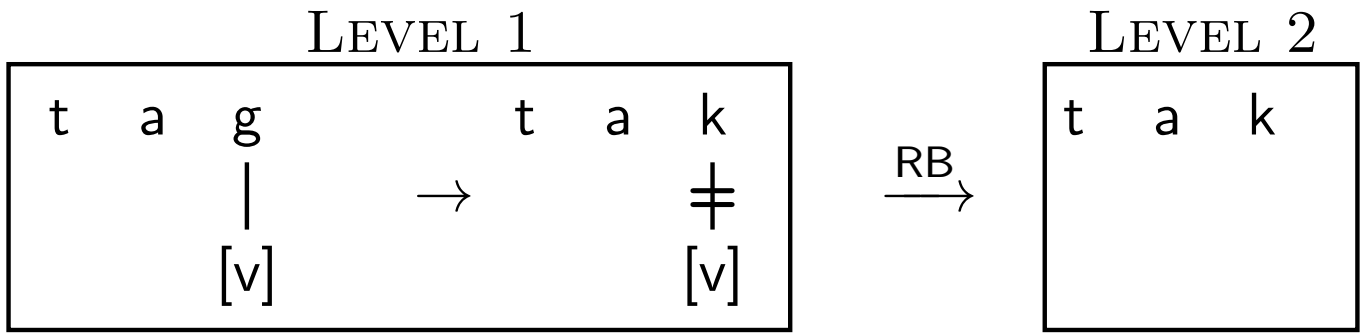
Extended Stratal Containment

- Extended Stratal Containment (= ESC, Trommer 2011)
- Optimality Theory: Phonological structures are evaluated by ranked and violable constraints
- Strata: Grammar is organized into a (semi-fixed?) number of strata, from morpheme to phrase
- Containment: GEN cannot delete phonological material, it can only manipulate association lines
  - $|$ = visible underlying, $\nmid$ = visible epenthetic, $\nparallel$ = invisible
- Colors: Morphological provenience is only visible to the phonology on a same/different basis

Prince and Smolensky (1993/2004), Kiparsky (2000), van Oostendorp (2006), Trommer (2011), Bermúdez-Otero (2012)

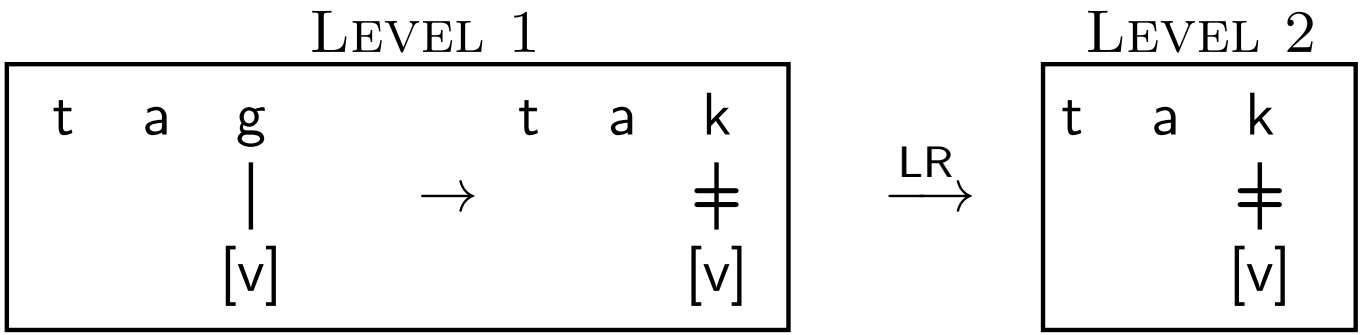
How much post-stratal clean-up is necessary?

- Trommer's ESC
  - Rebirthing (RB)
    At the end of each stratum:
    a. Replace the output *O* of the stratum by its P-structure (Phonetization)
    b. Assign the same unique color to all nodes and association lines of *O* (Morpheme Merger)



How much post-stratal clean-up is necessary?

- A more permissive version of ESC
  - Limited Rebirthing (LR)
    At the end of each stratum:
    a. ~~Replace the output *O* of the stratum by its P-structure (Phonetization)~~
    b. Assign the same unique color to all nodes and association lines of *O* (Morpheme Merger)



Empirical testing ground: Unexpected mutations in reduplicants

- In morphology-heavy theories, unexpected phonological behavior in reduplicants can be attributed to
  - Faithfulness to base / Non-faithfulness to input (BRCT, . . .)
  - Construction-specific co-phonologies (MDT, . . .)

