Parallel Interaction between Infixation and Root Domain Constraints

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OCP20

January 27th, 2023

Main Claim

- There is an empirical gap in the interaction between infixation and root domain constraints.
- Root domain constraints are immune to bleeding by infixation.
- Serial approaches to phonology predict empirically unattested pattern.
- A parallel account based on prosodic domains is naturally restricted by a fixed ranking of OT-constraints.

Infixation & Root Domain Constraints

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- Phonological Root domain constraints (RDCs) are phonological generalizations that hold over roots (Albright, 2004).
- Infixation can split up root domains leading to discontiguous roots (Yu, 2007), cf. (1).
- How do these building blocks interact?

(1) Infixation: $[\text{Root}]_{\text{root domain}} + \text{Infix} \rightarrow \text{Ro}\langle\text{infix}\rangle\text{ot}$

(2) fan⟨fucking⟩tastic (McCarthy, 1982)

A hypothetical language L

- In the hypothetical language L, an OCP(C)-like root domain constraint forbids roots from containing syllable adjacent identical consonants, repaired by dissimilation, cf. (3).
- Additionally, L features an infix ⟨it⟩ that attaches after the initial consonant, cf. (4).

(3) RDC in L

siza	***s**i**s**a
goko	***g**o**g**o
tedu	***t**e**t**u
tudi	***t**u**t**i

(4) Infixation in L

sida	s⟨**it**⟩ida
goko	g⟨**it**⟩oko
tedu	/t⟨**it**⟩etu/→ [???]
tudi	/t⟨**it**⟩uti/→ [???]

Questions

- What happens if an infix attaches to a root that already containts a /t/?
- Is the infix affected by the RDC?
- Is the non-contiguous root still affected by the RDC?

Aside: Dissimilation

- In regular dissimilation patterns, repairs often apply to the middle segment between two other segments.
- This applies for tone in Shona (Atlantic-Congo, Zimbabwe), if three high tones are adjacent, the middle one is deleted (Myers, 2004).

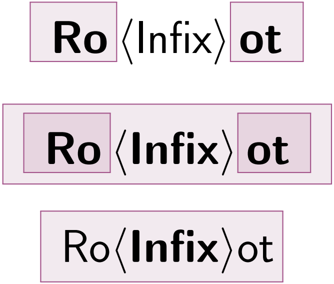
(5) Tone Dissimilation in Shona
/báng**á** gúrú/→[báng**à** gúrú]
knife big

Three possible outcomes

(6) L1: Infix is ignored.
tedu t⟨it⟩e**d**u
tudi t⟨it⟩u**d**i

(7) L2: infix & root undergo RDC
tedu t⟨**is**⟩e**d**u
tudi t⟨**is**⟩u**d**i

(8) L3: No RDC for ro⟨⟩ot
tedu t⟨**is**⟩etu
tudi t⟨**is**⟩uti



Typological Survey: No L3!

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- A typological study of 55 patterns in 32 languages from 9 families with RDCs and infixation shows **no L3 languages**, but 12 L1 and 20 L2 patterns, cf. (7), based on Yu (2004); Mielke (2005); Zuraw & Lu (2009).
- Infixation interacts with OCP/dissimilation (Hebrew, Muna), maximality constraints/deletion (Hunzib, Nakh-Dagestanian), and syllable structure (Semelai, Austroasiatic; Yeri, Nuclear Torricelli).

(9) Typological Results

		# of lgs.
L1	Infix is ignored	12
L2	RDC for Infix & ro⟨⟩ot	20
L3	No RDC for ro⟨⟩ot	**0**
	No interaction	23
	Total	55

Genealogical Distribution

- L2 mainly occurs in Austronesian languages, wheras L1 is more widely distributed, cf. (8).

