

English /aɪ/-raising: new insights into an old problem

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INTRODUCTION

§1 English /aɪ/-raising: the basics

- (i) In many English dialects, the diphthongal phoneme /aɪ/ exhibits allophonic behaviour like the following:

$$/aɪ/ \rightarrow \begin{cases} [aɪ] & \text{e.g. } \textit{sigh, sign, dive, side} \\ [aɪ̯] & \text{e.g. } \textit{life, sight} \end{cases}$$

This phenomenon used to be called ‘Canadian raising’ after its most famous and canonical instantiation in the Ontario dialect (Chambers 1973),

but • it is found in multiple dialects throughout the English-speaking world (see Moreton 2016: 17 for a list, with references),

and • it continues to arise through sound change in new dialects (e.g. Berkson et al. 2017, Davis et al. 2019).

- (ii) The usual analysis of the diachronically mature, phonologically categorical version of this allophonic pattern is that it involves raising triggered by a following voiceless obstruent under certain prosodic conditions:

$aɪ \rightarrow aɪ̯ / _[-\text{voice}]$ under certain prosodic conditions

E.g. Chambers (1973: 116, 1989: 79), Joos (1942: 141), Paradis (1980), among countless others.

- (iii) Under this analysis, the overapplication of raising before flapped /t/ in words like *writer* and *title* involves a counterbleeding interaction between raising and /t,d/-flapping (e.g. Halle 1962):

	<i>rider</i>	<i>writer</i>	<i>idol</i>	<i>title</i>
UR	/aɪdɪdɪ/	/aɪtɪtɪ/	/aɪdɔ/	/tɪtɪtɔ/
raising	—	aɪtɪtɪ	—	tɪtɪtɔ
flapping	aɪrɪdɪ	aɪrɪtɪ	aɪdɔ	tɪtɪtɔ

§2 Why /aɪ/-raising matters

English /aɪ/-raising has played a prominent role in key debates in phonological theory:

- (i) on opacity e.g. Halle (1962), Chomsky & Halle (1968: 342), Bromberger & Halle (1989: 58–60), Kenstowicz (1994: 6–7), Bermúdez-Otero (2003), Mielke et al. (2003), Idsardi (2006), etc.
- (ii) on lexical abstractness e.g. Hall (2005), Farris-Trimble & Tessier (2019), etc.
- (iii) on acquisition e.g. Bermúdez-Otero (2003), Hayes (2004), Pater (2014), etc.
- (iv) on sound change e.g. Thomas (1991), Moreton & Thomas (2004, 2007), Gussenhoven (2007, 2017), Fruehwald (2013, 2016), Bermúdez-Otero (2014), etc.

§3 Today's agenda

In this talk, I use evidence from English /aɪ/-raising as a parade example of the explanatory power of an approach to phonological alternations that combines three elements (◀❶):

- (i) contemporary constraint-based **Stratal Phonology**
(Bermúdez-Otero 2018 and, specifically on /aɪ/-raising, Bermúdez-Otero 2003),
- (ii) a theory of **lexical storage** in which stem-level outputs are listed nonanalytically
(Bermúdez-Otero 2012: §2.3, Bermúdez-Otero 2013),
- (iii) an understanding of the **diachronic life cycle** of phonological processes
(Bermúdez-Otero 2015 and, specifically on /aɪ/-raising, Bermúdez-Otero 2014, 2017).

This is the topic of my Brugmann Fellow course: www.bermudez-otero.com/research.htm#Leipzig

§4 Preview

The talk makes the following points:

- (i) Synchronically, the **opacity** of the diachronically mature, phonologically categorical version of /aɪ/-raising follows automatically from the affiliation of the process to the **stem level**:
I show this through an analysis of the canonical **Ontario** pattern (Chambers 1973).
- (ii) Since mature /aɪ/-raising is stem-level and sustains lexical exceptions, **Chung's Generalization** predicts cyclic misapplication of /aɪ/-raising within stem-level forms:
I corroborate this prediction with new data from **Mississippi** (Moreton 2016), and I explain the irregular nature of these cyclic misapplication effects in terms of lexical storage.
- (iii) /aɪ/-raising always applies before flapped /t/—even in its incipient, phonetically gradient stage—because it first emerges as a **phonetic enhancement of prefortis clipping**, which is stem-level:
I show that this diachronic account of /aɪ/-raising explains the pattern of rule generalization recently observed in **Fort Wayne**, Indiana (Davis et al. 2019).

