Dynamic versus static phonotactic conditions in prosodic morphology*

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Abstract

Complementary distribution stems from two sources. The first is a conse-quence of static lexical regularities such that two sounds never appear in the same context. The second is from dynamic alternations induced by morphological derivation. In this paper I provide evidence — from New York English, Akan, Madurese, and Malay — that these two sorts of relationship among sounds possess distinct phonological properties. Sounds engaged in a static complementary relationship remain nonalternating upon reduplication/truncation, thus maintaining identity between a base and its relation. By contrast, dynamic phonotactic constraints induce identity-defeating alternations, provided the triggering context is present upon reduplication/truncation. These observations show that approaches that posit base-reduplicant/truncatum identity constraints miss the proper generalization regarding reduplicative and truncatory patterning.

1. Introduction

Phonologists typically recognize two types of complementary distribu-tion. The first type may be viewed as consequence of allophonic alternations, due to active, or dynamic, sound substitutions upon mor-phological derivation, which, according to some (for example, Matthews 1974; Sommerstein 1974) are driven by actively imposed phonotactic constraints. Allophones ALTERNATE, and by doing so they are in accor-dance with phonotactic regularities. This dynamic relationship among allophones should be contrasted with the second sort of complementary distribution, in which phonetically distinct values, also, never occupy the same position, but only within morphemes. STATIC complementary distri-bution is thus a lexical (morphemic) phonotactic regularity: there are no synchronic alternations involved by which allomorphs dynamically

conform to phonotactic constraints. These distinctions are summarized in (1).

(1) *Dynamically imposed complementary*   *Static/lexical complementary*
      distribution: *distribution*:

  – a consequence of dynamically   – a consequence of static/lexical
    imposed phonotactic constraints   phonotactic conditions
  – involves alternation   – no alternations are involved

Due to the distinct properties of dynamic versus static complementary distribution — deriving from dynamically imposed constraints versus mere static phonotactic conditions — one might predict that the sounds engaged in these two sorts of relationship 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 trigger these alternations as well. Such alternations may induce nonidentity between the base and its correspondent. For example, Javanese has a regular process of nasal assimilation that is fully active upon reduplication, thus inducing nonidentity between base and copy. Some examples are in (2) (Wilbur 1973); the identity-defeating alternation is underlined.

(2) dɔm   'needle'   dɔ<u>n</u> dɔm   'to sew'
     cəm   'to steep'   cə<u>ŋ</u> cəm   'steep (s/ed)'
     kɔn   'to order'   kɔ<u>ŋ</u> kɔn   'order (s/ed)'

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. As discussed at length in section 3, Akan exemplifies this pattern. Here, velars and palatals are in static complementary distribution: palatals are found only before front vowels, (3a), while the velars are found elsewhere, (3b); there are no alternations. Upon reduplication with prespecified high vocalism, the velar does NOT palatalize, as exemplified in (3c) (the supposed "violation" is underlined).

(3) a. [tɕɛ, tɕe, tɕɪ, tɕi]
     b. [kɔ, ko, kʊ, ku, ka]
     c. [ḵɪ–kaʔ] 'bite'

In short, static phonotactic conditions remain static upon all morphological derivation, including reduplication and truncation, and identity between a base and its relation is maintained.

   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, for example, Swadesh 1934; Twadell 1935; Bloch and Trager 1942). Similarly, in poststructuralist, generative theories, nonalternating 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 (for example, see Chomsky and Halle 1968; Kenstowicz and Kisseberth 1977, 1979; Archangeli 1984, 1988; Kiparsky 1985; McCarthy and Prince 1995).[1] 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, overapplication, and underapplication (Wilbur 1973). Regular application produces outputs that abide by the regular phonotactics of the language, be they actively or lexically imposed; overapplication results in identity between the base and its correspondent due to the unexpected application of a phonological process; underapplication results in 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 feature-changing rules), or, more recently, constraint ranking (identity constraints vis à vis phonotactic constraints), irrespective of the dynamic versus static influences on identity (over-, underapplication) or nonidentity (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 to distributional generalizations regardless of their static or dynamic natures, (4a), or whether such sounds behave in a manner that suggests distinct sensitivities to their dynamic versus static complementary distributions in some sense independent of their correspondents in the base, (4b).

