Nonanalytic listing and the theory of the stem level

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INTRODUCTION: THE STEM-LEVEL SYNDROME REDUX

The story so far

§1 Session ❶ posed the challenge of explaining the unique propensity of stem-level phonological processes (*both* prosodic *and* segmental) to exhibit unbounded cyclic reapplication.

Examples up to now:
- Armenian high vowel deletion ❶§16
- English stress assignment ❶§17
- English trochaic shortening ❶§18
- Spanish high vocoid syllabification ❶§19
- English /aɪ/-raising ❸§11-§26

§2 Session ❸ briefly outlined a theory of the stem-level syndrome consisting of three elements (Bermúdez-Otero 2012: 26-39, 2013b):

(i) *Optimality-theoretic computation*
- The cyclic transmission of phonological properties requires high-ranking input-output faithfulness in the relevant cycles;
- in turn, high-ranking IO-faithfulness at the stem level entails a relationship of mutual implication between cyclic reapplication and constrastivity (Chung's Generalization).

(ii) *Nonanalytic listing*
- If the stem-level output representation of a base is stored,
- then its stem-level properties will (when protected by high-ranking faithfulness) be cyclically transmitted to other complex stem-level forms derived from it online.

(iii) *A dual-route race model of processing*
- Cyclic reapplication effects emerge only when the online derivation of complex stem-level forms wins in the production race over the lexical retrieval of inherited noncyclic forms;
- therefore, cyclic reapplication effects spread historically by lexical diffusion and are sensitive to lexical token frequency.

We saw that, surprisingly, /aɪ/-raising in Mississippi supported this theory (◄❸§11-§26).

Refining the theory

§3 *OT and Chung's Generalization*

(i) English stress assignment and /aɪ/-raising illustrate the positive version of Chung's Generalization: i.e. contrastivity ↔ cyclicity.

(ii) But the **negative version of Chung's Generalization** predicts that
- there exist stem-level processes that enforce purely allophonic distributions over underived items,

and
- such processes do not show cyclic misapplication in complex stem-level derivatives, even if they misapply in word-level forms, giving rise to derived contrasts.

This prediction is confirmed by evidence from **/əʊ/-allophony in the London vernacular**.

§4 *Analytic and nonanalytic listing*

(i) The **nonanalytic listing of bases** suffices for a storage-driven account of cyclic misapplication effects in stem-level derivatives.

(ii) The nonanalytic listing of those bases can often be independently motivated with evidence from **semiproductivity, semantic noncompositionality**, and **phonological idiosyncrasy**.

(iii) Stratal analyses often assign highly productive and transparent affixes—notably including some **inflectional markers**—to the stem level, but this is unproblematic insofar as those affixes are **peripheral in stem-level domains**.

(iv) In a fully articulated theory of the stem level, therefore,
- **splits between stem-level and word-level affixation emerge diachronically** from historical changes which narrow down the domains of phonological processes (►❻,❼);
- nonanalytic listing is responsible only for cyclic reapplication effects.

(v) In turn, factors such as noncompositionality also often require the storage of word-level and even phrase-level constructs. Still,
- the **word and phrase level** remain internally noncyclic because the relevant expressions are **listed analytically**;
- the existence of analytic listing is independently motivated by **psychoLinguistic evidence** (e.g. word-level forms can exhibit surface frequency effects, and yet prime their bases as effectively as the identity prime).

§5 *Dual-route race processing in history*

(i) Stem-level cyclic misapplication exhibits effects of lexical token frequency because it arises when lexical retrieval loses to online derivation from a based stored nonanalytically.

(ii) However, the size of such frequency effects will be **alternation-specific** because **phonetic factors in sound change** exert a separate effect on the historical transmission of cyclic forms.

THE ROLE OF OT: CHUNG'S GENERALIZATION AND ITS NEGATIVE VERSION

Chung's Generalization again

§6 *An instance of cyclic reapplication: English stress assignment* (◄❶§17, ◄❸§11)

		underived item	derived item
		[SL *abracadábra*]	[SL [SL *imagine*] *ation*]
☹	1st cycle	[ω (***à***.*bra.*)*ca.*(*dá.bra*)]	[ω *i.*(***má***.*gi*)<*ne*>]
	2nd cycle	—	[ω *i.*(***mà***.*gi.*)(*ná.*)<*tion*>]
		initial dactyl	initial dactyl cyclically blocked

§7 In OT, cyclic inheritance requires high-ranking faithfulness:

[ω *i.*(***má***.*gi*)<*ne*>] ☹	IDENT-stress	ALIGN(ω,L;Ft,L)
[ω (*ì.ma.*)*gi.ná.tion*]	*!	
☜ [ω *i.*(***mà***.*gi.*)*ná.tion*]		*

§8 In Stratal OT, high-ranking faithfulness at the stem level entails contrast.