Claim

What looks like reduplicant-specific processes actually follows from a modular and stratal organization of grammar with LR

McCarthy and Prince (1995), Gafos (1998), Alderete et al. (1999), Mc Laughlin (2000), Burkhardt (2001), Urbanczyk (2006), Gouskova (2007), Alderete and MacMillan (2015); Inkelas and Zoll (2005), Caballero (2006), Peterson and Maas (2009), Downing and Inkelas (2015)

Theoretical Assumptions

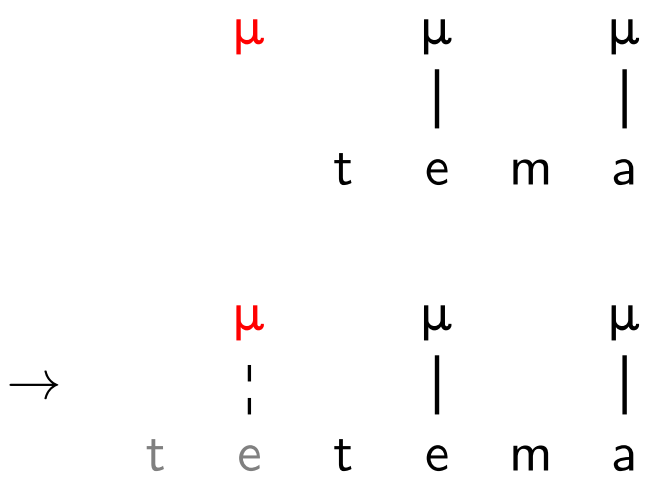
Generalized Non-Linear Affixation

- Generalized Non-Linear Affixation (GNLA): All mutation and non-concatenative morphology is the result of affixation
- Segmental mutation is the result of subsegmental (featural) affixes

Lieber (1992), Akinlabi (1996), Zoll, 1996, Bermúdez-Otero (2012), Trommer and Zimmermann (2014)

Minimal Reduplication

- Copying as a repair strategy for defective prosodic material
- Copied material has its own copy color
  which is different from the base color
  and the trigger color



Saba Kirchner (2010; 2013), Zimmermann (2017a,b)

Constraints

- Int(egrity): Assign one * for every node of the copy color
- Alt(ernation) Assign one * for every ¦ linking two nodes of the same color
- α ↑ β Assign one * for every node β that is not linked to a node α
- Dep α | β Assign one * for every inserted line between a node α and a node β
- Max α | β Assign one * for every deleted line between a node α and a node β
- *Mix Assign one * for every node N_1 that is linked to some node N_2 via an underlying line and to some node N_3 via an epenthetic line

The case of Seereer-Siin

The problem

- Bases with an initial voiced obstruent in Seereer-Siin (North Atlantic) lose their [+v] when they undergo reduplication

BASE	AGENT NOUN	
bind	o-**p**iː-**b**ind	'write / writer'
dap	o-**t**aː-**d**ap	'launder / launderer'
gaʔ	o-**k**aː-**g**aʔ	'see / seer'
ɟik	o-**c**iː-**ɟ**ik	'buy / buyer'

Fal (1980), Mc Laughlin (1994; 2000; 2005), Heath (2014)

Phonology

- Vowels: /i, iː, e, eː, a, aː, o, oː, u, uː/
- Consonants:

p b	t d	c ɟ	k g	q	ʔ
ɓ̥ ɓ	ɗ̥ ɗ	ʄ̥ ʄ			
mb	nd	ɲɟ	ŋg	NG	
f	s		x		
m	n	ɲ	ŋ		
w	r l	j			

- Final stress, no tones

Fal (1980), Mc Laughlin (1994; 2000; 2005), Heath (2014)

Nominal morphology

CLASS	PREFIX	GRADE	
1	o-	b	HUMAN SINGULAR
2		a	HUMAN PLURAL
3a	a-	a	SINGULAR
3b	a-	c	AUGMENTATIVE SINGULAR
4	a-	b	PLURAL
5		a	SINGULAR
6		c	SINGULAR
7		a	SINGULAR
8	fo-	a	PLURAL
9		b	PLURAL
10	o-	a	SINGULAR
11	xa-	b	PLURAL
12	o-	c	DIMINUTIVE SINGULAR
13	fo-	c	DIMINUTIVE PLURAL
14	fa-	c	SINGULAR
15	pa-	b	PLURAL