(iv) Finally, improving the proposals of Bermúdez-Otero (2003), I sketch a non-stipulative account of the **acquisition of free-ride derivations** in dialects with mature /aɪ/-raising:

e.g. *idol* /aɪdəl/ → [aɪrəl]
title /taɪtəl/ → [taɪrəl]

THE CANONICAL ONTARIO PATTERN: OPACITY THROUGH STRATIFICATION

The canonicity of the Ontario pattern

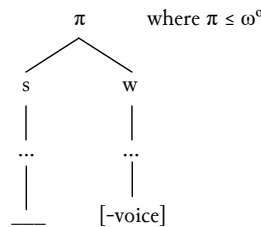
§5 Data from /aɪ/-raising in Ontario are particularly valuable because, in this dialect, the process is

- (i) exhaustively described
- (ii) categorical
- (iii) old already established in the late 19th century;
- (iv) sociolinguistically stable • no differences in application between the 1970s and today, aside from variation in respect of fronting of the nucleus;
 • remarkably identical pattern across the rest of Canada.

See e.g. Chambers (1973, 1989, 2006), Chambers & Hardwick (1986), Rosenfelder (2007), Thomas (1991).

Prosodic conditions on Ontario /aɪ/-raising

§6 The phonological environment of Ontario /aɪ/-raising in a nutshell



(i) Raising is triggered by a following voiceless consonant (C_o):

e.g. *write* [ʁaɪt] cf. *ride* [ʁaɪd]
knife [naɪf] cf. *knives* [naɪvz]

(ii) The trigger C_o must be in a weak branch of the lowest prosodic node dominating both trigger and target:

i.e.	in the coda	<i>cite</i>	[saɪt]
	in the a onset of a following weak syllable	<i>cycle</i>	[ˈsaɪ.kəl]
	in the onset of a following weaker foot	<i>nɪtrəte</i>	[ω [F ₁ 'nɪɪ] [F ₁ tɪɛt]]
but not	in the onset of a following stronger foot	<i>citation</i>	[ω [F ₁ ,saɪ] [F ₁ 'tɛɪʃən]]

(iii) Raising does not apply across prosodic-word (ω^o) boundaries:

e.g. *high school* [ω' [ω 'haɪ] [ω ,sku:l]] cf. unverbated [ω 'hɪɪ,sku:l]
tie shop [ω' [ω 'taɪ] [ω ,ʃɑp]]

Idsardi (2006: 26) reports that, in his idiolect, raised [aɪ] is acceptable in *Don't lie to me*. I have been unable to find another Canadian speaker who concurs with this introspective judgment.

Blocking by ω^o-boundaries correctly predicts nonapplication in transparently prefixed forms:

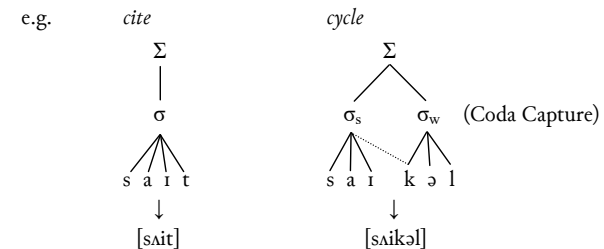
e.g. *bi-centennial* [ω' [ω ,baɪ] [ω sen'tɛniəl]]
tri-syllabic [ω' [ω ,tɹaɪ] [ω sɪ'læbɪk]]
 cf. *bicycle* ['baɪsɪkəl], not *[ω' [ω ,baɪ] [ω 'saɪkəl]] (Chambers 1973: 125)

The examples *bi-centennial* and *tri-syllabic* come from McCarthy (1982: 586), but my native-speaker informants from Ontario confirm that they have the same pronunciations. Exactly the same pattern holds in Ann Arbor (Dailey-O'Cain 1997: 111-112; cf. Vance 1987: 198-199), but not in Moreton's (2016: 24) Mississippi data.