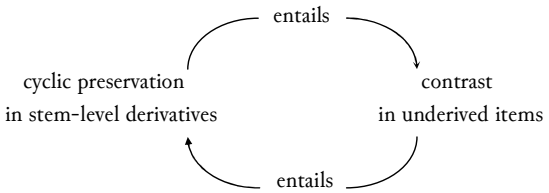
The prediction proves correct: regular ***à****bracadábra* contrasts with exceptional *apò**theósis***

/apòtheosis/ ☹	IDENT-stress	ALIGN(ω,L;Ft,L)
[ω (*à.po.*)*the.ó.sis*]	*!	
☜ [ω *a.*(***pò***.*the*).*ó.sis*]		*

The fine print again (◄❸§13):

- Exceptionality and robust contrast are points on the same continuum; they do not differ qualitatively from each other or require different constraint rankings (e.g. Kager 2009: 398, 412, 429).
- Exceptions are not random, but follow patterns captured by the weights of crucially dominated markedness constraints in the stem-level hierarchy: cf. Zuraw's (2000, 2010) 'subterranean constraints'.

§9 *Chung's Generalization: the positive version* (p ↔ q)

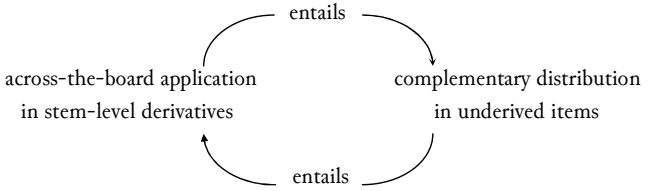


The literature again (◄❸§14):

The generalization is named after Chung (1983: 63). See Bermúdez-Otero and McMahon (2006: 400), Kiparsky (2007), Collie (2007: 252ff, 2008), and Bermúdez-Otero (2012: 31, 2013b), among others.

§10 *Chung's Generalization: the negative version* (¬p ↔ ¬q)

The statement in §9 is logicall equivalent to



§11 The negative version of Chung's Generalization creates a crucial difference between

and
- rule-based Lexical Phonology (Kiparsky 1982a,b; Kaisse & Shaw 1985; Borowsky 1993)
- constraint-based Stratal Phonology (Bermúdez-Otero 2010, 2011, 2018; Kiparsky 2000, 2015).

In rule-based Lexical Phonology, all stem-level processes are claimed to be

- cyclic
- structure-preserving (i.e. non-allophonic)

and
- blocked in nonderived environments (◄❶§5; see also Bermúdez-Otero 2013b: §2-§18)

In constraint-based Stratal Phonology, there are predicted to exist stem-level processes which

- apply allophonically (creating complementary distributions) in underived items,
- apply across the board (exhibiting no cyclic effects) in complex stem-level forms,

but
- misapply in word-level expressions, creating morphologically derived contrasts.

Constraint-based Stratal Phonology wins: its prediction is confirmed by London /əʊ/-allophony.

For more examples, see Bermúdez-Otero (2013b: §23).

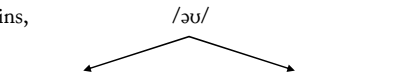
/əʊ/-allophony in the London vernacular

§12 Also known as 'the Cockney GOAT-split'

- Cockney ≈ the traditional vernacular dialect of London's East End (Sivertsen 1960)
  (now competing with Multicultural London English: Kerswill et al. 2007-2010)
- the GOAT vowel = the phoneme /əʊ/ in Wells's lexical-set terminology (1982: 146-147).

§13 *The process* (Wells 1982: 312-3, Sampson 1985, Harris 1990: 97-8)

Within stem-level domains, /əʊ/



§14 The environment for retracted [ɒʊ] is sometimes stated as __ ɬ with /l/ → [ɬ] in codas, rather than __ l σ]

This is likely to have been true of the process in its incipient diachronic stage.

