

[ðə swi'ŋpmitə 'tɜ:nd ə'genst sə 'miŋis 'kæmbəl]  
Evidence for Chung's Generalization

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INTRODUCTION

§1 *Postnasal plosive deletion*

- a. *iamb* ['ai.æm] ~ *iamb-ic* [ai.'æm.bi:k]  
b. *long* [lɒŋ] ~ *e-long-atev* ['i:lɒŋ.ɡeɪt]

This paper addresses the interaction between morphology and phonology in these alternations.

§2 I show that Stratal OT predicts facts that have typically been ignored in previous accounts:

in Stratal OT, as a matter of logical necessity,

- (a) if there exist alternation patterns like *bomb* ~ *bomb(-)ard* ~ *bomb-ing*, (§13)  
then there must exist forms like *bomb-ology*, *dumb-ocracy*, etc; (§14)

and, in turn,

- (b) if there exist forms like *swing-ometer*, *Peking-ése*, etc, (§14)  
then there must exist forms like *dinghy*, *hangar*, etc. (§10)

Some previous accounts of postnasal plosive deletion: Chomsky and Halle (1968: 85); Mohanan (1982: 121-22), Mohanan and Mohanan (1984: 577-78), Halle and Mohanan (1985: 62-64, 95-96), Kiparsky (1985: 89-90), Kaisse and Shaw (1985: 23); Borowsky (1993); Newell and Scheer (2007). Stratal OT account: Bermúdez-Otero (forthcoming: ch. 1).

§3 The correct prediction stated in §2(b) instantiates a key theorem of Stratal OT:

*Chung's Generalization*

If a phonological process displays cyclic misapplication inside stem-level domains (e.g. *bomb-ology*, *swing-ometer*), then it must either be neutralizing (e.g. *bomb-ing*, cf. *summ-ing*) or at least sustain lexical exceptions (e.g. *hangar*; cf. *anger*, *finger*, etc.)

On Chung's Generalization, see Bermúdez-Otero and McMahon (2006: 400), Kiparsky (2007), Collie (2007: 252ff). The theorem is named after Chung (1983: 63).

- §4 The analysis exposes the inadequacies of accounts couched in rule-based Lexical Phonology:
- Inadequate empirical coverage:  
there is no explanation for *bomb-ology*, *swing-ómeter*, and *din~~g~~hy*.
  - Insufficiently restrictive theory of access to morphological information in phonology:  
a segmental rule is directly triggered by a morphological bracket (⌈]).
  - Devaluation of the concept of cyclic domain:  
a rule is assigned to the word level even though it cannot see word-level affixes.
  - Incorrect characterization of the stem-level phonological processes:  
Strict Cycle Condition (which is stipulative and false) instead of Chung's Generalization (which is a theorem and true).
- §5 The analysis exposes inadequacies in the theory of Transderivational Correspondence (e.g. Benua 1997):
- Transderivational Correspondence fails to predict Chung's Generalization.

#### THE RECEIVED VIEW OF POSTNASAL PLOSIVE DELETION: ITS LIMITATIONS

- §6 Since *SPE* (Chomsky and Halle 1968: 85), most accounts of postnasal plosive deletion (see references in §2) have covered only a proper subset of the empirical facts.

In §7 to §16 I offer a first approximation to postnasal plosive deletion based on this partial evidence and I highlight its crucial limitations.

#### Phonological conditions

- §7 Within a morphological domain to be specified (see §12-§14 below), a noncoronal voiced plosive cannot occur in the coda after a (homorganic) nasal.

a.	<i>bomb</i>	[bɒm]	~	<i>bomb(-)ard</i>	[bɒm.'bɑ:d]
	<i>crumb</i>	[kɹʌm]	~	<i>crumb(-)le</i>	['kɹʌm.bɫ]
	<i>iamb</i>	['aɪ.æm]	~	<i>iamb-ic</i>	[aɪ.'æm.bɪk]
b.	<i>long</i>	[lɒŋ]	~	<i>e-long-atev</i>	['i:lɒŋ.geɪt]

The alternation pattern in (a) is shared by all present-day English dialects; the pattern in (b) occurs only in some dialects, which include 'General American' and RP. My discussion focuses on RP.

§8 The alternation between [mb] and [m] is neutralizing:

- underlying /mb/ and /m/ contrast where there is an onset slot available;
- but their contrast is neutralized in the coda.

e.g.	/mb/		/m/
	<i>iamb-ic</i>	[ai.'æm.bɪk]	≠ <i>atom-ic</i> [ə.'tɒ.mɪk]
but	<i>iamb</i>	['ai.æm]	= <i>atom</i> ['æ.təm]

§9 The alternations between [ŋg] and [ŋ] is nearly allophonic, as [ŋg] and [ŋ] are in near complementary distribution within the relevant morphological domain.