§7 *Excursus: against the ambisyllabic analysis*

Paradis (1980) and Chambers (1989: §2) propose that raising is triggered by a tautosyllabic C_o.

Key assumption: ambisyllabicity à la Kahn (1976).



This analysis incurs a fatal paradox:

- (i) In the canonical Ontario pattern, raising applies to *nɪtrəte* [nɪtɪɛt]: see §6ii. Therefore, the /t/ of *nɪtrəte* must be ambisyllabic in Paradis's analysis. Therefore, secondary stress on the following syllable must not block Coda Capture.
- (ii) If secondary stress on the following syllable does not block Coda Capture, then intervocalic /t/ is ambisyllabic in words like *phòtən* [fòtən]. But, in the Kahnian approach to English syllabification, intervocalic /t/ flaps if ambisyllabic. Therefore, the ambisyllabic approach to Canadian raising predicts that the /t/ of *phòtən* flaps.

☞ This prediction is incorrect: the /t/ of *phòtən* never flaps.

The stratal affiliation of Ontario /aɪ/-raising

§8 Ontario raising underapplies before word-level suffixes (Bermúdez-Otero 2003):

e.g. *eye-ful* [aɪfʊl], *[ˈlaɪfʊl] cf. *Eiffel* [ˈlaɪfəl]
Frau-ship [ˈfɹaʊʃɪp], *[ˈfɹaʊʃɪp]

∴ The conditions of application for Ontario raising are determined at the stem level.

- Not an effect of secondary stress on the affix: cf. *nitràte* [ˈnaɪ.tɹɪt].
- Not an effect of an ω-boundary between stem and affix: see Bermúdez-Otero (2011: §4). Cf. e.g. Szpyra (1989: 178-200), Hammond (1999: 322-329), Raffelsiefen (2005).

Opacity through stratification

§9 I assume Kiparsky’s (1979: 437) analysis of flapping (see also Jensen 2000):

i.e. *hit Ann* /hɪt/ *hit*^[lax] *hitæn*

- at the word level, obstruents become [lax] if not foot-initial
- at the phrase level, lax [t] or [d] flap between in the environment {V,_ɪ}_V

Flapping must be phrase-level because its domain straddles word boundaries.

See e.g. Kaisse & Shaw (1985: 4), among many others.

§10 ∴ Stem-level raising must apply before, and be counterbled by, phrase-level flapping.

	<i>rider</i>	<i>writer</i>	<i>idol</i>	<i>title</i>
UR	/raɪdɔɹ/	/raɪtɔɹ/	/aɪdɔɹ/	/taɪtɔɹ/
∫∫ raising	—	raɪtɔɹ	—	taɪtɔɹ
∫∫∫ flapping	raɪrɔɹ	raɪrɔɹ	aɪrɔɹ	taɪrɔɹ

THE MISSISSIPPI DATA: CHUNG’S GENERALIZATION

Chung’s Generalization

§11 The stem level is internally cyclic (◀❶§16-§19):

each stem-level affix triggers a cycle of the stem-level phonology.

E.g. pretonic secondary stress

	[_{SL} [_{SL} <i>imagine</i>] <i>ation</i>]
1 st cycle	<i>imáginē</i>
2 nd cycle	<i>imàgínation</i>

cf. noncyclic pretonic stress in monomorphemic *àbracadábra*, *dèlicatèssen*, *Mèditerránean*, etc.

§12 In Stratal OT (Bermúdez-Otero 2010, 2011, 2018; Kiparsky 2000, 2015), faithful preservation of a phonological property during a cycle requires high-ranking faithfulness.

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

§13 But, by Richness of the Base, high-ranking faithfulness in the stem-level phonology predicts contrast, whether full (phonemic opposition) or marginal (lexical exceptionality):

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

Background assumptions:

- 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’.

§14 *Chung’s Generalization derived as a theorem*

If a phonological property is cyclically inherited by stem-level derivatives, then it is contrastive (fully or marginally) in underived items, and vice versa.