Mc Laughlin (2000, p. 361)

Nominal morphology

- Paradigm for /roːn/ ‘milk bowl’:

CLASS	GRADE	WORD	
10	**a**	o- **r**oːn	SINGULAR
11	**b**	xa-**t**oːn	PLURAL
12	**c**	o- **nd**oːn	DIM. SINGULAR
13	**c**	fo-**nd**oːn	DIM. PLURAL
3a	**c**	a- **nd**oːn	AUGM. SINGULAR

Mc Laughlin (1994, p. 283)

ICM

- The three grades of Initial Consonant Mutations (ICM):
  - **a** = voicing mutation
  - **b** = continuancy mutation
  - **c** = nasal mutation

	/p	ɓ̥	w	f	t	ɗ̥	r	s	c	ʄ̥	k	x/
a	b	ɓ	w	f	d	ɗ	r	s	ɟ	ʄ	g	x
b	p	ɓ̥	b	p	t	ɗ̥	t	c	c	ʄ̥	k	q
c	mb	ɓ̥	mb	mb	nd	ɗ̥	nd	ɲɟ	ɲɟ	ʄ̥	ŋg	ɴG

Mc Laughlin (2000)

Agent nouns

- Agent nouns are formed by prefixing a CVː-sized copy of the initial stem syllable and a class 1 prefix
- Bases with an initial voiced obstruent lose their [v] when they undergo reduplication

BASE	AGENT NOUN	
bind	o-**p**iː-**b**ind	‘write / writer’
dap	o-**t**aː-**d**ap	‘launder / launderer’
gaʔ	o-**k**aː-**g**aʔ	‘see / seer’
ɟik	o-**c**iː-**ɟ**ik	‘buy / buyer’

Mc Laughlin (2000, p. 334)

Analysis

Mutation triggers

- The three grades of Initial Consonant Mutations (ICM):
  - **a** = voicing mutation
  - **b** = continuancy mutation
  - **c** = nasal mutation

	/p	ɓ	w	f	t	ɗ	r	s	c	ʄ	k	x/
a	b	ɓ	w	f	d	ɗ	r	s	ɟ	ʄ	g	x
b	p	ɓ	b	p	t	ɗ	t	c	c	ʄ	k	q
c	mb	ɓ	mb	mb	nd	ɗ	nd	ɲɟ	ɲɟ	ʄ	ŋg	NG

- Mutation grades are the result of floating features
  - **a** = voicing mutation = floating **[v]**
  - **b** = continuancy mutation = floating **[-c]**
  - **c** = nasal mutation = floating **[n]**

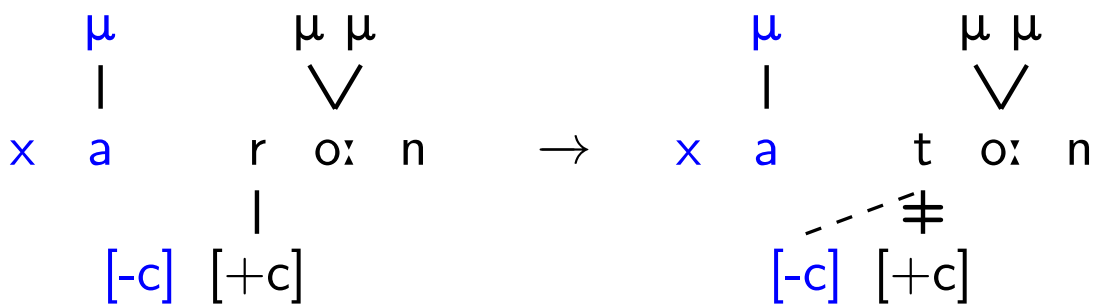
Mc Laughlin (2000)

Mutation triggers

- ICM is triggered by floating features

GRADE	FEATURE	/roːn/	'milk bowl'
a	**[v]**	**o**$_{[v]}$**-r**oːn	'milk bowl'
b	**[-c]**	**xa**$_{[-c]}$**-t**oːn	'milk bowls'
c	**[n]**	**o**$_{[n]}$**-nd**oːn	'small milk bowl'

- Continuancy mutation (b-grade):



