# **Dynamic Versus Static Phonotactic Constraints in English Truncation**

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Phonologists typically recognize two types of complementary distribution. The first type derives from allophonic alternations, a consequence of active, or dynamic sound substitutions upon morphological derivation, which, according to some (for example, Matthews 1974, Somerstein 1974) are driven by actively imposed phonotactic constraints. Allophones *alternate*, and by doing so they are in accordance with phonotactic regularities. This dynamic relationship among allophones should be contrasted with the second sort complementary distribution, in which phonetically distinct values, also, never occupy the same position, but only within morphemes. Static complementary distribution is thus a lexical (morphemic) phonotactic regularity: there are no synchronic alternations involved by which allomorphs dynamically conform to phonotactic constraints.

Due to the distinct properties of dynamic versus static complementary distribution-deriving from dynamically-imposed versus mere static phonotactic constraints-one might predict that the sounds engaged in these two sorts of relationships possess distinct phonological properties. Prosodic morphological processes such as truncation and reduplication provide a unique testing ground for this prediction. These morphological contexts are unique in that they acquire the bulk of their phonological character from a morphologically distinct base. Thus, dynamically-imposed phonotactics should induce alternations even upon truncation or reduplication, provided the relevant phonological context is present: since alternation is induced by dynamically-imposed phonotactics in all other contexts, reduplicative and truncatory morphology should engage in these alternations as well. Such alternations induce non-identity between the base and its correspondent. However, lexically static phonotactic patterns should remain nonalternating in these contexts, even if lexical phonotactic regularities come to be "violated" in the derived form: static phonotactic constraints do not induce alternations elsewhere, and so they do not induce alternations in reduplicative or truncatory morphology either. In short, static phonotactic conditions remain static upon all morphological derivation, including reduplication and truncation, and identity between a base and its relation are maintained.

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These predictions are quite different from those in which the static and dynamic properties of the sound system are treated as phonologically indistinct. Specifically, in structuralist phonology, one of the primary tests for allophonic relatedness is complementary distribution regardless of whether it is of the active or static variety (see, inter alia, Swadesh 1934, Twadell 1935, Bloch and Trager 1942). Similarly, in post-structuralist, generative theories, non-alternating lexical forms are typically treated as subject to dynamic processes in the form of feature-filling lexical redundancy rules or, more recently, optimality-theoretic constraints, and therefore these lexically static sound patterns are treated as indistinct from sound patterns that actually *are* dynamic, that is, those that alternate (see inter alia Chomsky and Halle 1968. Kenstowicz and Kisseberth 1977. 1979, Archangeli 1984, 1988, Kiparsky 1985, McCarthy and Prince 1995). Consequently, both active allophonic alternations and static complementary distributions are predicted to engage in largely identical phonological behavior. Traditional theorists have taxonomically divided reduplicative outputs into three broad classes: regular application, over-application, and under-application (Wilbur 1973). Regular application produces outputs that abide by the regular phonotactics of the language, be they actively or lexically imposed; over-application results in an unexpected identity between the base and its correspondent due to the unexpected application of a phonological rule; under-application results in an unexpected identity between the base and its correspondent due to the unexpected blocking of a phonological process. Thus, traditional approaches account for sound patterning in these contexts by rule ordering (copying vis à vis featurechanging rules), or, more recently, constraint ranking (identity constraints vis à vis phonotactic constraints), irrespective of the dynamic versus static influences on identity (over-, under-application) or non-identity (regular application).

Specifically now, the relevant issue to investigate is whether, in the spirit of structuralist and generative theories, sound correspondents in truncatory and reduplicative morphemes respond solely to distributional generalizations regardless of their static or dynamic natures (1a), or whether such sounds behave in a manner which suggests distinct sensitivities to their dynamic versus static complementary distributions in some sense independent of their correspondents in the base (1b).

a. <u>Standar</u>	d approach:
<u>Static complementary</u> <u>distribution</u> :	<u>Dynamically-imposed</u> <u>complementary</u> <u>distribution</u> :

1.

	Under-, over-, and regular application is detemined by rule ordering, or ranking of constraints		
b. Alternative approach:			
	Static complementary distribution:	Dynamically-imposed complementary distribution:	
	No alternations are induced	Alternations are induced	

I argue herein for this latter alternative (1b), providing evidence that identity effects in English truncation deriving from so-called underapplication are exactly a consequence of the static distributional nature of the sound correspondents in question, and that dynamic phonotactic constraints induce identity-defeating regular application. I show that the optimality-theoretic base-reduplicant/truncatum identity approach of Benua (1995) and McCarthy and Prince (1995) makes neither principled nor sufficiently restricted predictions regarding whether a particular prosodic morphological process should engage in regular-, over-, or underapplication. I conclude that phonological theory may be improved upon acknowledging the distinction between dynamically-imposed versus static phonotactic regularities.