Bermúdez-Otero (2012: 31). Named after Chung (1983: 63). See also Bermúdez-Otero and McMahon (2006: 400), Kiparsky (2007), Collie (2007: 252ff, 2008), Bermúdez-Otero (2013), and ▶❶.

Lexical exceptions to English /aɪ/-raising

§15 Lexical exceptions to the normal /aɪ/-raising pattern have been observed in many dialects:

(i) Some exceptions involve the unexpected allophone of /aɪ/ before a flap:

- unraised /aɪ/ before etymological /t/-flaps in
neuritis, colitis (Vance 1987: 200)
- raised /aɪ/ before etymological /d/-flaps in
cider (Vance 1987: 201, Fruehwald 2007: 89)
spider (Vance 1987: 201, Fruehwald 2007: 89)
tidy (Fruehwald 2007: 89, Moreton 2016: 40)

These could be explained away as involving lexical redistribution of underlying /t/ and /d/.

(ii) But some exceptions involve /aɪ/ before segments other than flaps:

- unraised /aɪ/ before fortis obstruents in
 - nice* (Vance 1987: 200)
 - bison* [b__sɪ] (Vance 1987: 200)
 - Cyclops* (Chambers 1973: 117, Vance 1987: 200)
- raised /aɪ/ before lenis obstruents or sonorants in
 - cyber* (Fruehwald 2007: 89)
 - tiny* (Fruehwald 2007: 89)
 - tiger* (Vance 1987: 201, Moreton 2016: 41)

§16 Exceptions of the t[ai]ger type require the stem-level ranking IDENT-height >> *ai:

/tʰaɪgəɹ/	§L	IDENT-height	*ai
tʰaɪgəɹ		*!	
tʰaɪgəɹ	☞		*

§17 But the stem-level ranking IDENT-height >> *ai predicts cyclic overapplication of /aɪ/-raising in stem-level derivatives:

- e.g. *typ-ology*
- 1st cycle [sL [sL tʰaɪp] ɒlədʒɪ]
- 2nd cycle [tʰaɪp ɒlədʒɪ] ☞ prosodic conditions for raising not met!

[ω .tʰaɪp.]	§L	IDENT-height	*ai
[tʰaɪp ɒlədʒɪ]		*!	
[tʰaɪp ɒlədʒɪ]	☞		*

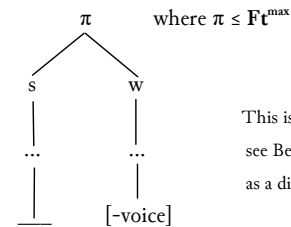
Where are the predicted cyclic misapplication effects?

None is reported by Chambers (1973, 1989, 2006), Vance (1987), Dailey-O’Cain (1997), or Fruehwald (2007, 2013)!

Mississippi /aɪ/-raising confirms the predictions of Chung’s Generalization

§18 The Mississippi pattern of /aɪ/-raising (Moreton 2016) is largely like the canonical Ontario pattern, except

- Somewhat different ‘Southern’ phonetic realizations: unraised [q:], hereafter <^>
raised [aɪ], hereafter <_>
- Following secondary stress blocks raising: e.g. *Pý^tʰ[ə]n* (the snake)
Pý_tʰòn (the program)



This is just a less general version of §6: see Bermúdez-Otero (2015: §22.3.1) for the prosodic hierarchy as a dimension of rule generalization.

§19 Crucially, as in Ontario, there is no raising pretonically:

e.g. *crì_térion, Lỳ_sánder, Mì_céne, tỳ_cóon*, etc.

§20 Moreton reports morphologically driven overapplication in pretonic position in a number of instances:

§21 Irrelevant evidence: neologisms involving stem-level affixes added to native bases

e.g. *figb^t-ology, lighb^t-éria, strit^p-átion, writ^t-átion*, etc.

Why? Because of what I will call the ‘botheration-syndrome’ (►6).

Treating low-productivity stem-level affixes as fully productive, violating their selectional restriction to learned bases, triggers word-level behaviour.

E.g. • *dumb-ocracy* [dʌ.'mɒ.kɹə.sɪ]

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

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

Note the humorous flavour.

