

Crafting a Russian Doll

Phonological computation
as an indicator of
structural change

Externalizing Words: Mono- and
Multilingual Perspectives
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- *“The uncertainty whether a particular instance of morphosyntactic conditioning in phonology should be analyzed procedurally or representationally is in fact one of the most serious and recurrent obstacles faced by empirical research into the morphosyntax–phonology interface.”*

(Bermúdez-Otero 2011 : 2026)

The central question of this talk

How many
phonologies are there
in a single grammar?

The answer



§1 Overview

§2 The question: Why do phonological rules ‘turn off’?

§2.1 The answer: They don’t. Phonology is always-on.

§2.2 An aside on putting the PIC aside. The syntax is also always-on.

§3 Flipping the phonological switch – McCarthy (1998) was right

§3.1 When rules stop applying

- English cluster resolution : when it’s gone it’s gone.
- Spanish s/z voicing : when it’s gone, you can put it back .

§3.2 Do rules actually turn off?

- Belfast dentalization : persistence, and how to write a rule

- Armenian high vowel reduction : phonological illusions

§3.3 When rules do turn back on. Non-isomorphism.

- English cohering and non-cohering affixes
- Eastern Armenian V-initial inflection

§4 Take-Home Messages

- A language has a single syntax, and a single phonology.
- Memorizing lexical items is a given. Memorizing phonologies is extra.
- On the definition of diacritics.
- On Faithfulness, persistence, and the hardness of Russian Dolls.

§2 The question: Why do phonological rules 'turn off'?

Table 85.1 Two types of morphosyntactic conditioning acknowledged throughout the history of generative phonology

<i>Theory</i>	<i>Representational effects</i>	<i>Procedural effects</i>	<i>Sample reference</i>
<i>SPE</i>	boundary symbols (+, #)	the cycle	Chomsky & Halle (1968)
Lexical Phonology	prosodic units (built by rules)	the cycle (with levels)	Booij & Rubach (1984)
Stratal OT	prosodic units (controlled by ALIGN)	the cycle (with levels)	Bermúdez-Otero & Luís (2009)
Classical OT	prosodic units (controlled by ALIGN)	OO-correspondence	Raffelsiefen (2005)
Lateral Phonology	empty CV units	the cycle (phases)	Scheer (2008)

(Bermúdez-Otero 2011:2019)

*§2.1 The answer: They don't.
Phonology is always-on.*

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This is not a new proposition. For example, this is the take of Classic OT.

That I'm
proposing
that Classic
OT got
something
right is not
actually
shocking, I
assure you.

- This is where Government Phonology/CVCV Phonology and Classic OT agree.
- There is only one phonological grammar per language.
 - Note that registers/dialects/loan-word systems are different grammars.
- All instances of the phonology 'turning off' are derived environment effects/non-derived environment blocking (this talk/research programme follows Kula 2008 closely).
 - See references therein for GP and non-GP structural analyses of DEEs.
 - See also Newell & Ulfsbjorninn's (2021) Special issue of *The Linguistic Review* for implications of structural phonology for phonology vs. allomorphy in various frameworks, Newell (2021), and Ulfsbjorninn, under revision.
- **And, importantly here, so are the effects of the phonology 'turning back on'** (They do exist, contra the Russian Doll Theorem).

The Russian Doll Theorem



Let there be the nested cyclic domains

$$c[\dots b[\dots a[\dots] \dots] \dots].$$

If a phonological process p is opaque in b because its domain is a , then p is opaque in c .

- *“To my knowledge, this entailment of cyclic theory has not been formally enunciated before, probably because it has been considered so obviously true as to be entirely trivial.”*

(Bermúdez-Otero 2011: 2023)

The view being argued against :

- I will argue that the RDT does not always hold.
- I will argue that Lexical Phonology and Morphology, Stratal OT, Co-phonologies etc. are not the right way to capture the patterns that cause the RDT to hold as far as it does.
 - These theories allow for rules/constraints to not apply/be demoted to the point where they have no effect.
 - Interestingly, the distinction between rankings from lower to higher strata are often determined by a promotion of faithfulness constraints (Ito & Mester 2001 etc., c.f. the discussion in Kiparsky 2015), which, as we will see, doubles the work of representations.

§2.3 An aside on putting the PIC aside. The syntax is also always-on.

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It is of note that there are no theories of syntax (that I know of) wherein distinct syntactic rules/rankings are proposed at each stratum (even within the almost universally rejected OT-syntax).