(4)

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

I argue herein for this latter alternative, (4b), providing evidence from a number of languages that base-copy identity effects deriving from so-called over- and underapplication in truncation and reduplication are exactly a consequence of the static distributional nature of the sound correspondents in question. Furthermore, dynamic phonotactic constraints induce identity-defeating regular application. I show that the optimality-theoretic base-reduplicant (BR)/truncatum (BT) 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.

In what follows, I consider several prosodic morphological processes, from New York English (section 2), Akan (section 4), Madurese (section 5), and Malay (section 6), that remain problematic for both traditional and optimality-theoretic approaches to reduplication, yet are readily explainable in terms of an approach that recognizes the distinction between dynamic and static properties of the phonological system. I further briefly touch upon other reduplicative systems that, contrary to superficial appearances, betray no evidence of a BR-identity grammatical component (section 8).

2.   New York truncation

According to Benua (1995), New York English has a productive process whereby [æ] tenses and diphthongizes to [æ̯ə] 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 (5).

(5) æ → ǽ̧ə̯ / __ C]σ (where C = voiced obstruents, voiceless fricatives, anterior nasals)

In support of this claim, Benua presents the forms in (6). 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 [æ]–[ǽ̧ə̯] alternations.

(6) New York alternations (sic):
  a. manage   ['mænəd̥ʃ]   b. man   ['mǽ̧ə̯n]
      Janice   ['d̥ʃænɪs]   plan   ['pl̥ǽ̧ə̯n]
      cafeteria [ˌkʰæfə'tʰiɹiə]   laugh   ['lǽ̧ə̯f]
      cannibal   ['kʰænəbɫ]   mandible ['mǽ̧ə̯ndəbɫ]
      planet   ['pl̥ænɪʔ]   plan it ['pl̥ǽ̧ə̯nɪʔ]

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 [ǽ̧ə̯] might be set up as the underlying form. According to Benua, it is the posited constraints and their ranking that determine which alternant actually surfaces in any given context. These are presented in (7).

(7) Constraints:
  a. æ-TENSING: *æC]σ (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/x or /plǽ̧ə̯n/y	æ-TENSING	*TENSE-low	IDENT-IO[tense]
a. ['pl̥æn]	*!		* y
b. ☞['pl̥ǽ̧ə̯n]		*	* 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 [ǽ̧ə̯], in spite of the fact that these vowels are in the tensing environment, (8).

(8) New York nonalternations:

Janice	['d̠ʒænɪs]	Jan-	['d̠ʒæn]	(*['d̠ʒæ̰ə̰n])
cafeteria	[ˌkʰæfə'tʰiɹiə]	caf-	['kʰæf]	(*['kʰæ̰ə̰f])
Massachusetts	[ˌmæsə'tʃʰusits]	Mass-	['mæs]	(*['mæ̰ə̰s])

To account for the supposedly exceptional behavior of truncata in New York, Benua invokes base–truncatum identity constraints, a subclass of output–output correspondence constraints, that demand identity between the featural plus segment-sequential properties of a base form and its truncatum. As BT identity outranks the phonotactic constraint, ['d̠ʒænɪs], for example, truncates to ['d̠ʒæn], not ['d̠ʒæ̰ə̰n], which the otherwise high-ranking æ-tensing constraint would require, (9).

(9) Truncation:

['d̠ʒænɪs]   ← BT-Identity →   ['d̠ʒæn] (*['d̠ʒæ̰ə̰n])
↑
IO-Faith
↓
/'d̠ʒænɪs/ or /'d̠ʒæ̰ə̰nɪs/
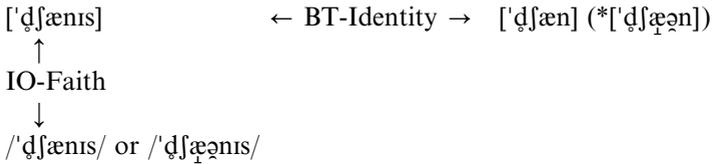
Benua concludes that the truncatum must be a correspondent of the output, since, recall, the status of the input can contain either [æ] or [æ̰ə̰]:

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 (1995: 88; emphasis in original).

A tableau is presented in (10).