According to Benua (1995), New York English has a productive process whereby [æ] tenses to [æə] preceding tautosyllabic obstruents except voiceless stops, and preceding tautosyllabic anterior nasals, and thus both surface values derive from a single underlying form. Employing rewrite rules, we might characterize the process as in 2.

2.  $a \rightarrow a a a / C ]_{\sigma}$  (where C= voiced obstruents, voiceless fricatives, anterior nasals)

In support of this claim, Benua presents the forms in 3. She refers to the respective low front vowel pairs as alternants of each other, although the vowels in each pair belong to distinct morphemes. Indeed, Benua provides no examples of actual  $[\alpha] - [\alpha \alpha]$  alternations.

3. New York alternations (sic):

a. manage	[ˈmænəd∫]	b.	man	[ˈmæ̯ə̯n]
Janice	['t∫ænıs]		plan	[ˈpl̥æ̣ə̯n]
cafeteria	[ˌkʰæfəˈtʰiɹiə]		laugh	[ˈlæᢩəf]
cannibal	[ˈkʰænəbɬ]		mandible	[ˈmæᢩəndəbɬ]
planet	['plænı?]		plan it	[ˈpl̥æ͡ə̯nɪʔ]

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Benua casts the patterns under scrutiny in optimality-theoretic terms: as the tenseness of the low front vowel is purportedly determined by context, it is derived from a single lexical value; either [æ] or [æn] might be set up as the underlying form. According to Benua, it is the posited constraints and their ranking which determines which alternant actually surfaces in any given context. These are presented in 4.

- 4. Constraints:
  - a. æ-TENSING: \*æC]<sub>o</sub> (where C=voiced obstruents, voiceless fricatives, anterior nasals)
  - b. \*TENSE-low: "no tense low vowels"
  - c. IDENT-IO[tense]

Ranking: *æ*-TENSING >> \*TENSE-low, IDENT-IO[tense]

Input: /plæn/ <sub>x</sub> or /plæ̯ə̯n/ <sub>y</sub>	æ-TENSING	*TENSE-low	IDENT-IO[tense]
[ˈpl̥æn]	*!		* V
ده [ˈpl̪æ̣ə̯n] ه		*	* X

Given the supposed indeterminacy of the input, input-output (IO) faithfulness constraints, which demand identity between inputs and outputs, do not play a determining role in choosing the correct output. Instead, the æ-tensing phonotactic constraint requires that "plan" surface with a tense vowel.

Benua further states that truncata are exceptional. Observe that truncated forms have [æ], not [æ2], in spite of the fact that these vowels are in the tensing environment (5).

5.	New York non-alternations:				
	Janice	[ˈdʃænɪs]	Jan-	[ˈdʃæn]	(*[ˈdʃæ̯͡ən])
	cafeteria	[ˌkʰæfəˈtʰiɹiə]	caf-	[ˈkʰæf]	(*[ˈkʰæ̣̣̣̣̣̣̣̣̣̣̣̣̣̣̣̣̣̣̣̣̣̣̣̣̣̣̣̣̣̣̣̣̣̣̣̣
	Massachusetts	[ˌmæsə't∫ <sup>h</sup> usits]	Mass-	['mæs]	(*['mæ̈́ə̯s))

To account for the supposedly exceptional behavior of truncata in New York, Benua invokes base-truncatum (BT) identity constraints, a sub-class of output-output correspondence constraints, which demand identity between the featural properties of a base form and its truncatum. As BT identity outranks the phonotactic constraint, ['tʃænɪs], for example,

truncates to  $[t\int an]$ , not  $['t\int and n]$ , which the otherwise high-ranking atensing constraint would require (6).

6. Truncation:

['dʃænıs] ← BT-Identity → ['dʃæn] (\*['dʃæʌ]) ↑ IO-Faith ↓ /dʃænıs/ or /dʃæə̯nıs/

Benua, recall, concludes that the truncatum must be a correspondent of the output, since the status of the input can contain either [æ] or [æ]: "Since Optimality Theory's output constraints cannot require the lax allophone to be present in the input string, either allophone may be present in the underlying form. OT [optimality theory –D.S.] relies on constraint ranking to force the appropriate segment to appear in the optimal output. The lax [æ] in the base name *Pamela* is therefore *reliably* present only in the output form of this word. Because the truncated version is always faithful to this allophone, BT-Identity constraints must compare the two surface strings" (p.88; emphasis in original). A tableau is presented in 7.