Synchronically, however, Southern British English speakers often show retracted back-vowel allophones before surface light [l]:

e.g. unfronted [uː] before light [l] in *fool-ing* (speaker YF8 in Strycharczuk & Scobbie 2016: 83)

§15 *The process is allophonic*

Perfect complementary distribution in underived items:

e.g.	[ɒʊ]	__ l σ]	[ʊʊ]	__ [σ lV…
		coal		*cola*, *coley* 'type of fish'
		hole		*holy* 'sacred'
		roll		*Roland*
		Walpole		
		pole, poll		

§16 *The process is stem-level*

Cyclic overapplication of retraction when the following /l/ is resyllabified into the onset before a vowel-initial **word-level** suffix ⇨ 'derived contrast' in the sense of Harris (1990):

e.g.	[ɒʊ]	*coal-y* 'coal-like'	cf. [ʊʊ] in	*cola*, *coley*
		hol-ey 'full of holes'		*holy*
		roll-er, roll-ing		*Roland*
		poll-er, poll-ing		

Derivation:

		poll-er	
domains		⟦WL ⟦SL pəʊl⟧ ə⟧	
☉ℒ	(allophony)	.pɒʊl.	retraction before tautosyllabic [l]
𝒲ℒ	(faithfulness)	.pɒʊ.lə.	resyllabification

§17 *No cyclic misapplication in stem-level derivatives!*

e.g.	[ʊʊ]	*Mongol-ian*	} like *coley, holy*
		Walpol-ian†	
		pol-ar	cf. [ɒʊ] in *pole* and *poll-er*

† An established word for same speakers, but elicited as a nonce form from Sampson's (1985: 289) informants.

☞ The negative version of Chung's Generalization (§10) is confirmed!

§18 *Analysis*

(i) Stem-level grammar: *ʊʊlσ] ≫ *ɒʊ ≫ IDENT markedness dominates

(i) Word-level grammar: IDENT ≫ *ɒʊ faithfulness dominates

§19 High-ranking markedness at the stem level enforces complementary distribution in underived items (see §15):

(i) retraction

/ə ʊ/ll ☉ℒ	*ʊʊlσ]	*ɒʊ	IDENT
(ω .*p*[ʊʊ]*ll*.)	*!		*
(ω .*p*[ɒʊ]*ll*.) ☜		*	*

(ii) fronting

/h/ə ʊ/ly ☉ℒ	*ʊʊlσ]	*ɒʊ	IDENT
(ω .*h*[ʊʊ].*ly*.) ☜			*
(ω .*h*[ɒʊ].*ly*.)		*!	*

§20 High-ranking faithfulness at the word level enforces cyclic overapplication of retraction (see §16):

(ω .*p*[ɒʊ]*ll*.)-*er* 𝒲ℒ	IDENT	*ɒʊ
(ω .*p*[ʊʊ].*ller*.)	*!	
(ω .*p*[ɒʊ].*ller*.) ☜		*

§21 High-ranking markedness at the stem level triggers flip-flopping derivations in stem-level derivatives, resulting in complementary distribution within complex stem-level forms (see §17):

Derivation:

		pol-ar	
domains		⟦SL ⟦SL pəʊl⟧ ə⟧	
☉ℒ	(allophony)	.pɒʊl.	retraction before tautosyllabic [l]
〃	〃	.pʊʊ.lə.	fronting

(i) 1st cycle: retraction

/p/ə ʊ/le ☉ℒ	*ʊʊlσ]	*ɒʊ	IDENT
(ω .*p*[ʊʊ]*le*.)	*!		*
(ω .*p*[ɒʊ]*le*.) ☜		*	*

(ii) 2nd cycle: fronting

(ω .*p*[ɒʊ]*le*.)-*ar* ☉ℒ	*ʊʊlσ]	*ɒʊ	IDENT
(ω .*p*[ʊʊ].*lar*.) ☜			*
(ω .*p*[ɒʊ].*lar*.)		*!	

/əʊ/-retraction cannot be word-level

§22 *Prosodic bounding analysis* (e.g. Szpyra 1989: 178-200, Hammond 1999, Raffelsiefen 2005)

retraction before tautosyllabic /l/: /əʊ/ → [ɒʊ] / __ l $_{\sigma}$]

but word-level suffixes adjoin under ω′	*pole/poll*	*pol-ar*	*poll-er*
and ω-boundaries block resyllabification	($_{\omega^o}$ .pɒʊl.)	($_{\omega^o}$ .pɐʊ.lə.)	($_{\omega'}$ ($_{\omega^o}$ .pɒʊl.) .ə.)

Objection: this prosodification is inconsistent with the phonetic data on preboundary lengthening (Bermúdez-Otero 2011: §4).