(10) BT-Identity >> æ-TENSING >> *TENSE-low >> IO-Faith

Base: ['d̠ʒænɪs]	IDENT-BT	æ-TENSING, etc.
a. ☞['d̠ʒæn]		*
b. ['d̠ʒæ̰ə̰n]	*!	

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 [æ̰ə̰] alternate with each other, and thus one allophone is presumed derived from the other.[2] The truncatum thus corresponds to the base, and not necessarily to the lexical value,

as tenseness is nondistinctive — 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 York possesses no cases of [æ]–[æ̠ə̯] alternation, allophonic or otherwise. Indeed, Kiparsky (1996: 648) observes,

> It is clear that they ([æ]–[æ̠ə̯]) 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 [æ̠ə̯] are in fact found in morphologically derived forms. Some examples are provided in (11).

(11)

	contrasts with
banner ['b̥æn̪ɹ̩] 'pennant'	banner (ban+er)['b̥æ̠ə̯n̪ɹ̩] 'one who bans'
adder ['æɾɹ̩] 'species of snake'	adder (add+er) ['æ̠ə̯ɾɹ̩] 'one who adds'
have ['hæɣ]	halve ['hæ̠ə̯ɣ] (denominal of "half")
camera ['kʰæm.ɹə] truncates to (steady-) cam ['kʰæm]	Camden ['kʰæ̠ə̯mdn̩] cam (-engine) ['kʰæ̠ə̯m]
Janice truncates to Jan- ['d̥ʃæn]	Janny ['d̥ʃæ̠ə̯ni] derives from Jan (full name) ['d̥ʃæ̠ə̯n]
Cabbott ['kʰæbət] truncates to Cab- (Calloway) ['kʰæb̥]	cabbie ['kʰæ̠ə̯bi] derives from cab ['kʰæ̠ə̯b̥]

Morphological derivation may yield allophonic alternations. But in the case at hand, the correct generalization regarding the distribution of [æ] and [æ̠ə̯] in New York is that the two never alternate with each other.[3] Instead, the relationship between [æ] and [æ̠ə̯] may be characterized as one of static complementary distribution in underived contexts. That is, there is a lexical distributional generalization regarding the vowel qualities
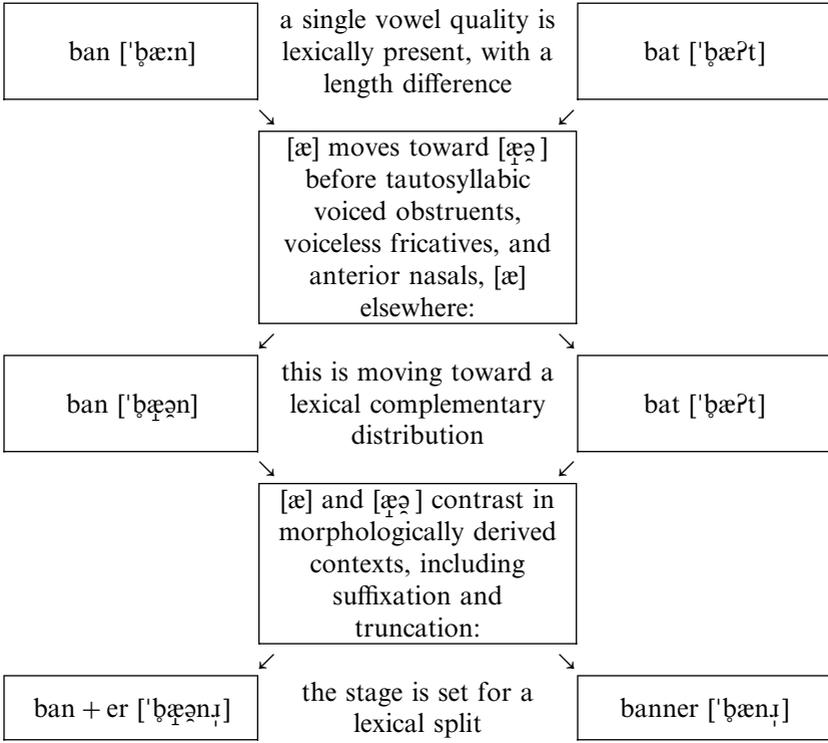
in question, that [æ] may appear in certain phonologically restricted lexical contexts, while [æ̝ə̯] may appear in complementary contexts. However, there is no ACTIVE relationship between the two vowels; there are no actively imposed phonotactic constraints by which alternations arise as a consequence of morphological derivation, truncatory or otherwise, and there are no lexical substitutions that change meaning. Upon morphological derivation however, [æ] and [æ̝ə̯] indeed acquire contrastive status with respect to each other (e.g. banner versus ban + er).