Base: [ˈd̥ʃænɪs]	IDENT-BT	æ-TENSING, etc.
a. ☞[ˈd̥ʃæn]		*
b. [ˈd̥ʃæ̞ə̯n]	*!	

7. BT-Identity >> æ-TENSING >> \*TENSE-low >> IO-Faith

Benua's analysis of base-truncatum identity in New York rests on her assertions that hypothesized underlying representations are single-valued for tenseness, and that the vowels [æ] and [æa] engage in an (allophonic) alternation, and thus one allophone is presumed derived from the other.<sup>1</sup> The truncatum thus corresponds to the base, and not necessarily to the lexical value, as tenseness is non-distinctive—either value, but not both, may be lexically present. However, phonological alternations consist of *active* context-dependent phonetic changes in a single contrastive value. While this appears to be a mere fine point of word definition, it turns out to be significant to our understanding of the pattern under investigation: New

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<sup>1.</sup> Benua's characterization of the tense-lax distinction is prefigured by Trager in both his 1930 and 1934 papers, in which he argues for an allophonic treatment of the these vowels' distribution. However, several years later (1940) he re-evaluates the pattern, aknowledging their contrastive status.

York possesses no cases of  $[a] - [a \neq 2]$  alternation, allophonic or otherwise. Indeed, Kiparsky (1996:648) observes, "It is clear that they ( $[a] - [a \neq 2]$ ) are two distinct phonemes, in the sense that there is an irreducible lexical contrast between them in certain environments...From the viewpoint of many phonological theories [though not Kiparsky's –D.S.]...they contrast and they do not alternate with each other, so their distribution cannot be rule-governed."

Yet despite their lexical complementary distribution, contrasts between [æ] and [æa] are in fact commonplace in morphologically derived forms. Some examples are provided in 8.

8.	
	contrasts with
banner ['pæn,ı]	banner (ban+er)['pæə̯n,ı]
(pennant)	(one who bans)
adder ['ær,1]	adder (add+er) [ˈæ̪əɾ̪ɪ]
(species of snake)	(one who adds)
have ['hæɣ]	halve [ˈhæ̯ə̯ɣ]
	(denominal of 'half')
Harry [ˈhæ.ii ]	hairy [ˈhæ̯əɹi]
truncates to	
Har- [ˈhæɹ]	hair [ˈhæ̯ə̯ɪ]
camera ['kʰæmɹə]	Camden ['k <sup>h</sup> æə̯mdn ]
truncates to	
(steady-) cam ['k <sup>h</sup> æm]	cam (-engine) [ˈkʰæ̯ə̯m]
Larry ['læ.ii]	
truncates to	
Lar- [ˈlæɹ]	lair [ˈlæ̯ə̪ɹ]
Janice	Janny [ˈd̥ʃæ̣̣̣̣̣̣̣̣̣̣̣̣̣̣̣̣̣̣̣̣̣̣̣̣̣̣̣̣̣̣̣̣̣̣̣̣
truncates to	
Jan- ['ḋ∫æn]	Jan (full name) [ˈd̥ʃæ̣ə̯n]
Cabbott ['k <sup>h</sup> æbət]	cabbie [ˈkʰæ̣ə̯bi]
truncates to	
Cab- (Calloway) ['k <sup>h</sup> æb]	cab [ˈkʰæ̯ə͡b ]
Marilyn [ˈmæɹələn]	Mary [ˈmæ̣ə̯ɹi ]
truncates to	truncates to
Mar- ['mæı]	Mar- [ˈmæ̯ə̯ɹ]

Morphological derivation may yield allophonic—allomorphic alternations. But in the case at hand, the correct generalization regarding the

distribution of [æ] and [æn] in New York is that the two never alternate with each other.<sup>2</sup> Instead, the relationship between [æ] and [æn] may be characterized as one of static complementary distribution in underived contexts, that is, there is a lexical distributional generalization regarding the vowel qualities in question, that [æ] may appear in certain phonologically restricted lexical contexts, while [æn] may appear in complementary contexts. There is no *active* relationship between the two vowels; there are no actively imposed phonotactic constraints by which alternations arise as a consequence of morphological derivation, truncatory or otherwise, and there are (virtually) no lexical substitutions which change meaning. Upon morphological derivation however, [æ] and [æn] indeed acquire contrastive status with respect to each other (e.g. banner versus ban+er).