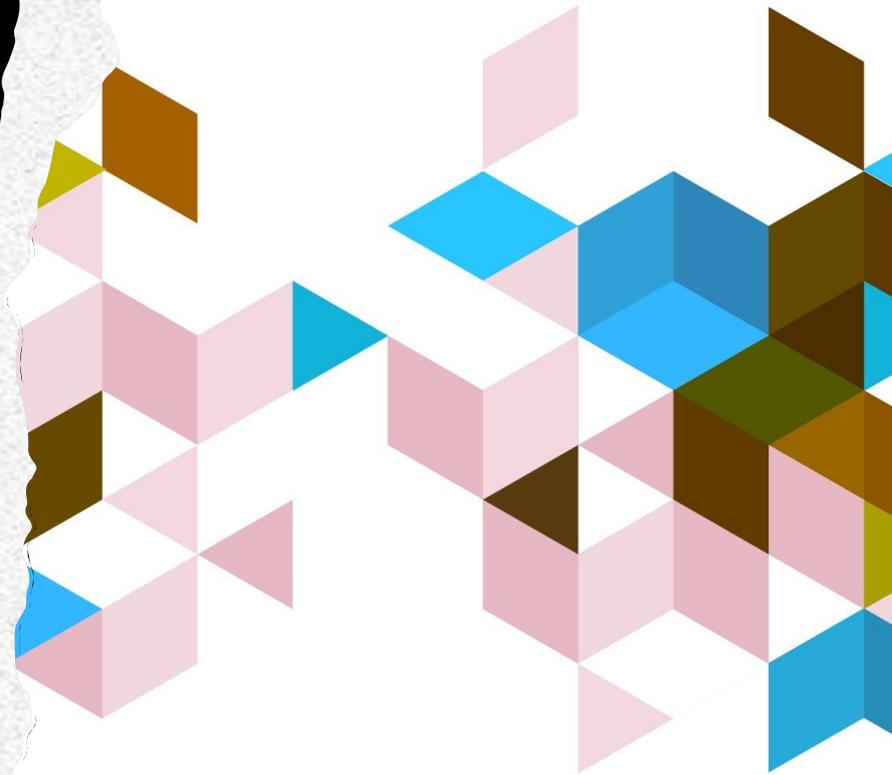
Syntactic rules apply when their structural conditions are met. Just like phonological rules.

- No one says ‘Agree applies at the vP phase, but not at the CP phase’).
 - We should all wonder why syntax would be simple, and phonology full of sub-modules. (They are both cyclic. They both have access to stored lexical items.)
- What about the PIC?
 - The PIC is a theoretical proposition, not backed up by any solid positive evidence (so, rules don’t ‘turn off’). (Embick 2014, Newell 2017).
 - The PIC, like what will be argued in the following talk for phonology, is an epiphenomenon of syntactic cyclicity and feature-valuation.

§3 Flipping the phonological switch – McCarthy (1998) is still right

“If the representations are right, the rules will follow”

(McCarthy 1998)



§3.1 *When rules stop applying*

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Let's start here with a couple of simple examples of rules 'turning off' where it is very easy to account for why the rule would not turn back on.

English cluster resolution – when it's gone it's gone.

- Non-coronal post-nasal stops are deleted when final in their domain. This can be dealt with procedurally (1) or representationally (2) (as clearly discussed in Bermúdez-Otero 2011).

(1)

a.	/bɒmb/	→			[bɒm]	‘bomb’	
b.	/bɒmb-aɪd/	→			[bɒmbaɪd]	‘bombard’	
c.	/bɒmb/	→	[bɒm]	→	bɒm-ɪŋ	→ [bɒmɪŋ]	‘bombing’
d.	/bɒmb/	→	[bɒm]	→	bɒm ən ...	→ [bɒmən...]	‘bomb an..’

(2)

a.	[bɒmb] _{PW}	→	[bɒm]	‘bomb’
b.	[bɒmb-aɪd] _{PW}	→	[bɒmbaɪd]	‘bombard’
c.	[[bɒmb] _{PW} -ɪŋ] _{PW}	→	[bɒmɪŋ]	‘bombing’
d.	[bɒmb] _{PW} ən] _{CG}	→	[bɒmən...]	‘bomb an..’

In neither case do we need to say the rule turns off.

- In (1) the reduced clusters are final at some stage of the derivation. In (2) the reduced clusters are final in a Prosodic Word (the actual label of the domain is irrelevant here). There is no point in the derivation where cluster resolution is expected to apply but fails to apply.

Spanish s/z voicing – when it’s gone, you can put it back.

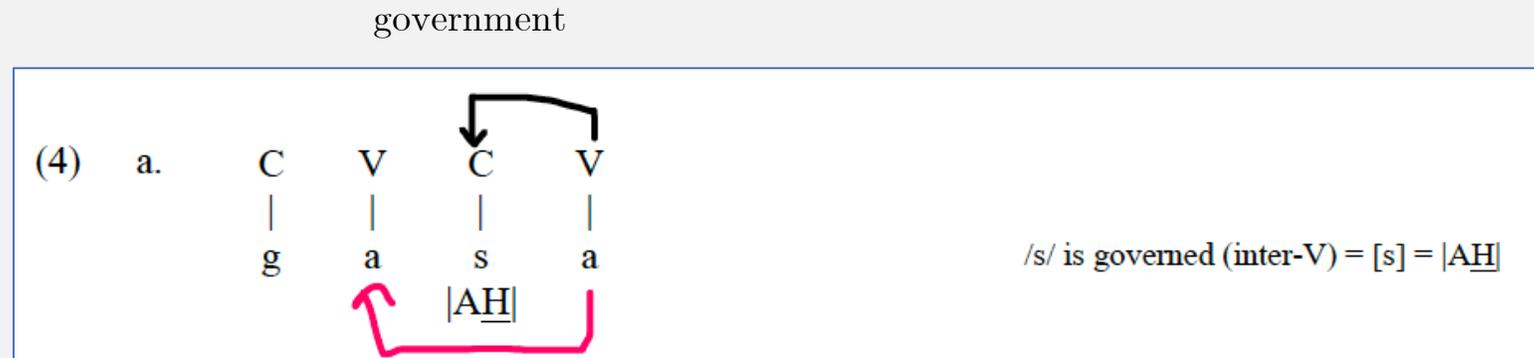
- Quito Spanish /s/ is realized as [s] in an onset, domain finally, and in a voiceless coda-onset cluster. It is realized as [z] intervocalically or in a voiced/sonorant coda-onset cluster.