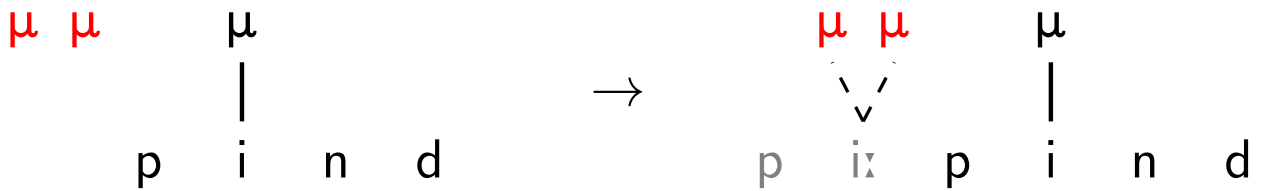
Mc Laughlin (2000)

Morphology of agent nouns

- The agentive morpheme:

$$[\text{AGEN}] \quad \leftrightarrow \quad \mu\ \mu$$

- The two defective μ trigger CVː-sized copying



Morphology of agent nouns

- Two mutation grades in infinite and finite verb forms
- Voicing in the infinitive is due to a-grade mutation, not an underlying [v] !

Infinitive A-grade	Singular A-grade	Plural C-grade	
bug	bugu	mbugu	‘want, like’
ɓaf	ɓafa	ɓ̥afa	‘pour out waste water’
waːɗ	waːɗa	mbaːɗa	‘look for’
duʔ	duʔa	nduʔa	‘stutter’
ɗeg	ɗega	ɗ̥ega	‘cut’
ref	arefu	andefu	‘be’
ɟir	ɟir	ɲɟir	‘be ill’
gen	agenu	aŋgenu	‘live’
xoːx	axoːxu	aɴgoːxu	‘cultivate, farm’

Mc Laughlin (2000, p. 338)

Morphology of agent nouns

- AN's are built from the infinitive stem, not the bare root
- The infinitive stem consists of the verbal root and a-grade (voicing) mutation
- The complete structure of agent nouns:

[WORD [STEM]]]

[CL.1 [AGEN [INF $\sqrt{v}$]]]

o [-c] + μ μ + [v] + **pind**

Derivation of agent nouns

- If the floating [v] from the infinitive morpheme induced voicing at the stem level, word-level reduplication would be expected to create a copy of the voiced stop

	Stem	Word
Input	[v] + pind	o [-c] + μ μ + bind
Output	bind	obi:bind ↯

Derivation of agent nouns

- Instead, the [v] stays floating on the level where it is introduced . . .
- . . . and links to a C root node only at some later point, when reduplication has already taken place

	Stem	Word	Phrase
Input	[v] + pind	o [-c] + μ μ + [v] pind	opiː [v] pind
Output	[v] pind	opiː [v] pind	opiːbind

- Crucial assumption: Floating material is not copied along segmental material (cf. cases of underapplication in Lakota and Kulina)

Shaw (1980), Dienst (2014)

The issue of directionality

- Problem: How to ensure the floating [v] ends up at the desired root C •?
  - Root material cannot be favored over affix material on the phrase level due to MORPHEME MERGER
  - Base material cannot be favored over reduplicant material because there is no RED morpheme
- Solution: [v] is not a prefix, it is an infix
  - Pivotal position: right side of first root C
- [v] links to an onset C because voiced coda C's are dispreferred
  - MAX ≫ NOVCDCODA ≫ [v] → C
  - Skipping is banned (NOSKIP)

Yu (2007); Itō and Mester (1998), Lombardi (1999), Kager (2004), Broselow (2004)

Derivation of agent nouns: Stem level

- Infinitive stem: [INF [$\sqrt{v}$]]

Input = a.	DEP | [v] •	↑ [v] •
☞ a. μ | p i nd | [v] [v]		*
b. μ | b i nd | [v] [v]	*!	

Derivation of agent nouns: Word level

- Agent noun word: [CL.1 [AGEN [INF.-STEM]]]

Input = a.	*Mix	Dep S	Dep •|[v]	μ↓•	•↑[v]
a. o p i nd (μ μ μ; [v] [v])				*!*	*
☞ b. o p iː p i nd (μ μ μ; [v] [v])					*
c. o p iː b i nd (μ μ μ; [v] [v])			*!		