The unusual mixed status of the [x]- $[x_2]$  relationship—that these vowels are in lexical complementary distribution, but are contrastive upon morphological derivation-can be traced to the historical origins of their phonetic distinction. Investigated by Trager 1930, 1934, 1940, and discussed in Labov 1981, 1994, and Kiparsky 1988, 1996, and further references therein, since the Middle English period the low front lax vowel was long in certain contexts, and only in the most recent times is being replaced by a raised and diphthongized reflex in various eastern American locales. Thus, for example, where "ban" and "bat" may have previously both possessed the lower monophthong with a length difference, the longer vowel in "ban" has undergone diachronic raising/diphthongization. Consequently, a morphologically simple form like "banner" (['bæn.ı)) meaning "pennant," possesses the lax vowel, while a morphologically complex form like "banner" (ban+er [bæən]) meaning "one who bans," retains its lexical tense quality: as the relationship between the two vowel qualities is a lexically static one, there is no reason to posit an allophonic relationship between the two. The derived contrast, note, is suggestive of a lexical split in progress: as the tense and lax vowels are contrastive in derived contexts, the stage is now set for the introduction of actual lexical contrasts, for example, "marry" ['mæsi] versus "Mary" (['mæşsi]. Abstracting away from the issues of lexical diffusion discussed at length by Labov (1981), the pattern's history is summarized in 10.

<sup>2.</sup> A superficial counter-example to this claim is "lab"-"laboratory" ['læəbj-['læbıə,t<sup>h</sup>ɔzi], but "lab" is clearly lexicalized, and thus fits the pattern perfectly. Moreover, "ad" [æəd] – "advertisement" [ædv,tajzmnt] is probably a lexical distinction as well. Note in particular that all "adv-" words possess the lax vowel in New York.



In sum, the [x]- $[x_2]$  complementary distribution is static in nature due to a sound change, and betrays no evidence of engaging in alternation. It should not be surprising, then, that truncata do not engage in an alternation that is elsewhere absent from the language.

Significantly, non-identity upon truncation is the obvious and wellattested result when the relevant phonological relationship is dynamic. Some examples are presented in 10.

10.			
	allophonically	we don't	because X~Y
	alternates with	see	is phonologically active
Patricia [p <sup>h</sup> ə't <sup>∫</sup> ,n∫ə]	Pat- ['p <sup>h</sup> æ?]	*[ˈp <sup>h</sup> æt <sup>h</sup> ] *[ˈp <sup>h</sup> ət <sup>h</sup> ] *[ˈp <sup>h</sup> əʔ]	t <sup>h</sup> ~ ? citation [.saj't <sup>h</sup> ej∫ŋ]- cite ['saj?] ə ~æ schema ['skimə] - schematic [skə'mærı?k] grammar ['kıæmı] – grammatical [kıə'mærıki]

10.

Cabbott [ˈkʰæbət]	Cab- [ˈkʰæbၞ]	*[ˈkʰæb]	b ~ ջ clubbing [ˈklʌbɪŋ] - club [ˈklʌɒ̯]
Melanie [ˈmɛləni] Philip [ˈfɪləp]	Mel- [ˈmɛɨ] Phil- [ˈfɪɨ]	*[ˈmɛl ] *[ˈfɪl ]	l ~ <del>4</del> falling [ˈfəliŋ] - fall [ˈfəɬ]

Thus, while "Patricia" has a released, aspirated and affricated alveolar plosive, its truncatum may possess the glottal stop in its place, Similarly, the  $[\eth]\sim[\And]$  and  $[b]\sim[\between]$  alternations are elsewhere attested as well. Finally, while "Melanie" possesses the alveolar lateral, its truncatum, "Mel," has [!]. In actuality, Sproat and Fujimura (1993) observe that light-dark lateral allophony is continuous, rather than categorical. Both a tip raising gesture and a dorsal backing gesture are present regardless of position, but their magnitude and phasing vary according to syllable position, and also rime duration and following boundary strength. Indeed, in New York English, most instances of the lateral are dark to a certain degree. But regardless of prosodic and/or morphological conditioning, the important point here is that there is indeed *context-dependent* variability, continuous or otherwise, and that these alternations are regular processes in the phonology of New York: they occur upon morphological derivation, and so truncata engage in these alternations as well.

Now, standard optimality theory involves constraints *in conflict* that require *resolution* through ranking. In the case presently under investigation, however, no such conflict exists: dynamic phonotactics induce alternations, while static phonotactics do not. That is, static phonotactics remain static regardless of the conditions that morphological derivation—including truncation—create. To fully clarify, since there is no alternation anywhere in the language involving [æ] and [æq], why should alternation be present only upon truncation and nowhere else? The answer is, "it shouldn't, and it isn't." In this sense then, truncation simply abides by the conditions that hold everywhere else. There is no conflict to resolve, *contra* the claims of the optimality-theoretic approach to the pattern.