- Within the relevant morphological domain, [ŋg] is forbidden in the coda:

e.g. *long* [lɒŋ], \*[lɒŋg]

- Within the relevant morphological domain, [ŋ] is almost completely forbidden in the onset

e.g. *anger* ['æŋ.gə], \*['æ.ŋə]  
*finger* ['fɪŋ.gə], \*['fi.ŋə]

§10 However, the ban on onset [ŋ] within the relevant domain has lexical exceptions:

e.g. *hangar* ['hæ.ŋə], *dinghy* ['dɪ.ŋi] (also ['hæŋ.gə], ['dɪŋ.gi])  
*Sir Menzies* ['mi.ŋɪs] *Campbell*<sup>†</sup>  
*Birmingham* ['bɜ:.mi.ŋəm], *Nottingham* ['nɒ.tɪ.ŋəm], etc. (see Wells 1990: *sub vocibus*)

<sup>†</sup> British politician who was forced to step down as leader of the Liberal Democrat party on 15 October 2007—whence my facetious title noting that ‘the swingometer turned against him’ (on swingometers in British politics, see §14c below). The name ['mi.ŋɪs] originates in Scotland; the spelling <Menzies> is a corruption of <Minzies> with the letter yogh <ɣ>, which was the equivalent of <g> in early English scripts. See [http://en.wikipedia.org/wiki/Sir\\_Menzies\\_Campbell](http://en.wikipedia.org/wiki/Sir_Menzies_Campbell).

§11 ☞ The fact that [ŋg] and [ŋ] are not in perfect complementary distribution within the relevant morphological domain has hardly played any rôle in previous accounts.

It is, however, crucial to the success of a Stratal OT analysis.

### Morphological conditions

§12 In the light of the partial data-set analysed in Chomsky and Halle (1968: 85) and subsequent work, the morphological domain of postnasal plosive deletion might be characterized as follows:

- transparent application morpheme-internally and before stem-level suffixes,
- overapplication before word-level suffixes.

where...	<i>SPE</i>		Siegel (1974)		Booij and Rubach (1987)		Stratal OT
	+	≈	level 1	≈	cyclic	≈	stem-level
	#	≈	level 2	≈	postcyclic	≈	word-level

§13	a. monomorphemic / stem-level	b. word-level
	<i>bomb</i> [bɒm]	<i>bomb(-)ard</i> [bɒm.'bɑ:d]
	<i>crumb</i> [kɹʌm]	<i>crumb(-)le</i> ['kɹʌm.bl]
	<i>long</i> [lɒŋ]	<i>e-long-atev</i> ['i:.lɒŋ.geɪt]
		<i>bomb-ing</i> ['bɒ.miŋ]
		<i>crumb-y</i> ['kɹʌ.mi]
		<i>long-ish</i> ['lɒ.ŋɪʃ]

[If you want to know about the synthetic comparatives *long-er* ['lɒŋ.gə], *strong-er* ['strɒŋ.gə], and *young-er* ['jʌŋ.gə], and the corresponding superlatives, ask me during the question period...]

§14 However, previous accounts ignore evidence of overapplication before stem-level suffixes:

a. *bomb-ology* [bɒ.'mɒ.lə.dʒi]

“A great tonic following just a tad too much CNN, liberation **bombology** and our friend Dubwya”

<http://www.davidrisstrom.org/NewsApr-Jun03.html>

[pronunciation of *bombology* confirmed in personal communication]

Coyne, James P. (1990). ‘**Bombology**’. *Air Force Magazine Online* 73: 6. Available at <https://www.aef.org/magazine/1990/0690bomb.asp>

cf. *bomb(-)ard* [bɒm.'bɑ:d]

b. *dumb-ocracy* [dʌ.'mɒ.kɹə.si]

“**Dumbocracy** (duh'mock'rasseeeeeeeee) is the most widespread form of government in the whole wide world and its environs.”

<http://uncyclopedia.org/wiki/Dumbocracy>

cf. *dumb-o* ['dʌm.bəʊ] “A slow-witted or stupid person” (*OED*<sup>2</sup>: *sub voce*).

c. *swing-ometer* [swɪ.'ŋɒ.mi.tə]

“A device consisting of a dial with a movable pointer, used to demonstrate (esp. on television) how a likely or observable ‘swing’ should influence the outcome of an election”

*OED*<sup>2</sup> [pronunciation also in Wells (1990)]

See also <http://news.bbc.co.uk/1/shared/vote2005/swingometer/html/labcon.stm>

Note [ŋ] in onset! Cf §9.

d. *Peking-ése* [pi:.ki.'ɲi:z]

“The form of Mandarin Chinese spoken in Peking (now Beijing)”

≠ *Pekin-ése* [pi:.ki.'ni:z] “Designating a breed of small dog”

*OED*<sup>2</sup> [pronunciations also recorded in Wells (1990)]

Again, note [ɲ] in onset! Cf §9.