§23 *Extrinsic rule-ordering analysis* (cf. Kiparsky 1985: 91)

retraction before tautosyllabic /l/: /əʊ/ → [ɒʊ] / __ l $_{\sigma}$] (word level)

		pole/poll	*pol-ar*	*poll-er*
domains		⟦$_{WL}$ ⟦$_{SL}$ pəʊl⟧⟧	⟦$_{SL}$ ⟦$_{SL}$ pəʊl⟧ ə⟧	⟦$_{WL}$ ⟦$_{SL}$ pəʊl⟧ ə⟧
$\mathfrak{S}\mathfrak{L}$	1st cycle	.pəʊl.	.pəʊl.	.pəʊl.
	2nd cycle		.pəʊ.lə.	
$\mathfrak{W}\mathfrak{L}$	/əʊ/-allophony	.pɒʊl.	.pɐʊ.lə.	.pɒʊl.ə.
	resyllabification	—	—	.pɒʊ.lə.

Objections (◀❷§33): • devalues the concept of cyclic domain;
• requires a very powerful learning theory.

§24 *Direct reference to brackets* (see Harris 1990: 98; also Mohanan 1982: 121 and Halle & Mohanan (1985: 96)

retraction before base-final /l/: /əʊ/ → [ɒʊ] / __ l] (word level)

		pole/poll	*pol-ar*	*poll-er*
domains		⟦$_{WL}$ ⟦$_{SL}$ pəʊl⟧⟧	⟦$_{SL}$ ⟦$_{SL}$ pəʊl⟧ ə⟧	⟦$_{WL}$ ⟦$_{SL}$ pəʊl⟧ ə⟧
$\mathfrak{S}\mathfrak{L}$	1st cycle	[.pəʊl.]	[.pəʊl.]	[.pəʊl.]
	2nd cycle		[[.pəʊ.l]ə.]	
	Bracket Erasure†	—	[.pəʊ.lə.]	—
$\mathfrak{W}\mathfrak{L}$	input	[.pəʊl.]	[.pəʊ.lə.]	[[.pəʊl.] ə]
	resyllabification	—	—	[[.pəʊ.l] ə]
	/əʊ/-allophony	[.pɒʊl.]	[.pɐʊ.lə.]	[[.pɒʊ.l] ə]

† Internal brackets erased at the end of each stratum (Kiparsky 1982a: 140; cf. *SPE:* 20).

Objection: misses a generalization,
since we still need /əʊ/-retraction before tautosyllabic non-base-final /l/

e.g *poultry* [pɒʊl.tɹi], *[pɐʊl.tɹi]
no bracket follows /l/ in the WL-input [.pəʊl.tɹi.]

§25 Conclusion

- Constraint-based Stratal Phonology predicts the existence of two types of phonological processes with sublexical domains (i.e. stem-level processes):
  (i) one type is structure-preserving and shows cyclic reapplication effects in its domain;
  (ii) the other is purely allophonic and applies across the board in its domain.
- The prediction is correct! English stress assignment is type-(i) (§6-§8)
  Cockney /əʊ/-allophony is type-(ii) (§12-§24)

THE ROLE OF STORAGE: ANALYTIC AND NONANALYTIC LISTING

Nonanalytic listing

§26 *Another instance of cyclic reapplication: English trisyllabic shortening* (◀❶§18)

		⟦$_{SL}$ ⟦$_{SL}$ ⟦$_{SL}$ *metre* ⟧ *ical* ⟧ *ity* ⟧	
$\mathfrak{S}\mathfrak{L}$	1st cycle	mét̀re	
	2nd cycle	mét̀rical	← ó antepenultimate only in this cycle
	3rd cycle	mèt̀ricálity	

§27 The insight behind the storage-driven approach to stem-level cyclic reapplication:

Metricality will cyclically inherit the derived short vowel in the first syllable of *metrical* if

- *metrical* has an entry in the permanent lexicon (i.e. in long-term memory);
- the phonological representation stored in the lexical entry for *metrical* is the one generated by the stem-level phonology;
- *metricality* is derived from the lexical entry for *metrical* by suffixing *-ity* and reapplying the stem-level phonology.

§28 ⇨ The lexical entry for *metrical*:

- not METRICAL ↔ /miːtɹ/-/ɪkl/ 'analytic' (URs of the pieces)
- but rather METRICAL ↔ ($_{\omega}$ ($_{Ft}$ mét.tɹɪ.) kəl.) 'nonanalytic' (SL-output)

For a more elaborate theory of the format of lexical entries, see Bermúdez-Otero (2013a: 50-57, and ►❺).

§29 The insight in general form:

> Cyclic misapplication can occur within a stem-level derivative if its base is stored nonanalytically.