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

- bónor* (Linate) → *honór-ify* (stem-level weak retraction)
- márket* (Germanic) → *márket-ify* (word-level stress neutrality)

[See Hayes (2016) on how native speakers can induce the Linate/Germanic distinction from phonotactic evidence.]

§22 Relevant evidence: normal application cyclic overapplication

tʰ^tan → *tì_tán-ic* *tý^pe* → *tý^p-ólogy*
cí^te → *cì_tátion* *Hítì^t-te* → *Hítì^t-t-ólogy*

§23 Q. Why is cyclic overapplication lexically specific, rather than systematic?

A. Because it is mediated by lexical storage (Bermúdez-Otero 2012: 25-40, 2013, and ►4).

- §24 (i) Initial state: $tj^{\wedge}pe \rightarrow tj_p\text{-}ólogy$ (processes start their life cycle as transparent: ►5)
- (ii) Both $tj^{\wedge}pe$ and $tj_p\text{-}ólogy$ are stored nonanalytically in the lexicon, with their derived stem-level properties, including stress and raising.
- (iii) When the ranking IDENT-height \gg * ι i becomes established at the stem level (§16), online derivation of $tj_p\text{-}ólogy$ from stored $tj^{\wedge}pe$ yields innovative $tj^{\wedge}p\text{-}ólogy$.
- (iv) From now on there is lexical competition between
- $tj_p\text{-}ólogy$ produced whenever the inherited form is retrieved directly from the lexicon,
 - $tj^{\wedge}p\text{-}ólogy$ produced whenever online derivation beats lexical retrieval.
- (v) The conservative realization of the derivative tends to win if
- online derivation yields the wrong semantics;
 - the base has relatively low token frequency compared with the derivative, and therefore is retrieved relatively slowly, and so causes online derivation to lose the race against retrieval of the derivative.
- On the dual-route race model of morphological processing, see e.g. Schreuder & Baayen (1995).

§25 Lexical frequency (lexeme tokens in COCA):

normal application cases			cyclic overapplication cases		
TITAN	TITANIC	ratio	TYPE	TYPOLOGY	ratio
4,003	2,710	1.48	100,207	981	102.15
CITE	CITATION	ratio	HITTITE	HITTITOLOGY	ratio
28,732	3,827	7.50	142	0	∞

§26 Semantics:

normal application cases			cyclic overapplication cases	
<i>titanic</i>	‘titan-like’,	but more often	‘awesome, enormous’	
<i>citation</i>	‘act of citing’,	but more often	‘quotation / commendation / summons’	
cyclic overapplication cases				
<i>typology</i>	‘study of types’	also	‘study of crosslinguistic variation’	
<i>Hittitology</i>	‘study of Hittite’			

THE FORT WAYNE DATA: PHONOLOGIZATION AND RULE GENERALIZATION

A puzzle: /aɪ/-raising overapplies before /t/-flaps in ALL English dialects

§27 *Dialect B?*

- Joos (1942: 143–144):

dialect A *write* [ʌɪt] ~ *writer* [ʌɪrɔɪ]

dialect B *write* [ʌɪt] ~ *writer* [ʌɪrɔɪ] (allegedly among Ontario schoolchildren)

Further reports in Rudes (1976) and, indirectly, Picard (1977).

Picked up as an argument for extrinsic rule ordering by Halle (1962), subsequently echoed in Chomsky & Halle (1968: 342), Bromberger & Halle (1989: 58–60), and Kenstowicz (1994: 6–7), among others.

- But it is highly unlikely that dialect B ever existed in Ontario, *pace* Joos.

Chambers (1973: 122): no dialect-B speakers in the 1970s.

Kaye (1990): if there had ever been any, they all without exception either
 (a) underwent lifespan change in adulthood
 or (b) died before the age of 50.

Both (a) and (b) are incredible (on the rarity of lifespan change, see Fruehwald 2017).

- Berkson *et al.* (2017):

acoustic documentation of young speakers in Fort Wayne, Indiana, pronouncing /aɪ/ with a raised nucleus in *write*,
 but not in *ride*, *riding*, and—crucially—*writing*.