Derivation of agent nouns: Phrase level

- Agent noun word: [CL.1-AGENT-NOUN]

Input = a.	MAX | [v]	↑ [v]	NO SKIP	NOVCD CODA	DEP | [v]	ALT
a. o p iː p i nd [v] [v]		*!		*		
☞ b. o p iː b i nd [v] [v]				*	*	*
c. o b iː p i nd [v] [v]			*!	*	*	*
d. o p iː p i nd [v] [v]	*!			*	*	*

Derivation of agent nouns: Phrase level

- Effect of NoVcdCoda

Input = a.	Max [v]	↑ [v]	No Skip	NoVcd Coda	Dep [v]	Alt
a. o t aː t a p, [v]		*!				
☞ b. o t aː d a p, [v]					*	*
c. o t aː t a b, [v]				*!	*	*

Further evidence I

- The plural of agent nouns involves class 2 morphology, i.e. voicing (a-grade) mutation
- Devoicing is only observed in class 1 but not in class 2
- This is because there are two floating [v] features, one introduced at the stem and the other at the word level

BASE	AGENT NOUN SG	AGENT NOUN PL	
bind	o-**p**iː-**b**ind	**b**iː-**b**ind	'write / writer(s)'
dap	o-**t**aː-**d**ap	**d**aː-**d**ap	'launder / launderer(s)'
gaʔ	o-**k**aː-**g**aʔ	**g**aː-**g**aʔ	'see / seer(s)'
ɟik	o-**c**iː-**ɟ**ik	**ɟ**iː-**ɟ**ik	'buy / buyer(s)'

Mc Laughlin (2000, p. 359)

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- This is because there are two floating [v] features, one introduced at the stem level and the other at the word level

	Stem	Word	Phrase
Input	[v] + pind	[v] + μ μ + [v] pind	[v] piː [v] pind
Output	[v] pind	[v] piː [v] pind	biːbind

Further evidence II

- How do we know *bind*, *opiːbind*, and *biːbind* derive from /pind/ and not from a form with an underlying voiced C?
- Nasal (c-grade) mutation: [n] realized except with implosives

	/p	ɓ̥	w	f	t	ɗ̥	r	s	c	ʄ̥	k	x/
c	mb	ɓ̥	mb	mb	nd	ɗ̥	nd	ɲɟ	ɲɟ	ʄ̥	ŋg	NG

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	/p	ɓ̥	w	f	t	ɗ̥	r	s	c	ʄ̥	k	x/
c	mb	ɓ̥	mb	mb	nd	ɗ̥	nd	ɲɟ	ɲɟ	ʄ̥	ŋg	NG

- Verbs that have a voiced C in the infinitive are always voiceless underlyingly:

Infinitive A-grade	Singular A-grade	Plural C-grade	
bug	bugu	mbugu	‘want, like’
duʔ	duʔa	nduʔa	‘stutter’
ɓaf	ɓafa	ɓ̥afa	‘pour out waste water’
ɗeg	ɗega	ɗ̥ega	‘cut’

Mc Laughlin (2000, p. 338)

Discussion

Problems with abandoning Stray Erasure

- Stray Erasure one of the main insights of early LP analyses of tone
  - Post-lexical L deletion in Bari
  - Cyclic free feature deletion in Igbo
- However, there is also some evidence to the contrary
  - Post-lexical L metathesis in Tiv
  - Deletion of floating M vs. retention of floating H (in some contexts) in Yongning Na
- Limited Rebirthing might be too strong as a universal principle
- Languages may differ with respect to interface operations
- Potential advantage of Correspondence over Containment Theory: Every stratum can have a grammar that either allows floating output material or enforces deletion thereof

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Yokwe (1987); Clark (1990); Pulleyblank (1986); Michaud (2017)

Saving LR: A tier- and/or level-specific parameter

- Fundamental division: Tone vs. Segments?
  - Segmental features much less amenable to deletion
  - ATWD subsegment preservation in French Liaison
  - Late integration of PHAR in Fox Meskwaki
- Fundamental division: Stem vs. Word vs. Post-lexical?
  - Individual strata have been argued to have certain innate unique properties
  - LP acknowledges different cyclic properties between different levels
  - The "stem-level syndrome": Cyclic reapplication requires nonanalytic listing, which does not go beyond the stem level
  - Interface operations between the word and phrase level can be dramatic (e.g. tonal readjustments in Kinande)

Bermúdez-Otero (2013; 2018), Jones (2014)

ESC and opacity

- (Monostratal) Containment can only deal with certain types of opacity
- ESC and ESC with Limited Rebirthing extend the space of opaque patterns that can be accounted for
- ESC makes the prediction that over- and under-application in reduplication are essentially different in nature as they have two distinct sets of potential sources:
  - Overapplication may be the consequence of excitatory sequential interaction (feeding)
  - Underapplication must be the result of something else, e.g. non-copying of triggering features
- This is in stark contrast to the standard treatment of reduplicative opacity in BRCT, which directly follows from faithfulness