(3) a.	/gasa/	→	[ga.sa]	‘gause’	c.	/rasgo/	→	[ra.zʝo]	‘feature’
	/gaNso/	→	[gan.so]	‘gander’		/plasma/	→	[plaz.ma]	‘plasma’
	/a sido/	→	[a si.ðo]	‘hath been’		/gas blaNko/	→	[gaz βlaŋko]	‘white gas’
	/el sueño/	→	[el swe.ɲo]	‘the dream’		/gas noble/	→	[gaz noβle]	‘noble gas’
b.	/rasko/	→	[ra.sko]	‘I scratch’	d.	/gas akre/	→	[gaz akre]	‘acid gas’
	/gas karo/	→	[gas ka.ɾo]	‘expensive gas’		/as ido/	→	[az i.ðo]	‘hast gone’
	/gas/	→	[gas]	‘gas’					

(Bermúdez-Otero 2011: 2030)

The structure gets us what we need.

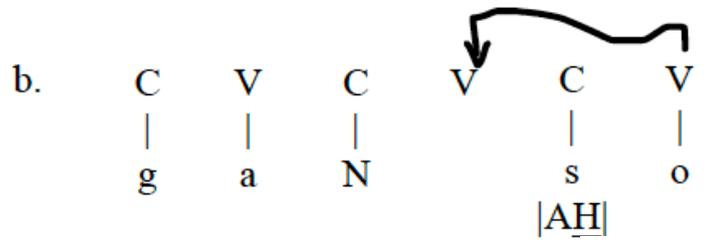
- Here again, the analysis can appeal to rules that apply everywhere, which is Bermúdez-Otero's analysis. The laryngeal features of /s/ are erased in the coda. [S] assimilates to its environment (devoicing by assimilation, voicing passively or actively between phonetically voiced segments, default voicelessness finally). There is no point where we must specify a domain.
- Let's translate this into CVCV (Scheer 2004)/Element Theory (Backley 2011).



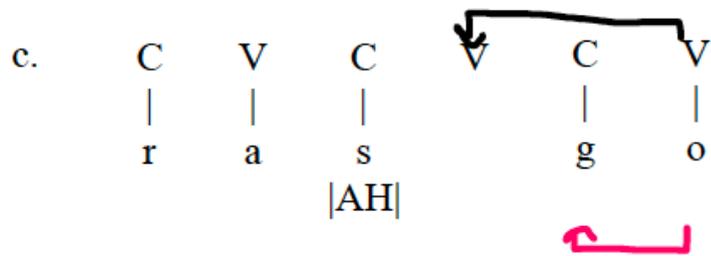
A = coronality

H = voiceless fricative

There are 3 different positions. Only in (4c) do we get laryngeal weakening in Quito Spanish.



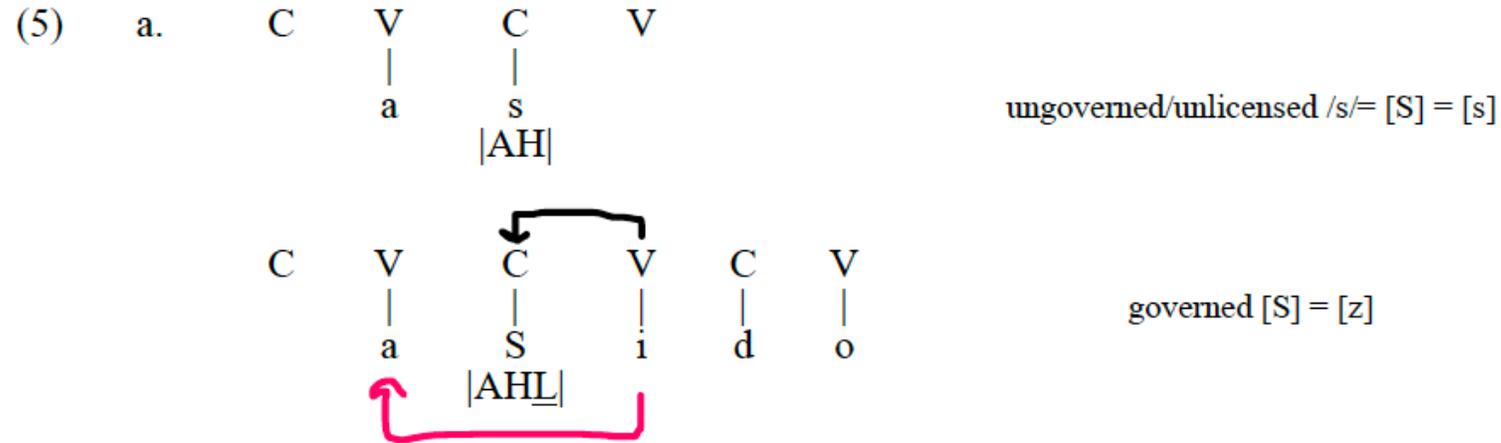
/s/ is licensed (coda-mirror) = [s] = |AH|