Observe also that *-ése* can be independently shown to trigger resyllabification even when attached to free bases: e.g. *Piedmont* [ˈpʰi:d.mɒnˈt] → *Piedmont-ése* [ˌpʰi:d.mɒn.ˈtʰi:z]

§15 Diagnostics of stem-level status for *bomb-ólogy*, *dumb-ócracy*, *swing-ómeter*, *Peking-ése*:

- Stress: primary stress shifts to the right.
- Morphology: *-ology*, *-ocracy*, *-ometer*, *-ese* combine freely with bound roots  
e.g. *pbren-ology*, *plut-ocracy*, *therm-ometer*, *Portugu-ese*.  
[Note that consistently word-level affixes cannot do this.]

§16 ☞ Previous accounts have generally ignored the fact that, within stem-level domains, postnasal stop deletion applies sometimes transparently (§13) and sometimes opaquely (§14).

This fact, however, is crucial to the success of a Stratal OT analysis.

## LEXICAL PHONOLOGY: DELETION AT THE WORD LEVEL

### The early 80s consensus

§17 The evidence of §13 indicates that word-level suffixes are consistently outside the morphological domain of postnasal plosive deletion.

Accordingly, one would have thought that practitioners of Lexical Phonology would have assigned the corresponding rule to the stem level.

They didn't.

See Mohanan (1982: 121-22), Mohanan and Mohanan (1984: 577-78), Halle and Mohanan (1985: 62-64, 95-96), Kiparsky (1985: 89-90), and Kaisse and Shaw (1985: 23).

§18 In fact, they formulated not a syllable-based stem-level rule  
but a bracket-based word-level rule.

$$\left[ \begin{array}{l} -\text{sonorant} \\ +\text{voice} \\ -\text{coronal} \end{array} \right] \rightarrow \emptyset / [+nasal] \_ ] \quad (\text{word level})$$

Halle and Mohanan (1985: 96), after Mohanan (1982: 121).

§19 Sample derivations:

		<i>long</i>	<i>e-long-ate</i>	<i>long-ish</i>
UR		/lɒŋg/	/lɒŋg/	/lɒŋg/
SL	morphology	[ <sub>A</sub> [ <sub>V</sub> lɒŋg]]	[ <sub>V</sub> i: [ <sub>V</sub> lɒŋg] eɪt]	[ <sub>A</sub> [ <sub>V</sub> lɒŋg]]
	phonology (§18 <u>off</u> )	lɒŋg	'i:.lɒŋ.gɛɪt	lɒŋg
Bracket Erasure		.....		
WL	morphology	[lɒŋg]	['i:.lɒŋ.gɛɪt]	[ <sub>A</sub> [lɒŋg] ɪʃ]
	phonology (§18 <u>on</u> )	lɒŋ	'i:.lɒŋ.gɛɪt	'lɒ.ŋɪʃ

**Problem 1: observational inadequacy**

§20 Even if exceptional items like *dinghy* and *hangar* are set aside, still, the word-level rule in §18 wrongly predicts \**swin*[g]-*ómeter*, since there is no word-level bracket between *swing-* and *-ómeter* to trigger postnasal plosive deletion.

[Recall that, following Chomsky and Halle (1968: 85), early 80s Lexical Phonology asserts that English has no underlying \*/ŋ/ and that surface [ŋ] is predictably derived from underlying /ŋg/.]

**Problem 2: brackets as triggers**

§21 The rule in §18 allows a segmental rule to refer directly to morphological brackets.

Cf. a more restrictive theory of access to morphological information in phonology:

*Strong Indirect Reference Hypothesis*

Phonological constraints do not refer to morphological or syntactic information, except for constraints on the alignment of prosodic units with grammatical constituents.

See Inkelas (1989: 10ff.), Bermúdez-Otero (forthcoming).

§22 In fact, the rule in §18 is only marginally different from an *SPE* rule referring to boundary symbols:

$$\left[ \begin{array}{l} -\text{sonorant} \\ +\text{voice} \\ -\text{coronal} \end{array} \right] \rightarrow \emptyset / [+nasal] \_ \#$$

### Problem 3: devaluation of domains

§23 According to §18, plosive deletion applies to the clusters /mb/ and /ŋg/ when immediately followed by a visible morphological bracket at the word-level.

So, postnasal plosive deletion does not know or care what is on the other side of the bracket: i.e. postnasal plosive deletion cannot see word-level suffixes at all.