(10) Genealogical Distribution

top-level family	L1	L2	None	Total
Austronesian	1	19	5	25
Afro-Asiatic	4	1	5	10
Nakh-Dagestanian	1	0	0	1
Sino-Tibetan	2	0	0	2
Austroasiatic	2	0	2	4
Nuclear Torricelli	2	0	0	2
Other	0	0	11	11
Total	12	20	23	55

Generalization

(11) Infixation Immunity Generalization
Roots are immune to the effects of bleeding by infixation on root domain constraints.

Case Studies: Hebrew and Muna

Hebrew reflexive forms I

- In Hebrew (Afro-Asiatic, Israel), no root can contain two non-final identical syllable-adjacent consonants (Greenberg, 1950; McCarthy, 1979, 1981, 1986).
- In reflexive forms, a ⟨t⟩ is infixed after the first consonant in certain contexts, cf. (9).

Hebrew reflexive forms II

(12) Hebrew RDC: OCP(C)

katav *tatav
write.PST

namax *mamax
become.short.PST

(13) Hebrew Infix: reflexive forms

sarak hi-s⟨t⟩arek
R_i-⟨R_i⟩comb

ʃilev hi-ʃ⟨t⟩alev
R_i-⟨R_i⟩integrate

(14) Infix & RDC: reflexive form of /t/-medial root (Ezer Razin, p.c.)

seter hi-s⟨t⟩ater *hi-s⟨t⟩aser
R_i-⟨R_i⟩hide

ʃitef hi-ʃ⟨t⟩atef *hi-ʃ⟨t⟩aʃef
R_i-⟨R_i⟩share

Hebrew reflexive forms III

- The ⟨t⟩ can violate the RDC, but the ro⟨⟩ot cannot, cf. (11)
- Hebrew is thus of type L1: Infix is ignored, (cf. McCarthy, 1979).

Muna irrealis forms I

- In Muna (Austronesian, Indonesia), a root cannot contain a labial obstruent followed by a bilabial nasal [m] (van den Berg, 1989), cf. (12).
- In irrealis forms, an infix ⟨um⟩ is added after the first consonant, cf. (13).

Muna irrealis forms II

(15) Muna RDC: *BM

foni	***fom**i
climb	
pili	***pim**i
chose	

(16) Muna Infix: irrealis forms

dadi	d⟨**um**⟩adi
	⟨IRR⟩live
gaa	g⟨**um**⟩aa
	⟨IRR⟩marry

(17) Infix & RDC: irrealis form of B-initial roots

foni	**m**-oni	*f⟨um⟩oni,*m-omi
	IRR-climb	
pili	**m**-ili	*p⟨um⟩ili
	IRR-chose	

Muna irrealis forms III

- Both ⟨m⟩ and ro⟨⟩ot cannot violate the RDC, such instances are repaired, cf. (14).
- Muna is thus of Type L1: infix & ro⟨⟩ot undergo RDC.

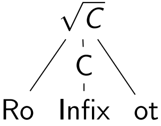
Hierarchical Morphoprosodic Structure

Hierarchical Morphoprosodic Structure I

- A fixed rankings of OT-constraints (Prince & Smolensky, 1993) explains the gap.
- The constraint domains derive from prosodic constituents (cf. Itô & Mester, 2021).

Hierarchical Morphoprosodic Structure II

(18) Prosodic Domains in Infixation



$\rightarrow$ [$_{\sqrt{C},\text{DD}}$ Ro⟨⟩ot], [$_{\sqrt{C},\text{D}}$Ro⟨Infix⟩ot]

- A domain is either only material directly dominated (DD) by the root constituent $\sqrt{C}$, i.e. the Ro⟨⟩ot, or all material dominated (D) by $\sqrt{C}$, i.e. Ro⟨Infix⟩ot, cf. (18).

Analyses: A fixed ranking

- Constraint with domains derived by direct domination always dominate constraints with domains derived by domination from the same prosodic constituent, i.e. $\text{RDC}_{\text{DD}} \gg \text{RDC}_{\text{D}}$ (cf. Suzuki, 1998), cf. (19).
- This excludes L3.