/s/ is neither governed
nor licensed (coda) = [S] = |AH|

[S] = |AH| is targeted by rules of devoicing (|AH̥|), voicing (= |AHL̥|) or nothing (|AH|). Here, structure becomes important. Underspecification is key.

While onset /s/ → [s], onset [S] is voiced between sonorants (actively or passively). Word-final [S] (and [S] that assimilated to a voiceless C) → [s] (actively, or passively).



Here we must distinguish between (4a) and (5b). Both of the relevant positions are governed, but the elements of the segments are different at the moment where government applies. No rules are being turned off.

No need for different phonologies at different strata.

§3.2 When rules have been argued to actually turn off.

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In this section, we look at one case where the type of analysis we just saw in §3.1 is argued to not work, and that multiple phonologies are needed, each at a different stage of the derivation.

And then I will argue that a structural account is preferable.

Armenian high vowel reduction : phonological illusions

Նոսա քելե : the position of the deleted vowel will be pronounced as schwa if needed to break up illicit consonant sequences.

A recent analysis proposing that we must have analyses where rules/constraints ‘turn off’ is Dolatian’s (2021:844) work on Armenian destressed high vowel reduction (HVR).

High vowels delete(reduce) iff they were stressed in cycle X, and then stress shifts in cycle X+1:

- (14)
- | | | |
|--------------------------|---------------------------|----------------------------------|
| a. Base: | amusín | ‘husband’ |
| b. Der. Suffix: | amusn-utjú ⁿ | ‘marriage’ |
| | *amsin-utjú ⁿ | |
| | *amusin-utjú ⁿ | |
| c. C-init Infl. Suffix: | amusin- ⁿ ér | ‘husband-Pl.’
(both) |
| d. V-init. Infl. Suffix: | amusin- ⁿ óv | ‘husband-Instr.’
(West. Arm.) |
| | amusn- ⁿ óv | ‘husband-Instr.’
(East. Arm.) |

Dolatian's Stratal OT analysis is as follows (simplified for exposition):

(15) amusnutún 'marriage'

Stem Level (base) : AlignStressRight : DestressHighV >> MaxV → amusín

Stem Level (deriv.): AlignStressRight : DestressHighV >> MaxV → amusnutjún

(16) amusinóv 'husband-Instr.' (WA) (and amusinnér, both)

Stem Level (base) : AlignStressRight : DestressHighV >> MaxV → amusín

Word-Level: MaxV >> AlignStressRight : DestressHighV → amusinóv

(17) amusnóv 'husband-Instr.' (EA)

Stem Level (base) : AlignStressRight : DestressHighV >> MaxV → amusín

Stem-Level: AlignStressRight : DestressHighV >> MaxV → amusnóv

N.B. V-initial affixes in EA are re-prosodified as part of a smaller domain due to constraints on syllable alignment, so they do not trigger word-level phonology.



But, there is a plausible
alternative 1-phonology analysis

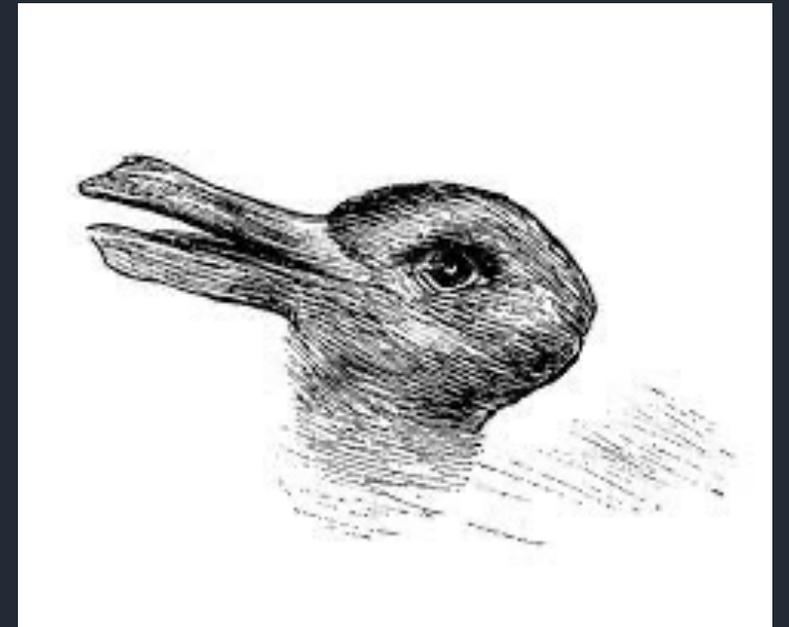
But first, an aside in which we explain a phonological illusion.