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Zimmermann and Trommer (2016); McCarthy and Prince (1995)

References I

Akinlabi, Akinbiyi (1996). "Featural Affixation". In: *Journal of Linguistics* 32, pp. 239–289.
Alderete, John and Kayleigh MacMillan (2015). "Reduplication in Hawaiian. variations on a theme of minimal word". In: *Natural Language and Linguistic Theory* 33, pp. 1–45.
Alderete, John et al. (1999). "Reduplication with Fixed Segmentism". In: *Linguistic Inquiry* 30.3, pp. 327–364.
Bermúdez-Otero, Ricardo (2011). "Cyclicity". In: *The Blackwell companion to phonology, vol. 4*. Ed. by Marc van Oostendorp et al. Vol. IV. Blackwell companions to linguistics series. Oxford: Wiley-Blackwell, pp. 2019–2048.
— (2012). "The architecture of grammar and the division of labour in exponence". In: *The morphology and phonology of exponence*. Ed. by Jochen Trommer. Oxford: University Press, pp. 8–83.
— (2013). "The stem-level syndrome". Paper presented at the Speaker Series of the University of Pennsylvania Linguistics Department, Philadelphia, 11-April-2013.
— (2014). "French adjectival liaison. Evidence for underlying representations". Talk given at Leipzig University, 04-Jun-2014.
— (2018). "Stratal phonology". In: *The Routledge handbook of phonological theory*. Abingdon: Routledge.
Broselow, Ellen (2004). "Unmarked structures and emergent rankings in second language phonology". In: *International Journal of Bilingualism* 8.1, pp. 51–65.
Burkhardt, Petra (2001). "Multiple faithfulness relations in Fox (Central Algonquian) reduplication". In: *Proceedings of ConSOLE X, Leiden*, pp. 33–48.
Caballero, Gabriela (2006). ""Templatic backcopying" in Guarijio abbreviated reduplication". In: *Morphology* 16, pp. 273–289.
Clark, Mary (1990). *The tonal system of Igbo*. Dordrecht: Foris.
Dienst, Stefan (2014). *A Grammar of Kulina*. Vol. 66. Mouton Grammar Library. Berlin/Boston: de Gruyter.
Downing, Laura J. and Sharon Inkelas (2015). "What is Reduplication? Typology and Analysis Part 2/2. The Analysis of Reduplication". In: *Language and Linguistics Compass* 9, pp. 516–528.
Fal, Arame (1980). *Les nominaux en Sereer-Siin. Parler de Jaxaaw*. Les nouvelles éditions africaines.
Gafos, Diamandis (1998). "A-templatic reduplication". In: *Linguistic Inquiry* 29.3, pp. 515–527.

References II

Gouskova, Maria (2007). "The reduplicative template in Tonkawa". In: *Phonology* 24.3, pp. 367–396.
Heath, Jevon (2014). "Assertive Verb Doubling in Sereer. Reduplication or Repetition?". In: *UC Berkeley Phonology Lab Annual Report*, pp. 209–229.
Inkelas, Sharon and Cheryl Zoll (2005). *Reduplication: Doubling in Morphology*. Cambridge Studies in Linguistics. Cambridge: University Press. ISBN: 9781107320161.
Itō, Junko and Armin Mester (1998). "Markedness and word structure. OCP effects in Japanese". Ms., University of California, Santa Cruz [ROA 255].
Jones, Patrick Jackson (2014). "Tonal interaction in Kinande. Cyclicity, opacity, and morphosyntactic structure". PhD thesis. Massachusetts Institute of Technology.
Kager, René (2004). *Optimality Theory*. Cambridge: University Press.
Kiparsky, Paul (1982). "Lexical Morphology and Phonology". In: *Linguistics in the morning calm: selected papers from SICOL-1981*. Ed. by In-Seok Yang. Seoul: Hanshin Publishing Company, pp. 3–91.
— (2000). "Opacity and Cyclicity". In: *The Linguistic Review* 17, pp. 351–367.
Lieber, Rochelle (1992). *Deconstructing Morphology*. Chicago: University Press.
Lombardi, Linda (1999). "Positional faithfulness and voicing assimilation in Optimality Theory". In: *Natural Language and Linguistic Theory* 17, pp. 267–302.
Mc Laughlin, Fiona (1994). "Consonant mutation in Seereer-Siin". In: *Studies in African Linguistics* 23.3, pp. 279–313.
— (2000). "Consonant mutation and reduplication in Seereer-Siin". In: *Phonology* 17, pp. 333–363.
— (2005). "Voiceless implosives in Seereer-Siin". In: *Journal of the International Phonetic Association* 35, pp. 201–214.
McCarthy, John and Alan Prince (1995). "Faithfulness and reduplicative identity". In: *University of Massachusetts Occasional Papers in Linguistics 18: Papers in Optimality Theory*. Ed. by Jill Beckman, Laura Dickey, and Suzanne Urbanczyk. Amherst, MA: GLSA, pp. 249–384.
Michaud, Alexis (2017). *Tone in Yongning Na*. Vol. 13. Studies in Diversity Linguistics. Berlin: Language Science Press.
Mohanan, Karuvannur Puthanveettil (1982). "Lexical Phonology". PhD thesis. MIT.