Independent evidence for the nonanalytic listing of stem-level derivatives

§30 Many a stem-level derivative must have its own lexical entry because its semantics is **not fully compositional**:

e.g. *edit-or* 'one who edits' → *edit-or-ial* 'pertaining to the editor'
but also 'editor's opinion piece'
globe 'sphere / Earth' → *glob-al* 'Earth-wide'
but not *'spherical'

Noncompositionality is prevalent among **deradical items** (Marvin 2002, Arad 2003, Embick & Marantz 2008), which are always stem-level; but it is not limited to such items (e.g. Marantz 2013).

§31 Similarly, many a stem-level derivative must have its own lexical entry because it is the output of a **semiproductive** morphological process,
and therefore the outputs of the process that do exist must be listed in the lexicon:

E.g.		*-ion*	*-al*	*-ance*
a. *commit*		*commission*	*committal*	*committance*
	OED entry?	yes	yes	yes ('obsolete, rare')
	tokens per 10^6 words in BNC	112.04	2.65	0
b. *permit*		*permission*	*permittal*	*permittance*
	OED entry?	yes	no	yes
	tokens per 10^6 words in BNC	33.84	0	0
c. *submit*		*submission*	*submittal*	*submittance*
	OED entry?	yes	yes ('rare')†	yes ('obsolete')
	tokens per 10^6 words in BNC	15.66	0	0

† Frequent in American English, but only as the nominalization of transitive *submit* (as in *submit an application*); cf. intransitive *submit to authority*.

Data from Bermúdez-Otero (2012: 26). For the general principle, see e.g. Jackendoff (1975) and Jackendoff & Audring (2018: 11-12, 14).

§32 The semantic noncompositionality (§30) and semiproductivity (§31) of stem-level constructions requires that a great many stem-level forms should have their own lexical entries.

In turn, **phonological idiosyncrasy** requires that those lexical entries should be nonanalytic:

e.g. regular *-ic* suffixation triggers penultimate stress
***á**crobat* ~ *acrob**á**t-ic*
***á**tom* ~ *at**ó**m-ic*
***í**dyll* ~ *id**ý**ll-ic*
*m**é**tal* ~ *met**á**ll-ic*
*t**í**tan* ~ *tit**á**n-ic*
etc
but cf. exceptional *Árab* ~ *Árab-ic*
Cáthol-ic

The analytic entry ARAB ↔ /æɹæb/-/ɪk/ would yield incorrect **Aráb-ic*.

On stem-level inflection

§33 Many stratal analysis require that highly productive, semantically transparent affixes—including inflectional markers—should be affiliated to the stem level:

e.g. • Arabic subject-agreement markers (Kiparsky 2000)
criterion: interaction between stress assignment and high vowel deletion
• Spanish verbal inflection (Bermúdez-Otero 2013a, and ◄❶§19, ◄❷§26)
criterion: interaction between stress assignment and mid vowel diphthongization

It is implausible to argue that all forms containing such affixes are listed.

Q. Is this a problem?

§34 A. No! These affixes occupy **peripheral** positions within stem-level domains;
the relevant cyclic misapplication effects only require **the nonanalytic listing of their bases** (see §27, §29).

E.g. *Arabic stratification* (Kiparsky 2000: 359)

		'he understood'	'he understood us'	'we understood'
domains		[WL [SL fihim]]	[WL [SL fihim] na]	[WL [SL [SLfihim] na]]
𝔖𝔏	1st cycle	fihim	fihim	fihim
	2nd cycle	—	—	fihímna
𝔚𝔏		fihim	fihímna	fhímna

In this type of situation, only the inner stem, viz. (ω fi.him), need be stored nonanalytically;
the correct stratal-cyclic effects would emerge even if the outer stem-level affix, viz. 1PLSBJ *-na*SL, always attached online.