An aside : Virtual Long Vowels

In a nutshell, phonetics \neq phonology. There are (at least) two classes of phonetic reflexes that indicate stress/length :

(1) amplitude/pitch/length (the expected reflexes), and

(2) non-reduction (the illusion).



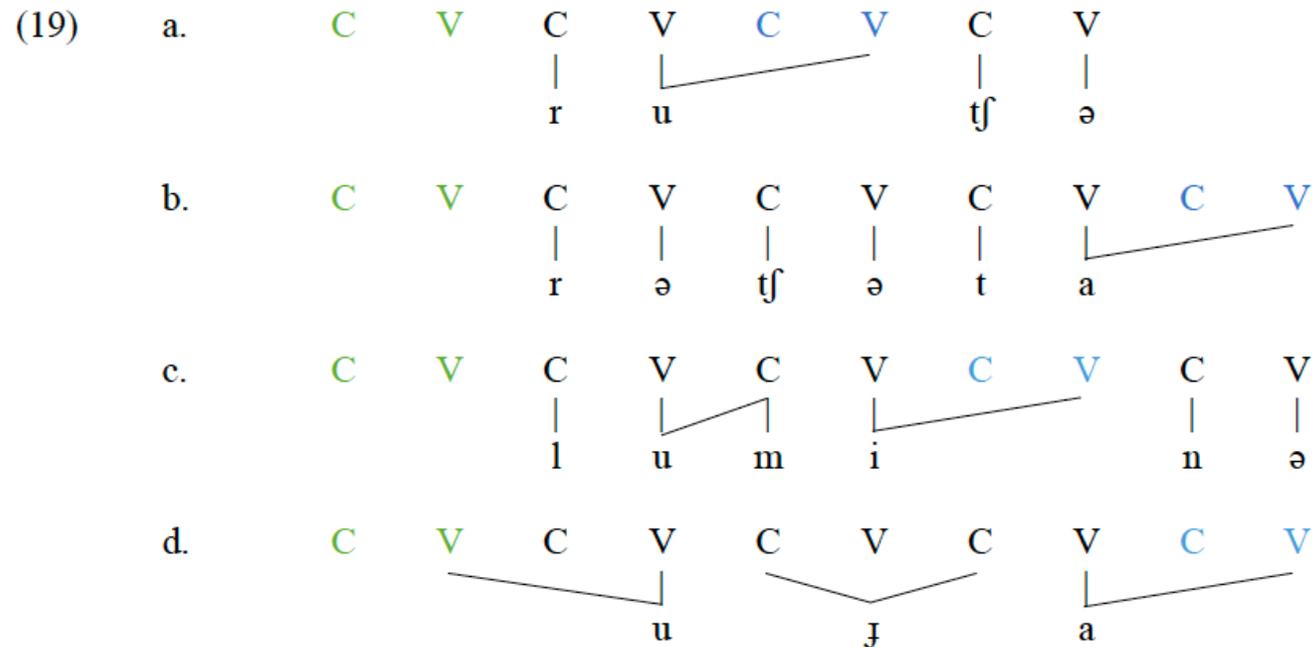
Coratino
virtual
length
(Bucci
2013, 2018)

In Coratino all non-low vowels (/i,u,o,ɔ,e,ɛ/) reduce to schwa when unstressed, unless they share place features with an adjacent C or are word-initial (+more on diphthongs and lax Vs). I give representative examples with /u/.

(18)	a.	rútfə	‘fried’	stressed-u
	b.	rətʃetá	‘fry-verb’	unstressed-reduced-u
	c.	lumínə	‘lamp-dim.’	unstressed- nonreduced-u (lab.C)
	d.	ujjá	‘oil-verb’	unstressed- nonreduced-u (#_)

The CVCV analysis:

Stress is syllabic space (CV) (Chierchia 1986; Larsen 1998, Ségéral et Scheer 2008, etc.). There is extra CV-space word-initially (Lowenstamm 1999, etc.).



Nota Bene! In Coratino (and other southern Italian languages) length is not limited to open syllables, and may be signaled by either diphthongization or non-reduction – not phonetic length. Only phonologically short vowels are reduced.

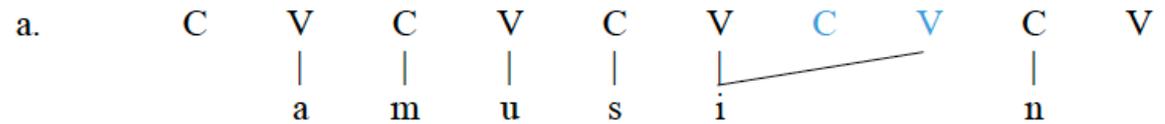


Let's go back to Armenian

A CVCV (non-reduction/deletion) re-analysis continued

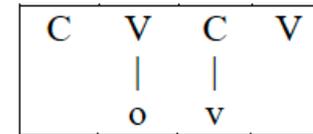
(21) amusinóv 'husband-Instr.' (WA)

Cycle 1



Cycle 2 : no merger of 2 domains (just linearization) : no deletion : Primary & Secondary stressed survive.