But, surely, being blind to word-level morphology is the very definition of being stem-level!

☞ Rule §18 is a cheap trick to bypass the evidence of domains: it allows a rule whose true domain is the stem level to be assigned to the word level.

§24 Why, oh why? Why did all the Lexical Phonology analyses of the early 80s indulge in this cheap trick?

Because of faith in the Strict Cycle Condition:

- if postnasal plosive deletion was stem-level, then it had to apply cyclically;
- and, by the Strict Cycle Condition, a cyclic rule could apply in structure-changing fashion only in derived environments;
- but postnasal plosive deletion applied in nonderived environments (e.g. /bɒmb/ → [bɒm]), so it just had to be postcyclic (word-level), never mind the evidence of domains.

For the original Strict Cycle Condition, see Mascaró (1976); for the version that became current in the mid 80s, see Kiparsky (1985: 89-91), Halle and Mohanan (1985: 97), or Kaisse and Shaw (1985: 22). For evidence that it was indeed the Strict Cycle Condition that was responsible for the fiasco of §18, see the discussion in Halle and Mohanan (1985: 96), who considered giving the Condition up but didn't.

§25 But the Strict Cycle Condition is false: see e.g. Kiparsky (1993). End of story.

If the Strict Cycle Condition could be refuted with relatively simple evidence from English, why did it gain such credence? That's another story, going back, like so many others, to *SPE*: see Kaisse and Shaw (1985: §4.1) for a contemporary account.

### STRATAL OT: DELETION AT THE STEM LEVEL

§26 In Stratal OT, cheap tricks like §18 are

- (i) unavailable (by the Strong Indirect Reference Hypothesis in §21)  
and (ii) unmotivated (because in an optimality-theoretic framework the Strict Cycle Condition is unstable anyway).

If word-level affixes are outside the domain of postnasal plosive deletion (§13)  
then postnasal plosive deletion must be stem-level.

☞ Stratal OT restores empirical content to the notion of cyclic domain, sadly subverted in rule-based Lexical Phonology.

### Predicting the contrast between *iam[b]-ic* and *bomb-ology*

§27 The stem level is internally cyclic,

whether conventionally (e.g. Kiparsky 2000) or via nonanalytic listing plus blocking (Bermúdez-Otero and McMahon 2006, Bermúdez-Otero 2007, Collie 2007).

However, only stems can constitute cyclic domains; roots do not trigger cycles.

(See Kiparsky 1982a: 32-33, 1982b: 144-45; Inkelas 1989: §3.5.5)

Therefore,

root + stem-level affix   ⇒ one stem-level cycle   ⇒ stem-level transparency: *iam[b]-ic*  
stem + stem-level affix   ⇒ two stem-level cycles   ⇒ opacity in second cycle: *bomb-ology*

§28

	<i>iambic</i>	<i>bombology</i>
Morphology	[ <sub>A</sub> [ <sub>V</sub> aiæmb] ik]	[ <sub>N</sub> [ <sub>N</sub> [ <sub>V</sub> bɔmb]] ɒlədʒi]
Stem-level domains	[ <sub>SL</sub> aiæmb- ik]	[ <sub>SL</sub> [ <sub>SL</sub> bɔmb] ɒlədʒi]
Stem-level phonology (1 <sup>st</sup> cycle)	ai.'æm.bik	bɔm
(2 <sup>nd</sup> cycle)	—	bɒ.'mɒ.lə.dʒi

§29 Some independent criteria for distinguishing root-based affixation from stem-based affixation:

- *Affixation to bound bases*

If an affix can attach to roots, then it must be able to appear with bound bases:

e.g. *e-lon[g]-ate*

so	<i>e-duc-ate</i>	<i>e-man-ate</i>	<i>e-nunci-ate</i>
	<i>e-dulcor-ate</i>	<i>e-mancip-ate</i>	<i>e-radic-ate</i>
	<i>e-jacul-ate</i>	<i>e-migr-ate</i>	<i>e-vacu-ate</i>
	<i>e-maci-ate</i>	<i>e-mascul-ate</i>	<i>e-viscer-ate</i> etc.

- *Semantic compositionality*

Root-based forms are typically noncompositional.

See Kiparsky (1982a: 136, 1982b: 8), Marvin (2002: 34-39), Arad (2003), Embick and Marantz (2008: 11).



A gratifying success: we've found the full stem-level syndrome in a process that wasn't even recognized to be stem-level in the first place.

§34 Postscript on Transderivational Correspondence:

Transderivational Correspondence fails to predict Chung's Generalization because the ranking of OO-constraints, responsible for mimicking cyclic effects, is entirely independent of the relative ranking of markedness and input-output faithfulness constraints, responsible for contrast.

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