(19) Partal factorial typology

Ranking	language	RDC domains
$\text{RDC}_{\text{DD}} \gg \textsc{Faith} \gg \text{RDC}_{\text{D}}$	L1, Hebrew	Ro⟨⟩ot
$\text{RDC}_{\text{DD}} \gg \text{RDC}_{\text{D}} \gg \textsc{Faith}$	L2, Muna	Ro⟨Infix⟩ot, Ro⟨⟩ot
*$\text{RDC}_{\text{D}} \gg \textsc{Faith} \gg \text{RDC}_{\text{DD}}$	L3	Ro⟨Infix⟩ot

Analyses: Two different rankings

Analyses: Two different rankings I

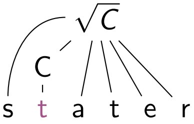
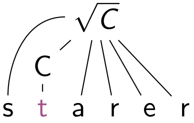
- In Hebrew, the infix is ignored because only the RDC_{DD} constraint is ranked high, (18).

(20) $\text{OCP(C)}_{\sqrt{C},\text{DD}}$
Count one violation for any two syllable adjacent non-final identical consonants inside material directly dominated by $\sqrt{C}$.

(21) $\text{OCP(C)}_{\sqrt{C},\text{D}}$
Count one violation for any two syllable adjacent non-final identical consonants inside material dominated by $\sqrt{C}$.

Analyses: Two different rankings II

(22) Hebrew requires $\text{RDC}_{\sqrt{C},\text{DD}} \gg$ FAITH $\gg \text{RDC}_{\sqrt{C},\text{D}}$

Input: stater	$\text{OCP(C)}_{\sqrt{C},\text{DD}}$	FAITH	$\text{OCP(C)}_{\sqrt{C},\text{D}}$
☞ a. stater 			*
b. starer 		*!	

Analyses: Two different rankings III

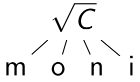
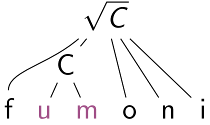
- In Muna, ranking both the RDC-constraint above FAITH yields an additional repair.

(23) $^{*}\mathrm{BM}_{\sqrt{C},\mathrm{DD}}$
Count one violation for a sequence of a labial obstruent and a syllable adjacent /m/ inside material directly dominated by $\sqrt{C}$.

(24) $^{*}\mathrm{BM}_{\sqrt{C},\mathrm{DD}}$
Count one violation for a sequence of a labial obstruent and a syllable adjacent /m/ inside material dominated by $\sqrt{C}$.

Analyses: Two different rankings IV

(25) Muna requires $\text{RDC}_{\sqrt{C},\text{DD}}$, $\text{RDC}_{\sqrt{C},\text{D}} \gg$ FAITH

Input: fumomi	$*\text{BM}_{\sqrt{C},\text{DD}}$	$*\text{BM}_{\sqrt{C},\text{D}}$	FAITH
☞a. 			**
b. 		*!	*

Serial approaches overgenerate!

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- Serial approaches with some kind of phonology-morphology interleaving (e.g. SPE (Chomsky & Halle, 1968), Lexical Phonology (Kiparsky, 1982), Stratal OT (Kiparsky, 2015)) predict L3 by ordering a repair for the RDC after infixation, cf. (26), (27).
- Late ordering of the RDC is independently needed to derive L2, Muna.

(26) Overgeneration of Serial Approaches

Order of Application	Language	RDC Domain
RDC≺Infixation	L1, Hebrew	Ro⟨⟩ot
RDC≺Infixation≺RDC	L2, Muna	Ro⟨Infix⟩ot, Ro⟨⟩ot
*Infixation≺RDC	L3	Ro⟨Infix⟩ot

Cyclic Infixation (Kalin, 2022) I

- Kalin (2022) proposes a cyclic account of infixation where infixes are procedurally special in that they involve some kind of reordering.
- This is based on data from allomorphy, lexical and regular phonology.
- This approach has to assume a cycle of phonology before and after infixation in order to derive the L2 (Muna) pattern.
- This also predicts that L3 should exist if the RDC only applies at the cycle after infixation.