UR of suffix:



(We'll talk about EA inflection in the next section)

Levels of stress

We know (1) that various levels of stress emerge in languages, and (2) we know that different stresses have different acoustic stress values, and (3) we know that stress/length prevents reduction.

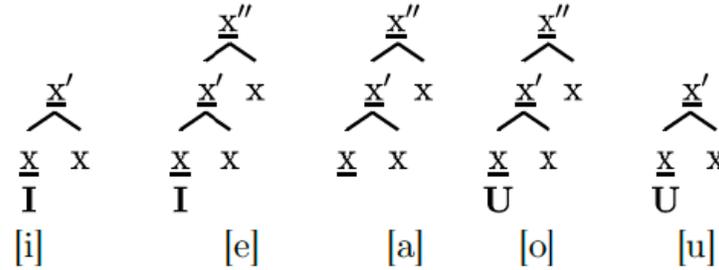
- See also English: góvern, góvernment, gòvernmental.

We would only need to posit that Destressed High Vowel Reduction is ‘turned off’ at the word level if the previously stressed high vowels are in fact destressed.

I contend that they are not, and that Armenian has the same phonological grammar at all levels.

Why high vowels?

Structure to the rescue again!



- High vowels are simpler than mid and low vowels structurally – they emerge as reduced forms of mid vowels in many languages.
- High vowels are weaker, and therefore they are subject to reduction. Vowels with more structure ‘hang on’. See Honeybone’s (2005) *Sharing makes us stronger: process inhibition and segmental structure*.
- [A] vowels behave even more differently cross-linguistically, and Pöchtrager translates this as structure (not elements).
- The lack of high vowel reduction in certain environments in Armenian is not due to a constraint-reranking. It has a deeper motivation.

§3.3 When rules do turn back on.

Non-isomorphism

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—

Violations of the Russian Doll Theorem

Inside a Russian Doll

Bermúdez-Otero proposes that there are no instances where the Russian Doll is contravened. What would that look like?

- * Cycle 1 rules: ..., dentalization, ...
- Cycle 2 rules: ..., ...
- Cycle 3 rules: ..., dentalization, ...

This presumes that each cycle is an independent sub-system (and presumes some clearly correct assumptions about patterns of language change).

But, there are cases that contravene the RDT. These cause Stratal-OT/Co-phonology-type accounts to require undesirable patches.

Eastern Armenian V-initial inflection

If we look at Dolatian's SOT account of Armenian, we have a bit of a contradiction.

First, affixes in his account are marked with Stem or Word Level diacritics.

Der: -utun_S vs. Infl: -ner_W / -ov_W

But, in his account, resyllabification across a Stem-boundary will trigger the Stem-Level Phonology, ignoring the diacritic on the suffix.

This causes a procedural glitch.

Prosody vs phonology?

Stratal and prosodic derivation of amusn-ov (EArm), amusin-ov (WArm), and amusin-ner (both)

			EArm	WArm	EArm & WArm
Input			/amusin -∅ _S -ov _W /	/amusin -∅ _S -ov _W /	/amusin -∅ _S -ner _W /
Cycle 1			(a.mu.sín) _S	(a.mu.sín) _S	(a.mu.sín) _S
Cycle 2	MORPH	Spell-out	(a.mu.sín) _S - /-ov _W /	(a.mu.sín) _S - /-ov _W /	(a.mu.sín) _S - /-ner _W /
	PROSODY	Syllabify	(a.mu.sí.n) _S -ov	(a.mu.sí.n) _S -ov	(a.mu.sín) _S -ner
		Readjust PStem	(a.mu.sí.n-ov) _S	(a.mu.sí.n-ov) _S	
	PHONO	PStem-level Stress	(a.mu.sǐ.n-óv) _S	(a.mu.sǐ.n-óv) _S	
		DHR (EArm)	(a.mu.s.n-óv) _S		
	PHONO	WLevel Stress	(a.mu.sn-óv) _S	((a.mu.sin-óv) _S	(a.mu.sin) _S -nér
Output			amusn-óv	amusin-óv	amusin-nér

(Dolatian 2021:868)

Note that here Dolatian must separate syllabification (prosody) from the stratal phonology. This is not *just* an alignment/interface issue (à la neo-Selkirkianism (Lee & Selkirk 2021; Elordieta & Selkirk 2022) – syllabification must be part of the PROSODY level.



The Broken Russian Doll

Let there be the nested cyclic domains

$$c[\dots b[\dots a[\dots]\dots]\dots].$$

If a phonological process p is opaque in b because its domain is a , then p is opaque in c .

But remember, the RDT is specific to cyclic domains, not to representational domains:

Let's agree that Infl. is 'word-level'. It is high in the syntax relative to Der. morphology. And it behaves as if it is high/Word-level *unless* it is V-initial in EA.