The unusual mixed status of the [æ]–[æ̝ə̯] 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 distinctness. Investigated by Trager (1930, 1934, 1940; see note 2), and discussed by 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 it 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'' (['b̥ænɹ̩]), meaning 'pennant', possesses the lax vowel, while a morphologically complex form like ''banner'' (ban + er ['b̥æ̝ə̯nɹ̩]), 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 them. 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. Abstracting away from the issues of lexical diffusion discussed at length by Labov (1981), the pattern's history is summarized in (12).

In sum, the [æ]–[æ̝ə̯] 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, nonidentity upon truncation is the obvious and well-attested result when the relevant phonological relationship is dynamic. Some examples are presented in (13).

(12)   Simplified account of the emerging split:

| ban ['b̥æːn] | a single vowel quality is lexically present, with a length difference | bat ['b̥æʔt] |

| | [æ] moves toward [æə̯] before tautosyllabic voiced obstruents, voiceless fricatives, and anterior nasals, [æ] elsewhere: | |

| ban ['b̥æ̞ə̯n] | this is moving toward a lexical complementary distribution | bat ['b̥æʔt] |

| | [æ] and [æə̯] contrast in morphologically derived contexts, including suffixation and truncation: | |

| ban + er ['b̥æ̞ə̯n̩ɹ̩] | the stage is set for a lexical split | banner ['b̥æn̩ɹ̩] |

(13)

	Allophonically alternates with	We don't see	Because X–Y is phonologically active
Patricia [pʰə'tʃɹ̩ɪʃə]	Pat- ['pʰæʔ]	*['pʰætʰ] *['pʰətʰ] *['pʰəʔ]	[tʰ]–[ʔ] citation [ˌsaj'tʰejʃn̩]–cite ['sajʔ] [æ]–[ə] schematic [skə'mæɹɪʔk]– schema ['skimə] grammar ['g̊ɹæmɹ̩]– grammatical [g̊ɹə'mæɹɪkɫ]
Cabbott ['kʰæbət]	Cab- ['kʰæb̥]	*['kʰæb]	[b]–[b̥] clubbing ['kl̥ʌbɪŋ]–club ['kl̥ʌb̥]
Melanie ['mɛləni] Philip ['fɪləp]	Mel- ['mɛɫ] Phil- ['fɪɫ]	*['mɛl] *['fɪl]	[l]–[ɫ] falling ['fɔlɪŋ]–fall ['fɔɫ]

Thus, while "Patricia" has a released, aspirated, and affricated alveolar plosive, its truncatum may possess the glottal stop in its place, Similarly, the [æ]–[ə] and [b]–[b̥] alternations are elsewhere found as well. Finally, while "Melanie" possesses the alveolar lateral, its truncatum, "Mel," has [ɫ].[4]

Now, standard optimality theory relies on the supposition that the phonology is composed of constraints in conflict with each other, 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 clarify, since there is no alternation anywhere in the language involving [æ] and [æ̰], 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 […] agree that one candidate passes and the other fails, then there is nothing to say. The optimal candidate — the output associated with [the specified input — D.S.] — 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 that 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 no conflict in need of resolution. Indeed, once we acknowledge that there is no conflict in need of resolution, the operational principle of the optimality-theory approach is rendered vacuous. In McCarthy and Prince's own words, then, "there is nothing to say." More fundamentally, given the rigorous output orientation of optimality theory, that approach is fully unequipped to capture the correct generalizations concerning the origins of reduplicative and truncatory identity, since these correct generalizations make reference to dynamic versus static sound relationships, irrespective of pure surface patterning.[5]

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 nonalternating forms should be fully specified in their supposed underlying representation, due to the principle of "lexicon optimization." This principle is succinctly 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 representation is chosen whose mapping to phonetic form incurs the fewest violations of highly ranked grammatical constraints.'' In New York, clearly, /ˈplæ̰ən/ (plan), for example, incurs fewer high-ranking violations than does /ˈplæn/, as the surface form is indeed [ˈplæ̰ən]. Given lexicon optimization, then, there is no motivation — even within this version of optimality theory — for treating nonalternating forms as anything other than a consequence of static lexical conditions. Consequently, when truncation results in violations of these static conditions, no active phonotactic constraint exists to induce alternation, and the lexical conditions seem to be ''violated'' in just this case, for example, [ˈd̠ʃæn] (Jan-).[6]