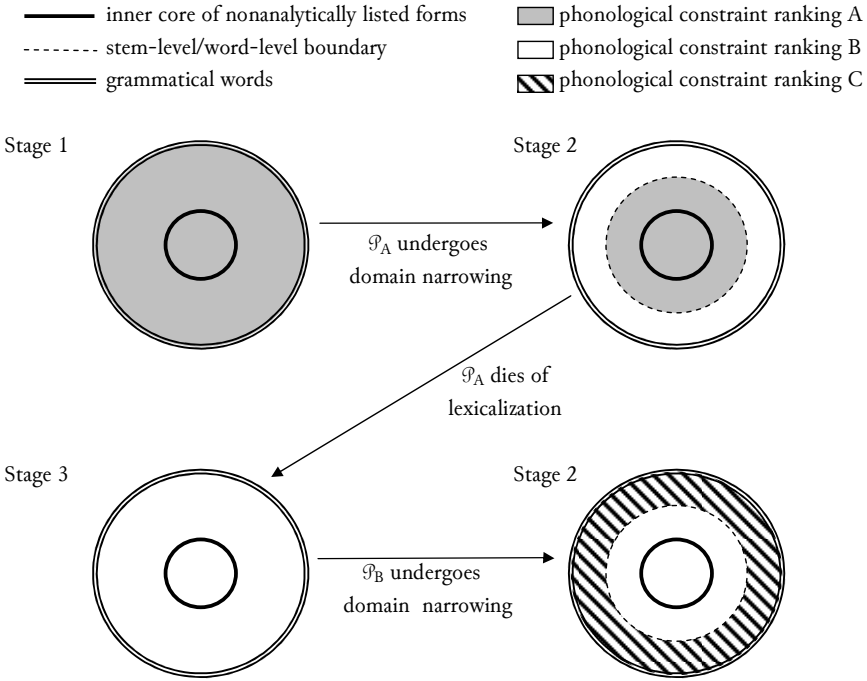
Different causal mechanisms for stratal splits and for stem-level misapplication

§35 (i) In sum, cyclic misapplication effects within forms derived at the stem level occur because the lexicon contains an inner core of stem-level expressions subject to nonanalytic listing (§30-§32):

viz. • deradical forms
• semiproductive, not fully compositional, exception-prone derivation

(ii) This remains the case even while the frontier between stem-level and word-level affixation fluctuates diachronically as a result of diachronic processes of domain narrowing (►❻,❼) and lexicalization (►❻).

§36 *A generic diachronic scenario:*



§37 In this scenario,

- endogenous historical processes of domain narrowing introduce splits between stem-level and word-level affixation;
- the location of the boundary between stem-level and word-level affixation varies widely from one synchronic stage to the other, but inner-core items (§35i) are always stem-level;

- within the stem level, the nonanalytic listing of inner-core items causes unbounded cyclic effects (for phonological properties protected by high-ranking faithfulness).

This explains why language after language exhibits a split between the stem and word levels, with each level exhibiting the expected properties (◄❶§15-§20), even though the location of the boundary between the levels varies widely and apparently erratically across languages (►❻).

Analytic listing

§38 Word-level and even phrase-level expressions may need to be lexically listed:

- *Noncompositional word-level derivatives*
  e.g. (i) English *schólar-ship* noncompositional meaning ('educational grant') but word-level phonology (stress neutral)
  (ii) Dutch and Catalan complex place names (Köhnlein 2015, Mascaró 2016)
  Dutch *Wágening*-[ə]*n* reference unpredictable, but word-level phonology (violation of trisyllabic stress window, schwa after stresseless syllable)
- *Clausal idioms* (e.g. Horvath & Siloni 2019)
  e.g. English *butter wouldn't melt in X's mouth* 'X is acting innocent'

§39 Q. Why doesn't the listing of word- or phrase-level expressions trigger cyclic misapplication?

B. Because such listing, when it occurs, is **analytic**:
phonological properties derived at the word- or phrase-level are not stored in the lexical entry.

E.g. Analytic storage of German word-level *ein-ig* [ae.nɪ**ç**] 'united / unanimous':

EINIG ↔ (ω aen)-ɪɣ

voiced /ɣ/, since voiceless [**ç**] is derived at the WL

Therefore, the representation of DAT.PL *ein-ig-en* in the input to the word level will be

(ω aen)-ɪɣ-ən

Hence, no cyclic reapplication of word-level coda devoicing:

[ae.nɪ.**g**n̩], not *[ae.nɪ.**ç**n̩]

See Buckler & Bermúdez-Otero (2012), Bermúdez-Otero (2018: 106)

§40 *Relevant psycholinguistic evidence* (see further Bermúdez-Otero 2013b: §36)

(i) Effects of frequency on recognition speed

- Two measures of frequency:

  e.g. *taking*

  surface frequency = frequency of *taking*

  base frequency = frequency of TAKE = sum of the frequencies of *take, takes, took, taken,* and *taking*

- General observation:

  higher frequency ⇨ higher recognition speed (e.g. Forster & Chambers 1973)

- So... **base frequency effect** ⇒ evidence for decomposition

  surface frequency effect ⇒ evidence for own entry in the lexicon

  (e.g. Baayen *et al.* 1997, 2002; but cf. Taft 2004)