References III

Pesetsky, David (1979). "Russian Morphology and Lexical Theory". Unpublished Ms, MIT.
— (1985). "Morphology and Logical Form". In: *Linguistic Inquiry* 16.2, pp. 193–246.
Peterson, John and Utz Maas (2009). "Reduplication in Kharia. The masdar as a phonologically motivated category". In: *Morphology* 19, pp. 207–237.
Prince, Alan and Paul Smolensky (1993/2004). *Optimality Theory. Constraint interaction in generative grammar*. Oxford: Blackwell.
Pulleyblank, Douglas (1986). *Tone in Lexical Phonology*. Dordrecht: Reidel.
Saba Kirchner, Jesse (2010). "Minimal Reduplication". PhD thesis. University of California at Santa Cruz.
— (2013). "Minimal reduplication and reduplicative exponence". In: *Morphology* 23, pp. 227–243.
Shaw, Patricia A (1980). *Theoretical Issues in Dakota Phonology and Morphology*. Outstanding Dissertations in Linguistics. New York/London: Garland.
Steriade, Donca (2012). "The cycle without containment: Latin perfect stems". Unpublished Ms.
Trommer, Jochen (2011). "Phonological Aspects of Western Nilotic Mutation Morphology". Habilitation. Leipzig University.
Trommer, Jochen and Eva Zimmermann (2014). "Generalised mora affixation and quantity-manipulating morphology". In: *Phonology* 31, pp. 463–510.
— (2016). "(Im)possible Opacity Patterns in Containment Theory". Thomas Müntzer Lecture given at Mühlhausen, 03-Apr-2016.
Urbanczyk, Suzanne (2006). "Reduplicative form and the root-affix asymmetry". In: *Natural Language and Linguistic Theory* 24, pp. 179–240.
van Oostendorp, Marc (2006). *A theory of morphosyntactic colours*. Unpublished Manuscript. Amsterdam. URL: http://egg.auf.net/06/docs/Hdt{}Oostendorp{}coulours.pdf.
— (2007). "Derived environment effects and consistency of exponence". In: *Freedom of analysis*. Ed. by Sylvia Blaho, Patrik Bye, and Martin Krämer. Berlin: Mouton de Gruyter, pp. 123–148.
Yokwe, Eluzai Moga (1987). "The tonal grammar of Bari". PhD thesis. University of Illinois at Urbana-Champaign.

References IV

Yu, Alan C. L. (2007). *A natural history of infixation*. Vol. 15. Oxford Studies in Theoretical Linguistics. Oxford: University Press.

Zimmermann, Eva (2017a). *Morphological Length and Prosodically Defective Morphemes*. Vol. 1. Oxford studies in phonology and phonetics. Oxford: University Press. ISBN: 9780198747321.

— (2017b). "Multiple reduplication as non-segmental affixation. A case study from Nuuchahnulth". In: *Proceedings of NELS 47*. Amherst: GLSA Publications, pp. 285–294.

Zimmermann, Eva and Jochen Trommer (2016). "The Typology of Opacity and Containment Theory". Talk given at LAGB Annual Meeting 2016, York, September 9, 2016. York.

Zoll, Cheryl (1996). "Parsing below the segment in a Constraint-based framework. Serial Phonology-Morphology Interaction in a Constraint-Based Model". PhD thesis. University of California, Berkeley.