But this will turn out to not to be an instance of dialect B: see §42–§44 below.

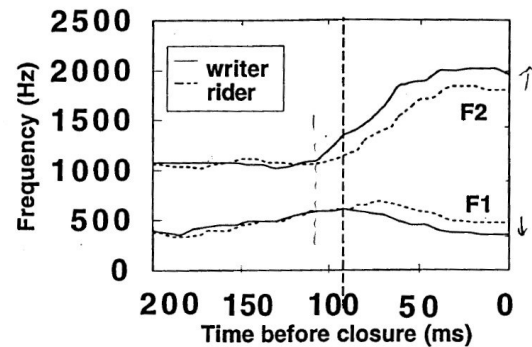
§28 *No diachronic explanation for the absence of transparent dialects*

- If transparency is the unmarked state of affairs because opaque interactions are hard to learn (Kiparsky 1971: 632; cf. Baković 2011) then the virtual absence of transparent dialects like ‘dialect B’ is unexpected.
- Possible diachronic explanation: there are no transparent dialects because...
 in all dialects, /aɪ/-raising is chronologically older than /t/-flapping and the opaque derivation has been retained.
- Counterexample:
 In Philadelphia English, /aɪ/-raising is chronologically younger than /t/-flapping (Fruehwald 2013).

/aɪ/-raising overapplies before /t/-flaps even in its incipient, phonetically gradient stage

§29 *Gradient offglide peripheralization before flapped /t/*

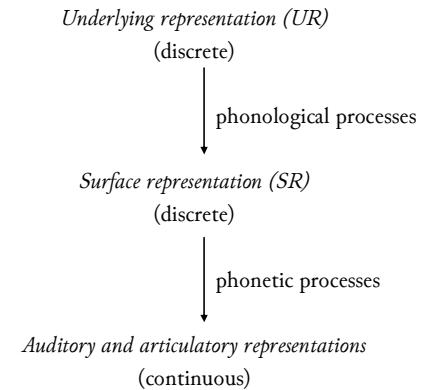
- The phonetic precursor of nucleus raising is offglide peripheralization:
i.e. [aɪt] >peripheralization [ɹaɪt] >raising [ɹaɪt]
See Thomas (1991, 2000), Moreton (2004), Gussenhoven (2007), Moreton & Thomas (2007).
- Offglide peripheralization is highly pervasive: all dialects investigated show it to some degree.
See Kwong & Stevens (1999), Thomas (1991: §4; 2000), Moreton (2004).
- Offglide peripheralization has been observed applying before flapped /t/, even in dialects where the nucleus has not yet been affected by raising, and where peripheralization remains a small, apparently gradient effect.



Time-normalized F1 and F2 trajectories for /aɪ/ in *writer* and *rider* uttered by a college-age American male.
Note identical nuclei but peripheralized offglide in *writer*.
(Kwong & Stevens 1999: 8)

§30 *A puzzle for classical modular feedforward architectures*

- In such architectures, phonology serially precedes phonetics:



See Pierrehumbert (2002: 101-2), Bermúdez-Otero (2007: 502, 2015: §2.1), Bermúdez-Otero & Trousdale (2012: 693), among others.

- Hence, a gradient phonetic process like offglide peripheralization should never be made opaque by a categorical phonological process.
- Yet /t/-flapping is demonstrably categorical (Herd, Jongman & Sereno 2010).

The solution: incipient gradient /aɪ/-raising targets categorically clipped allophones

§31 Prefortis clipping...

- is categorical,
- applies at the stem level,
- is therefore counterbled by phrase-level /t/-flapping in dialects that have the latter.

§32 Incipient gradient /aɪ/-raising...

- is a context-free process targeting categorically clipped allophones of /aɪ/,
- is therefore transparent (it is clipping that is opaque),
- starts out as an enhancement of clipping,
though it can be stabilized and undergo telescoping later (as happened already long ago in Ontario).