(ii) Priming

- Priming: exposure to form *a* speeds up the recognition of form *b*
- **Full priming**:

  e.g. German *Waggon-s* 'train_carriage-PL' primes *Waggon* 'train_carriage[SG]' as much as *Waggon* primes itself (identity priming) (Clahsen *et al.* 2003)

- Full priming ⇒ evidence for decomposition

  Reduced priming ⇒ evidence for own entry in the lexicon

§41 *A psycholinguistic argument for the analytic listing of German* -chen *diminutives*

German inflection and derivation (Clahsen *et al.* 2003)

Type of item	Full priming?	Surface frequency effect?
regular *-s* plural: e.g. *Waggon-s*	yes	no
diminutive: e.g. *kind-chen*	yes	yes
irregular *-er* plural: e.g. *kind-er*	no	yes

Recall that **full priming** ⇒ evidence for decomposition (§40ii)

surface frequency effect ⇒ evidence for own entry in lexicon (§40i)

Solution: a decomposed (analytic) entry KINDCHEN ↔ /kɪnd/+/çən/

THE ROLE OF HISTORY: DUAL-ROUTE RACE PROCESSING AND PHONETICS

Irregular stem-level cyclic reapplication (◄3§23-§26)

§42 *The* tràns*p*[ə]rtátion *problem*

In English, cyclic stress inheritance from the base is notoriously irregular among stem-level derivatives containing pretonic sequences of two heavy syllables of which the second is closed by a sonorant consonant.

See Chomsky and Halle (1968: 38-39, 116, 161), Liberman and Prince (1977: 299-304), Kiparsky (1979: 428-29), Halle and Kenstowicz (1991: 460-61), Burzio (1994: §6.3), Pater (2000), Marvin (2002: 60-70), Hammond (2003), Collie (2007: ch. 2), and Kraska-Szlenk (2007: §8.1.2), among others.

a. the cyclic pattern		*cond*[é]*mn*	*còn*d[è]*mn-átion*
		imp[ɔ́]*rt*	*ìmp*[ɔ̀]*rt-átion*
	cf.	*cómp*[ə]*nsàte*	*còmp*[ə]*nsát-ion*
		cónt[ə]*mplàte*	*còmt*[ə]*mplát-ion*
b. the noncyclic pattern		*cons*[ɔ́]*rve*	*còns*[ə]*rv-átion*
		*tràns*p[ɔ́]*rt*	*tràns*p[ə]*rt-átion*

§43 Not reducible to morphosyntactic constituency, pace *SPE* and DM:

- Chomsky and Halle's (1968: 39, 112, 116) suggested solution for the *tràns*p[ə]*rtátion* problem:

  (a) semantics of argument-structure nominal ⇨ V-based derivation ⇨ cyclic stress

  (b) semantics of referential nominal ⇨ √-based derivation ⇨ noncyclic stress

  e.g. (a) *còn*d[è]*nsátion* [N [V condense] ation] 'act of condensing'

  Andrew's skilful cond[è]*nsation of the argument into a few sentences was brilliant.*

  (b) *còn*d[ə]*nsátion* [N [√ condense] ation] 'condensed substance'

  I used a cloth to wipe the cond[ə]*nsation from the windscreen.*

  For argument-structure vs. referential nominals, see Borer (2003: §4). For the inability of roots to trigger cycles, see Kiparsky (1982b: 32-33, 1982a: 144-145) and Inkelas (1989: §3.5.5). Chomsky and Halle's idea has been restated in terms of Phase Theory (e.g. Marvin 2002: 39, Arad 2003: 740, Embick & Marantz 2008: 11, Embick 2010).

- But the correlation does not in fact hold up:

  In Noboa, *the plaintiffs argued that the airline's transp*[ə]*rtation of the human ashes in the valuable cargo section of the aircraft* [...] *was sufficient to justify a finding of wilful misconduct on the part of the airline.*

  (International Air Transport Association, *The Liability Reporter*, 9, February 2006)

§44 *The effect of lexical token frequency*

Noncyclic stress is more likely when the base has relatively low token frequency (◀❸§25):

			tokens per millions words in spoken section of COCA		
			base		derivative
a.	cyclic stress				
	cond[ɛ́]*mn*	*còn*d[ɛ̀]*mn-átion*	7.09	>	2.57
	imp[ɔ́]*rt*	*ìmp*[ɔ̀]*rt-átion*	5.15	>	0.62
b.	variable stress				
	cond[ɛ́]*nse*	*còn*d[ɛ̀-ə]*ns-átion*	0.28	≈	0.22
c.	noncyclic stress				
	cons[ɜ́]*rve*	*còns*[ə]*rv-átion*	1.65	<	9.11
	*tràns*p[ɔ́]*rt*	*tràns*p[ə]*rt-átion*	7.23	<	23.54