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So, the Destressed High Vowel Deletion is:

- | | |
|------------------------|--|
| Level 1 : Stem-Level : | On in both dialects |
| Level 2 : Pstem Level: | Off for WA but On for EA |
| Level 3 : Word Level: | Off in both for the Word-Level <i>except</i> when the (diacritic) Word-Level is reanalysed as the P-Stem Level after Spell- Out /Phonology has already started. |

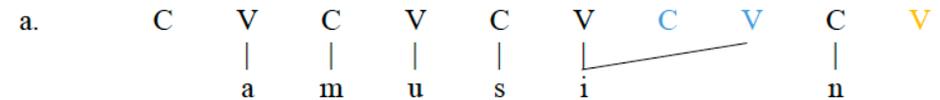
Hmm. Looks like we just turned HVR **on**, then **off**, then **on**.

The 1-Phonology Solution

- Morphemes treated in separate domains are linearized in the phonology (as we saw for WA Inflection).
- Morphemes may merge with an adjacent domain due to purely phonological requirements. (see Newell & Piggott 2014; Newell 2021 and references therein).
- **-ov is lexicalized with an initial floating vowel in EA.**
- When the representations are right, the rules will follow.
 - A single domain has a single stress.
 - Adjacent domains may have two.

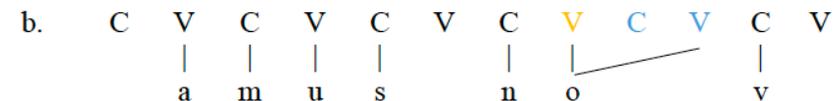
(22) amusnóv 'husband-Instr.' (EA)

Cycle 1



Cycle 2 : merger of 2 domains : initial floating vowel : deletion of CV *and* the segment attached to it.

UR of suffix:



(23) [[[[govern]_v ø]_v ment]_n less]_a

a. C V C V C V C V - C V C V C V - C V C V
 | | | | | | | | | | | | | | | | | |
 g ʌ v ə ɪ ø n ø m ə n ø t ø l ə s ø

b. (gʌvə)<m><ment><ləs> (<final extrametrical syllables>)

(24) [[[[govern]_v ø]_v ment]_n al]_a

a. C V C V C V C V - C V C V C V
 | | | | | | | | | | | | | |
 g ʌ v ə ɪ ø n ø m ə n ø t ø

b. C V C V C V C V - C V C V C V C V C V
 | | | | | | | | | | | | | | | | | |
 g ʌ v ə ɪ ø n ø m ε n ø t ə l ø

c. (gʌvə)<m>(mɛn)<təl>

English cohering and non-cohering affixes work the same way

- English allows the same kinds of derivation as in Armenian. [Level 1 – Level 2 – Level 1].
- Newell (2021) offers an analysis that parallels what we just said for EA.
- The stress-shift rule is ‘turning back on’, contra the Russian Doll theorem.

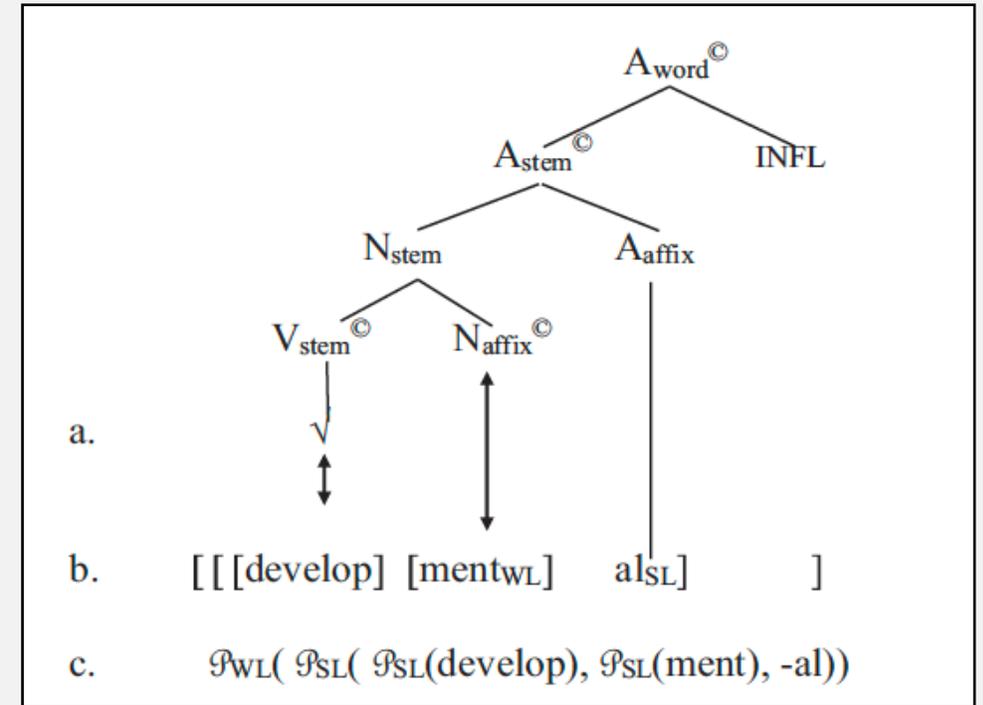
Again, the Stratal analysis ‘glitches’

Bermúdez-Otero (2016) and Lownstamm (2014) propose (independently) that *-ment* can be either Stem or Word Level, triggering different Spell-Out mechanisms.