To summarize this section, 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 [æ̰ə]) might 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. An augmentation of the standard approach that acknowledges the dynamic–static distinction may thus more effectively account for this phonological behavior.[7]

3.   Predicted typological variation

Having now laid the foundations of the present approach, in this section I consider in greater detail the distinct predictions of the two approaches to phonotactically induced complementary distribution; the present approach, which recognizes the distinction between dynamic versus static complementary distributions, and the standard approach, which does not recognize this distinction. To illustrate the difference between these two approaches, consider the schematic reduplicative examples in (14).

(14)

Dynamic phonotactic constraints induce allophonic alternation:		*Static phonotactic constraints reflect lexical complementary distribution:*	
A → B/C + _____ *base*: [AC]		# … ₍σ₎[X … , #[Y … *base*: [YZ]₍σ₎	
predictions of present approach:	predictions of standard approach:	predictions of present approach:	predictions of standard approach:
alternation [AC–BC]	*regular application* rule applies / phonotactic outranks identity: [AC–BC]	*no alternation* [YZ–YZ]	*regular application* rule applies / phonotactic outranks identity: [YZ–XZ]
	overapplication rule applies twice / identity outranks phonotactic: [BC–BC]		*overapplication* rule applies twice / identity outranks phonotactic: [XZ–XZ]
	underapplication rule blocked / identity outranks phonotactic: [AC–AC]		*underapplication* rule blocked / identity outranks phonotactic: [YZ–YZ]

The present approach to the behavior of truncata/reduplicants predicts that allophonic alternations that are observed in nontruncatory/reduplicative morphology will be observed in the truncatory/reduplicative morphology as well. So, for example, given a string [AC] that is to be copied, and given a regular alternation that replaces [A] with [B] when [C] comes to precede it within the word, it is predicted that [A] will indeed switch to [B] when the relevant context is present upon reduplication. The [l]–[ɫ] alternation from New York truncation is in this spirit. The present approach also predicts, however, that static distributional regularities remain static, even upon truncation/reduplication. For example, if [X] and [Y] are found in complementary lexical positions without alternations, the present approach predicts that alternation will not be introduced upon reduplication, thus culminating in surface identity between the base and the reduplicant ([YZ–YZ]). The New York [æ]–[æ͡ə] relationship is the truncatory counterpart to this predicted behavior in reduplication. Indeed, these are the only two patterns that are predicted by the present approach.

Now consider the predictions of the standard approach. Recall that the standard approach draws no distinction between active phonotactically induced alternations and static complementary distributions. Consequently, no difference in behavior resting on this distinction is predicted. Further recall that traditional theorists have taxonomically divided reduplicative outputs into three broad classes: regular application, overapplication, and underapplication. Regular application produces outputs that abide by the regular phonotactics of the language, be they actively or lexically imposed. Thus, the output of [AC] reduplication may be [AC–BC], but also, the output of [YZ] reduplication will be [YZ–XZ], in which the phonotactic rule is ordered after copy. However, overapplication may be observed as well, in which the phonotactic rule both precedes and follows copy. Thus [AC] overapplies the rule of alternation, resulting in [BC–BC]. Also, the static pattern [YZ] is predicted to reduplicate as [XZ–XZ] where the internal /Y/ nonetheless surfaces as [X], thus culminating in identity between the base and the copy. Finally, rules may underapply in the copy, and so the surface may consist of [AC–AC] and [YZ–YZ] strings, again culminating in reduplicative identity. Here, the rule fails to apply even in the base. Thus, beyond providing a useful taxonomy of reduplicative (and truncatory) morphological behavior, the standard approach imposes no principled restrictions on what sort of output is expected and is thus fully nonpredictive.