Indeed, to quote McCarthy and Prince (1993:7), "If both [constraints] A and B both agree [sic] that one candidate passes and the other fails, then there is nothing to say. The optimal candidate—the output associated with [the specified input]—is just the one that meets both constraints, as in standard approaches to constraint interaction." Following McCarthy and Prince then, a tableau faithful to the actual conditions which drive the truncation pattern here should consist of phonotactic constraints that do not crucially interact with each other, thus mirroring the plain truth that there is

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no conflict in need of resolution. In short, "there is nothing to say." In 11, S-PHONO refers to static phonotactic conditions which remain static regardless of the conditions that morphological derivations introduce; D-PHONO refers to dynamically-imposed phonotactics that induce alternations, provided the relevant context for alternation is present. The two constraint types, as they do not conflict, do not require ranking with respect to each other. (D-PHONO is violated when an actively imposed dynamic constraint is erroneously inactive. S-PHONO is violated when a static condition is erroneously treated in a dynamic fashion, by inducing alternation.)

Janice [ˈd̥∫ænɪs]	D-PHONO	S-PHONO
+ truncation		
☞ [ˈd̥ʃæn]		
[ˈd̥ʃæ̃∋̃u]		*
b.		
Philip [ˈfɪləp]	D-PHONO	S-PHONO
+ truncation		
☞['fil]		
['fil ]	*	

11. a.

In 11a, the winning candidate possesses [æ], just as the base does: since there is no alternation between [æ] and [æa], the relevant constraints are abided by. The losing candidate engages in an alternation that is absent from the language, thus violating a static phonotactic condition. In 11b, the winning candidate possesses [4], since alternation is regularly observed between word-final and prevocalic laterals. The losing candidate violates this dynamically-imposed phonotactic condition.

Finally, it should be noted that in some incarnations of optimality theory, specifically, those of Prince and Smolensky (1993) and Inkelas (1994, 1995), it is proposed that non-alternating forms should be fully specified in their supposed underlying representation, due to the principle of "lexicon optimization."<sup>3</sup> This principle is succintly characterized by Inkelas (1994:6), who writes, "of all possible underlying representations that could generate the attested phonetic form of a given morpheme [a morpheme that never alternates, D.S.], that particular underlying representations of highly

<sup>3.</sup> Inkelas in particular argues for treating alternating and non-alternating forms as disinct in their phonological (and lexical) properties.

ranked grammatical constraints." In New York, clearly,  $/p_{l}a \neq n/$  (plan), for example, incurs fewer high-ranking violations than does  $/p_{l}an/$ , as the surface form is indeed ['p\_{l}a \neq n]. Given lexicon optimization then, there is no motivation—even within this version of optimality theory—for treating non-alternating forms as anything other than a consequence of staticallyimposed lexical conditions. Consequently, when truncation results in violations of these static conditions, no active phonotactic constraint exists to induce alternation, and the lexical conditons are "violated" in just this case, for example, ['dʃan] (Jan-).<sup>4</sup>

To summarize, the present approach makes different predictions from standard approaches about the phonological properties of static versus dynamic phonological conditions. Within standard approaches, given that both the dynamic condition (such as the English lateral alternation) and the static condition (such as the distribution of New York [æ] and [æə]) might both be expressed in the same formal terms—independent of their dynamic versus static status—it is predicted that the two phonotactics should pattern indistinctly from each other. As English truncation shows, this prediction is incorrect. Instead, upon recognizing the dynamic versus static relations among sounds, and incorporating internal reconstructive hypotheses which these morphological processes suggest, a theory of truncation (and reduplication) is more accurately constrained, more accurately predictive, and more readily testable. An augmentation of the standard approach which acknowledges the dynamic-static distinction may thus more effectively account for this phonological behavior.<sup>5</sup>

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<sup>4.</sup> Inkelas further argues that alternating forms are best treated as underlyingly underspecified for their alternating features, but this aspect of her approach does not concern us here.

<sup>5.</sup> Benua's two other examples of supposed base-truncatum identity effects— Icelandic and Tiberian Hebrew—do not, under scrutiny, fare any better than does English. The analysis of Icelandic is based on a total of sixteen fossilized forms that are severely constrained both morphologically and phonologically: "All [sixteen] such words are action nouns, *a*-stems of neuter gender, derived from  $\bar{o}n$ -verbs, whose infinitives end in *Cra.*" (Orešnik 1978:156). The Tiberian Hebrew analysis, and the data on which it is based, has also been subject to rather strong theoretical and empirical criticism (Churchyard 1998).

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