Anecdotal data from Bermúdez-Otero (2012: §3.3.3), based on Kraska-Szlenk (2007: §8.1.2); but the effect has been replicated in rigorous statistical studies:

- see Collie (2007, 2008) on pretonic sequences of the types *σ̆σ̆σ́*... and *σ̆σ̆σ́*...
  e.g. *antícipate* ~ *antìcipát-ion* (cyclic) ~ *àntìcipát-ion* (noncyclic)
- see Dabouis (2017) on cyclically derived sequences of the type *σ̀σ́*...
  e.g. *colléctive* ~ *collèctiv-íty* (cyclic) ~ *còllectiv-íty* (noncyclic)

§45 *The effect of phonetics*

- The likelihood that stress assignment will fail to reapply cyclically varies according to context in the derived form:

probability of non-reapplication:
*σ̀*__*σ́*... e.g. *tràns*p[ə]*rtátion*, despite *tràns*p[ɔ́]*rt*
>
*σ̀*__*σ̆σ́*... e.g. *àntìcipátion*, despite *antícipate*
>
*σ̆*__*σ̆σ́*... e.g. *dìssimilátion*, despite *dissímilate*

See Collie (2007: 149) for a rigorous comparison of the *àntìcipátion* and *dìssimilátion* cases using dictionary data from Jones (2003).

- One possible interpretation of this cline is that it reflects relative perceptibility (Bermúdez-Otero 2012: §3.3.3):

the contextual phonetic cues to metrical prominence (presence of a foot-head) are
better in *σ̆*__*σ̆* (target syllable relatively long; flanking σ's headed by reduced vowels)
worse in *σ̀*__*σ́* (target syllable relatively short; flanking σ's headed by full vowels).

The diachronic competition between cyclic and noncyclic forms

§46 Both the effect of lexical token frequency (§44) and the effect of perceptibility (§45) can be explained diachronically:

- Assume an initial stage of noncyclic stress: i.e. *tràns*p[ə]*rtátion*.
- Once the relevant metrical faithfulness constraints are promoted in the stem-level phonology (►❻,❼), forms with cyclic stress, i.e. *tràns*p[ɔ̀]*rtátion*, first appear when online derivation from the nonanalytically listed base, i.e. *tràns*p/ɔ́/*rt*, beats the lexical retrieval of the inherited form *tràns*p/ə/*rtátion*.

  This assumes a dual-route race model of morphological processing: see Schreuder & Bayen (1995), Baayen et al. (1997), Hay (2003).
- After being produced, the new cyclic forms are nonanalytically listed too.
- Thereafter, the outcome depends on the balance of forces favouring the diachronic transmission of cyclic and noncyclic forms, i.e. *tràns*p/ɔ̀/*rtátion* vs *tràns*p/ə/*rtátion*.

§47 One mechanism boosts the transmission of *tràns*p/ɔ̀/*rtátion*:

☞ Whenever on-line derivation from (ω *tràns*p/ɔ́/*rt*)+/*ation*/ wins the race against lexical search, the output is (ω *tràns*p[ɔ̀]*rtátion*).

The magnitude of this effect depends on
the relative retrieval speed of TRANSPORT and TRANSPORTATION,
which in turn depends on their relative resting activation,
which in turn depends on their relative token frequency.

☞ In fact, on-line derivation from (ω *tràns*p/ɔ́/*rt*)+/*ation*/ will typically lose the race against the retrieval of a stored form because low-frequency TRANSPORT has lower resting activation than high-frequency TRANSPORTATION (see §44).

§48 Another mechanism boosts the transmission of *tràns*p/ə/*rtátion*:

☞ The foot-head on the second syllable of *tràns*p/ɔ̀/*rtátion* is relatively poorly cued phonetically because the syllable is weaker—and so shorter—than both its neighbours, which are also full-vowelled.

So: *tràns*p/ɔ̀/*rtátion* has a nonzero chance of being misperceived as *tràns*p/ə/*rtátion*.

The magnitude of this effect is **alternation-specific** (§45) because it depends on phonetic cue strength:

*tràns*p/ɔ̀/*rtátion* runs a greater risk of being misperceived as *tràns*p/ə/*rtátion*
than *dissìmilátion* does of being misperceived as *dìssimilátion*.

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