There are many problems with these solutions.

Consider the following examples:

- (1) Only the later affixation of a Level 1 affix tells you if *-ment* should be Stem-Level (paradoxically counter-cyclic).
- (2) In both (23) *governmentless* and (24) *governmental*, *-ment* behaves as though it is Level 2 – the consonant sequence [ɪnm] is illicit within a Level 1 domain. Real cases of dual-level behaviour exist, but these are phonologically distinct (ex. the 2 comparables, *twinklins*, *lightnings*).



(Bermúdez-Otero 2016:121)

Many Phonologies vs 1 Phonology

The correct procedural derivation in both Armenian and English has to go Stem-Word-Stem.

This opens the door wide for Russian Doll violations.

What doesn't open the door wide for Russian Doll violations?

If phonological rules/constraints are identical at every level.
(The RDT is an illusion)

Structures and cycles are all we need.

Coda : Take Home Messages

A language has a single syntax, and a single phonology.

- Operations in both modules have the *effect* of *turning off* rules/constraints (a.k.a. the PIC).
- Syntax: If an operation targets an X with an unvalued feature, it will not target an X with its feature valued (for example)
- Phonology: If an operation targets an underspecified Y, it won't target a specified Y (for example)

Memorizing lexical items is a given. Memorizing phonologies is extra.

- Everyone agrees that we memorize what is in the lexicon.
 - Everyone's lexicon contains things like floating tones, templates, long vs. short vowels. (a.k.a. structures)
- It is not the case that everyone agrees that lexical items come with memorized phonological grammars. *If we can do without, why wouldn't we?*
- Limiting variation to the lexicon narrows the acquisition hypothesis space.

On the definition of diacritics.

- The diacritic argument does not apply to the phonology of lexical representations. (see quote on following slide)
- Phonological forms make phonological predictions based on their phonology (Tones link to vowels, geminates will behave as stronger than singletons, codas are weak...).
- A true diacritic is a label that makes no logical phonological prediction (Stem, Word, Pword, etc.)

On Faithfulness, persistence, and the hardness of Russian Dolls.

- More structure = more things to be "Faithful" to.
 - We don't need the re-ranking of Faithfulness constraints to explain why later cycles resist change.
- We need only to recognise that Phonological Structure is (1) built or stored
 - Derived or lexicalizedand (2) abstract.
 - A surface phonological object (ex. [i]) is a phonetic illusion with many phonological sources.

On Diacritics

“The availability of such structures raises the question of whether they have any other motivation, in the form of phonological processes, say, or indeed, whether these structures are employed in other ways. If so, the use of such structures comes at no further cost to the model, since they are independently needed to capture contrasts that may be either simple or complex. The use of differing dependency relations to capture derived vs. non-derived segments in languages that need to employ this distinction is not ad hoc, as it draws on resources already available in the model.”

(Kula 2008)

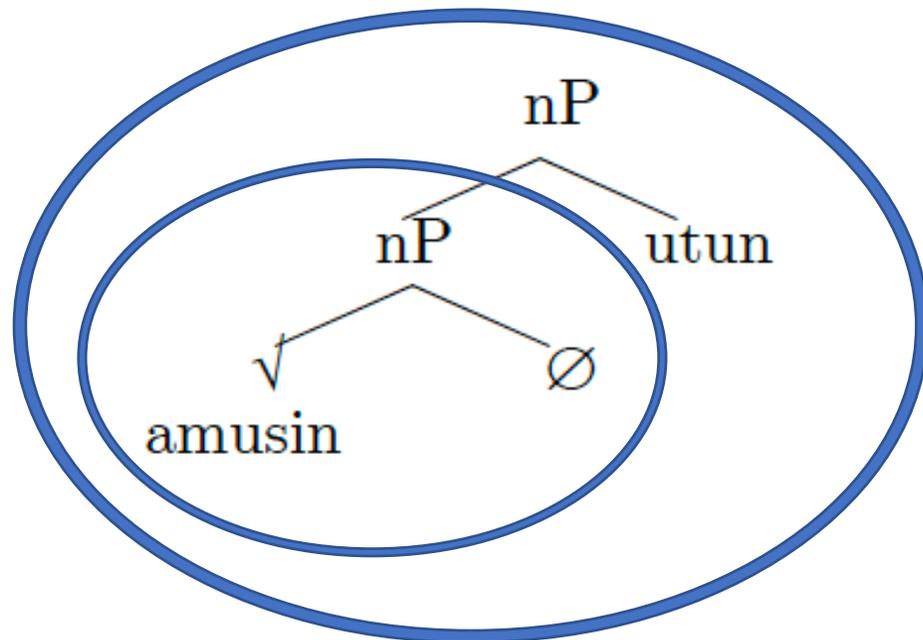
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How might we get Armenian Derivation vs Inflection?

The sort of thing that would work in this framework:

Derivation – no movement – base
visible at spell-out of suffix



Inflection – movement – base
invisible at spell-out of suffix