Cyclic Infixation (Kalin, 2022) II

(27) Example derivation of L3 in Kalin's work

a. First Cycle

(i)	Exponent Choice:	tetu	tetu
(ii)	Restricted Phonology:	—	—

a. Second Cycle

(i)	Exponent Choice:	—	⟨it⟩tetu
(ii)	Displacement:	—	t⟨it⟩etu
(iii)	Restricted Phonology:	tedu	t⟨is⟩etu

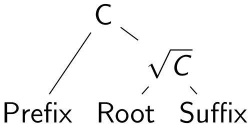
Strong Domain Hypothesis

- This problem could be solved by Strong Domain Hypothesis (SDH) (Kiparsky, 1985), which restricts phonological rules from applying only after morphology.
- However, empirically the SDH does not hold for prefixes and suffixes (cf. e.g. Mohanan, 1989; Hualde, 1989; Hyman, 1993; Kaisse, 1993).
- Therefore, an ordering restriction would have to be stipulated between phonological processes and infixation, but not other affixation processes.

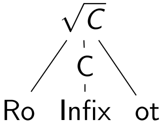
Infix Representations

- In the present approach, prefixes and suffixes show more variation in their prosodic constituency and therefore might be subject to different constraint, depending on their prosodic constituency, (28).
- Infixes are **representationally** special, not procedurally.

(28) Possible Prosody for other affixes



(29) Prosodic Domains in Infixation



Conclusion

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- There is an empirical gap in the interaction of infixation and root domain constraints.
- Root domain constraints are immune to bleeding by infixation.
- Parallel OT can derive this as a fixed ranking between constraints relativized to different domains derived from the same prosodic root constituents.
- Serial approaches overgenerate the unattested pattern and cannot be easily restricted to exclude it.

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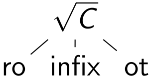
Infixes and Prosodic Structure I

- Somewhat counterintuitively, MATCH-Theory (Selkirk, 2011) predicts that infixes are prosodically more independent than other affixes under ther assumption that some MATCH-constraint applies to morphemes α and some prosodic constituent π (van Oostendorp, 1999).
- If no other constraint militates against recursive structures (cf. Gouskova, 2003), prosodically independent infixes are favored because they satisfy all MATCH constraints.

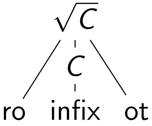
Infixes and Prosodic Structure II

(30) Match constraints favor recursive structure for infixes

a. Ilicit structure: Match(α,π) ✖, Match(π,α) ✔



b. Recursive structure: Match(α,π) ✔, Match(π,α) ✔



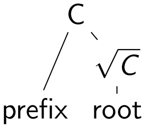
Infixes and Prosodic Structure III

- Structures with prefixes and suffixes, on the other hand, can never satisfy both constraints.
- Therefore, more variation in prosodic structure is expected.

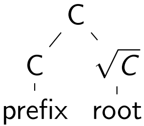
Infixes and Prosodic Structure IV

(31) Satisfaction of Match-constraints with prefixes

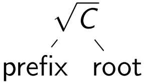
a. Prefixes: Match(α,π) ✖, Match(π,α) ✖



b. Prefixes: Match(α,π) ✔, Match(π,α) ✖



c. Prefixes: Match(α,π) ✖, Match(π,α) ✖



RoTB and MSCs

- Systematic phononological generalization on monomorphemic domains exist (Tebay, 2022).
- Early approaches to generative phonology introduced Morpheme-Structure-Rules, which are ordered before other phonological rules and appy to inputs to phonology (Halle, 1959).
- These approaches generally predict L3 to exist.
- In a parallel OT-approach where Richness of the Base (Prince & Smolensky, 1993) disallows any language-specific restrictions on the input, these domains have to apply to the output (McCarthy, 1998; Albright, 2004; Tebay, 2022).