§33 Therefore, the correct statement of incipient gradient /aɪ/-raising is

not aɪ → ai / __[-voice] under certain prosodic conditions (context-sensitive)

but ǎɪ → ǎi (context-free)

§34 Derivations in early 20th-century Philadelphia:

		<i>rider</i>	<i>writer</i>	<i>idle</i>	<i>title</i>
Stem level	(clipping)	ɹaɪd	ɹaɪt	aɪdəl	tʰaɪtəl
Word level		ɹaɪdɹ	ɹaɪtɹ	aɪdəl	tʰaɪtəl
Phrase level	(flapping)	ɹaɪrɹ	ɹaɪrɹ	aɪrəl	tʰaɪrəl
Phonetics	(raising)	ɹaɪrɹ	ɹaɪrɹ	aɪrəl	tʰaɪrəl

The relative order of processes...

- was fully determined by their stratal affiliation,
- unproblematically reflected the sequence of corresponding historical innovations.

Prefortis clipping is categorical

§35 *A long-standing question*

“[W]hat is the status of vowel length before voiced sounds in English, *bead* [bi:d] versus *beat* [bit]? The difference is greater than observed in many other languages (Keating 1985), but does it count as phonological?”

(Cohn 2006: 26)

For discussion of the general approach to categoricity and gradience I adopt here, see Bermúdez-Otero & Trousdale (2012: 694-96) and Strycharczuk (2012: 45-7).

§36 *Key points*

- The magnitude of the durational difference between clipped and unclipped allophones in English is extreme
(Chen 1970; see Sóskuthy 2013: 196-99 for a review of later literature).
- Prefortis clipping suffices to cue the laryngeal contrast by itself
(Denes 1955, Klatt 1976, Port & Dalby 1982, among many others).
- Prefortis clipping is itself not sensitive to the magnitude of other phonetic cues to the laryngeal contrast:
crucially, in English dialects with anticipatory assimilation in voicing/voicelessness, vowel duration remains unaffected by assimilation (Jansen 2004: 142).

§37 *If prefortis clipping is categorical, how is it represented in the phonology?*

- A simple proposal:
- voiceless obstruents share the skeletal unit of the preceding vocoid;
 - skeletal attachments iconically reflect durational trade-offs.

<i>bid</i>	<i>bit</i>	<i>bead</i>	<i>beat</i>	<i>bide</i>	<i>bite</i>
X X	X X	X X X	X X X	X X X	X X X
		∨	∨		
ɪ d	ɪ t	i: d	i' t	a ɪ d	ǎ ɪ t

On durational trade-offs in prefortis clipping, see Kluender *et al.* (1988).

On 'mora sharing', see Maddieson (1993), Maddieson & Ladefoged (1993), Hubbard (1995a,b), and Broselow *et al.* (1997).

A similar application of mora sharing to the analysis of Canadian raising has been independently proposed by Onosson (2014).

The environment of prefortis clipping

§38 *The testimony of Wells (1990, 2008)*

Instrumental studies of the effects of secondary stress and word-level suffixation on prefortis clipping are sadly lacking.

However, through the syllabification conventions of the *Longman pronunciation dictionary*, Wells (1990, 2008) reports (presumably introspective) judgements on the incidence of prefortis clipping.

Strikingly, as first observed by Bermúdez-Otero (2004: §21),

the environment of prefortis clipping as reported by Wells

is exactly identical with

the environment of Canadian raising as reported by Chambers)!

• Clipping...	before coda C _g	<i>cite</i>	[sɑɪt]
	before onset C _g in an unstressed σ	<i>cycle</i>	['sɑɪ.kəl]
	before onset C _g in a weaker stressed σ	<i>nitrāte</i>	['nɑɪ.tɹɪt]
• No clipping...	before onset C _g in a stronger stressed σ	<i>citation</i>	[sɑɪ.'tɪʃ.ən]
	across ω-boundaries	<i>high school</i>	['haɪ.sku:l]
	before word-level suffixes	<i>eyeful</i>	['aɪ.fəl]
		but <i>Éiffel</i>	['aɪ.fəl]

∴ Prefortis clipping is stem-level.

Independent confirmation: /aɪ/-raising in Scottish English

§39 *The Scottish Vowel Length Rule (SVLR)*

In Scottish English, /aɪ/, among other vowels, is...