Appendix

More on segmental alternations in mutation

- Mc Laughlin (2000) argues that gaps and unexpected alternations in the Seereer-Siin mutation paradigms are derivable by a set feature coocurrence constraints
- Fricatives resist voicing: FRIC/VCE: If a fricative, then not [v]
- Implosives escape prenasalization: NAS/CGL: If [cg], then not [n]
- Prenasalization creates ND segments: NAS/VCE, NAS/CONT: If [n], then [v] and [-c]
- For /r/ → /t/ in the b-grade, Mc Laughlin (ibid.) proposes a lexically indexed constraint against voiced initial consonants in the b-grade that she argues is additionally motivated by the devoicing pattern in agent nouns
- As was argued earlier, the latter receives a much more elegant treatment in a stratal analysis
- /r/ → /t/ (and not /r/ → */d/) in the b-grade can be attributed to /r/ being underlying voiceless and being redundantly interpreted as voiced by the phonetics due to it being [+son]

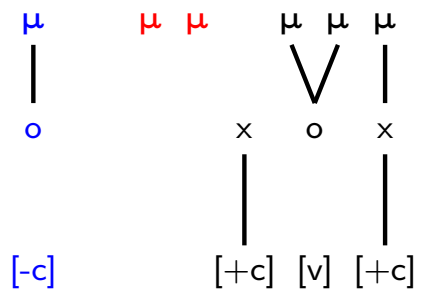
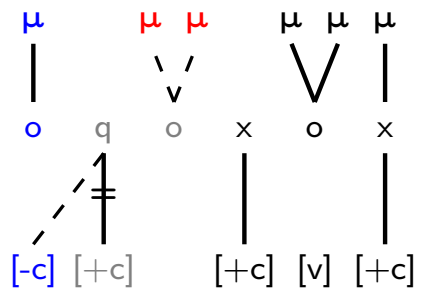
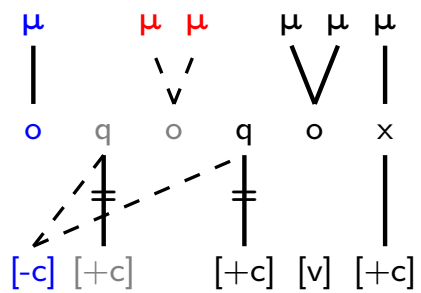
Optional overapplication of continuancy mutation

BASE	AGENT NOUN			
waːɗ	o-**b**aː-**w**aːɗ	∼	o-**b**aː-**b**aːɗ	‘search / researcher’
fec	o-**p**eː-**f**ec	∼	o-**p**eː-**p**ec	‘dance / dancer’
riw	o-**t**iː-**r**iw	∼	o-**t**iː-**t**iw	‘weave / weaver’
xoːx	o-**q**oː-**x**oːx	∼	o-**q**oː-**q**oːx	‘cultivate / farmer’

Optional overapplication of continuancy mutation

- Mutation overapplication in Seereer agent nouns is the result of greedy root nodes, triggered by a constraint [-son]→[-c] demanding obstruents to dominate a [-c]
- This constraint can only be satisfied when a floating [-c] is present due to DEP and *MIX
- Optionality arises from variable ranking of the NCC and [-son]→[-c]
- Underlying continuants are protected by MAX

Optional overapplication of continuancy mutation

Input = a.	MAX [+c] •	μ ↓ •	*3[-c]	NCC	[-son] ↓ [-c]	DEP [-c] •
a. 		*!*			**	
(☞) b. 					**(!)	*
(☞) c. 				*(!)	*	*

Association lines

- Standard assumptions about association lines in ESC:
  - Two types of association lines: Underlying (|) and epenthetic (¦)
  - Underlying association lines have the same color as the nodes they connect
  - Lines can be made phonetically invisible (ǂ)
  - At the end of each stratum, invisible lines are removed and colored lines are monochromized
- ALTERNATION: If an association line links two elements of color α, the line should also have color α. (van Oostendorp, 2007)

Association lines

- Two problems:
  - Conceptual: Lines are merely relations between phonological nodes and as such do not correspondent to a morphological entity
  - Empirical: Evidence for retention of invisible lines across strata
- Proposal:
  - Lines do not have a color, simple binary distinctions between | vs. ¦ and visible vs. invisible
  - Lines are preserved throughout the course of a derivation
  - The phonology has access to the information whether a line was there underlyingly or not at any given point
- Prediction:
  - The derivational history of a phonological form from as early as the stem stratum may be relevant phonological processes for as late as the phonology-phonetics interface
  - Evidence: Exception vowel mutation triggers and apparent paradigm uniformity in Lakota