- clipped before all consonants other than voiced continuants e.g. *sign, side, life, sight*
- unclipped elsewhere e.g. *sigh, dive*

On the SVLR, see e.g. Aitken (1981), Agutter (1988), McMahon (1991), etc.

Note that the SVLR is categorical and stem-level, like prefortis clipping in my analysis.

§40 *The SVLR and /aɪ/-raising*

If raising targets clipped tokens of /aɪ/, then, in Scottish English, raising will target tokens of /aɪ/ clipped by the SVLR even when such tokens are followed by a voiced consonant.

This is correct! (Scobbie *et al.* 1999: 241)

- [ɪi] clipped by the SVLR and so raised: *sign* (cf. Ontario!)
side (cf. Ontario!)
life
sight
- [æe] unclipped by the SVLR and so unraised: *lie*
alive

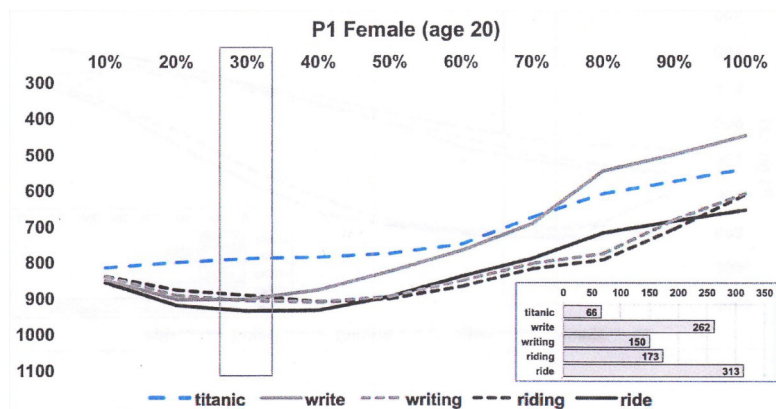
§41 *A unified explanation for /aɪ/-allophony across all English dialects*

	<i>alive</i>	<i>line</i>	<i>light</i>
① /aɪ/-raising in Scotland	[æe]	[ɪi]	[ɪi]
② /aɪ/-raising in Canada, Philadelphia, etc.	[aɪ]	[aɪ]	[ɪi]
③ /aɪ/-monophthongization in Southeastern US	[ɑ:]	[ɑ:]	[ā]

Relatively peripheralized offglides enhance clipping by { prefortis clipping ⇒ ②,③
the SVLR ⇒ ①

Cf. the spread-of-facilitation hypothesis of Moreton (2004: 29) and Moreton & Thomas (2007), which fails to predict the Scottish pattern.

So what about Fort Wayne (cf. §27)?

§42 Davis *et al.* (2017: 6) pattern 1: the putative dialect B

§43 Discussion of the data in §42:

- (i) *Write* shows clear offglide peripheralization in comparison to *ride*, as per §29 above.
- (ii) In contrast, the offglides of *writing* and *riding* are nearly identical. This is unlike the pattern documented by Kwong & Stevens (1999).

- Hypothesis 1: Offglide peripheralization is triggered by phonetically voiceless segments and so does not apply before flapped /t/ ⇒ dialect B.
- Hypothesis 2: Offglide peripheralization has undergone incrementation only in monosyllables, where the durational contrast between clipped and unclipped /aɪ/ is maximal ⇒ **not** dialect B.

Discriminating between hypotheses 1 and 2 requires data on the behaviour of the offglides in pairs of disyllables like *viper* ~ *fiber* and *biker* ~ *tiger*, which Davis *et al.* (2017) do not provide.

§44 In 2017, **before the relevant data had been collected**, I predicted that hypothesis 2 above would prove correct (Bermúdez-Otero 2017: §41, p. 17).

This prediction has now been **confirmed** (Davis *et al.* 2019):

☞ the majority of Fort Wayne speakers with raised [ɪi] in *wri*[t]e but not in *wri*[ɾ]ing do **not** have raising in trochaic words like *Nike* ['naɪki] and *bison* ['baɪsən] either.

IDOLS AND TITLES: THE ACQUISITION OF FREE RIDES

[On the blackboard.]

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