Such identity effects in reduplication were reinterpreted upon the introduction of correspondence theory (McCarthy and Prince 1995), in which the phonotactic constraints require proper ranking with respect to identity constraints. But still, as discussed, the distinction between allophonic alternation and static distribution is not made in correspondence theory, thus still relegating the observed strategies of inducing identity, or nonidentity, to an arbitrary status. Sometimes overapplication is observed, sometimes underapplication is observed, and sometimes regular application is observed, irrespective of the static-versus-dynamic nature of the complementary distributions in question. Ranking the phonotactic and identity constraints properly can model all of these patterns, but at the cost of losing all predictive power. The particular strategy employed — regular, over-, or underapplication — remains fully unconstrained and consequently does not place principled limitations on when one sort of identity or another should be found, and furthermore, does not predict those contexts in which nondentity is the expected result.

Indeed, by recognizing the distinction between actively imposed and static phonotactics, our theories of reduplication and truncation may be more accurately constrained, more accurately predictive, and more readily testable. In the following sections I present further evidence in favor of

the present approach to patterns of alternation in prosodic morphology and show that the correspondence-theoretic approach fails in every case to accurately predict the observed patterns.

4.   Akan reduplication

Schachter and Fromkin (1968) report that velars and [h] in Akan are palatalized in syllable-initial position when they occur before front vowels, (15). (However, velars and [h] may precede front vowels when a tautomorphemic voiceless coronal — [s] or [t] — follows, for example, [kita].)

(15)   /kɛ/   →   [tçe]   'divide'
       /gɛ/   →   [dʒɛ]   'receive'
       /wi/   →   [ɥi]   'nibble'
       /hɪ/   →   [çɪ]   'border'

There is no evidence for the velar or laryngeal origin of the palatals in question, as palatals appear exclusively in static, lexical contexts. That is, there are no cases of velar–palatal alternation in Akan.

   There is, in fact, independent evidence that the complementary distribution of velars and palatals is fully inactive in the system. Akan has a process of partial reduplication in which a root-initial syllable is copied with prespecified vowel height. This process is exemplified in (16).

(16)   [si–siʔ]   'stand'   [bu–bu(ʔ)]   'head'
       [fɪ–fɪʔ]   'vomit'   [sʊ–sʊ(ʔ)]   'carry on the head'
       [si–seʔ]   'say'   [su–soʔ]   'seize'
       [sɪ–sɛʔ]   'resemble'   [sʊ–sɔʔ]   'light'

Now, if the so-called palatalization process were "psychologically real" in the sense of Sapir (1949 [1933]) and others, we would expect velar-initial roots to palatalize upon reduplication, since they come to be followed by front vowels in certain contexts. In fact, no such palatalization takes place. Instead, the lexical distributional generalization is "violated" in just this instance: upon reduplication, velars (and [h]) are free to precede the front vowel, (17).

(17)   [kɪ–kaʔ]   'bite'
       [hɪ–hawʔ]   'trouble'

This is, then, a classic case of underapplication: supposed palatalization does not apply in the copy. Thus, while Schachter and Fromkin treat the velar–palatal relationship as dynamic in nature, the reduplication pattern

is in conformity with the present predictions about the asymmetrical patterning of static versus dynamic phonological relationships. Lexically static relationships such as the velar–palatal pattern in Akan are predicted not to be "active" in the relevant sense.

Instead, the synchronic patterning of the velars and the palatals vis à vis reduplication suggests an internal reconstructive scenario wherein a process of lexical palatalization was completed before the emergence of the reduplicative morphological process. As palatalization was fossilized by this point, it played no part in the newly derived contexts that reduplication introduced, (18).

(18)	*Early form*:	*Palatalization*:	*Reduplication*:	*Present-day form*:
kɛ 'divide'	tɕɛ	—	tɕɛ
kaʔ 'bite'	—	ki–kaʔ	ki–kaʔ

<div align="center">time →</div>

McCarthy and Prince (1995) cast the Akan data in optimality-theoretic terms, employing standard notions about the phonological properties of nonalternating forms: these forms, just like those that alternate, are determined by constraint ranking, and so lexically static phonotactics are treated as formally indistinct from active ones. As they treat the distribution of palatals and velars as dynamically determined, the authors find it noteworthy that reduplicated forms do not surface with palatalized alternants. McCarthy and Prince, acknowledging the fact that there are no velar–palatal alternations in Akan, nonetheless write that "… [I]t is a fact of Akan that the sequence [ki] is NEVER observed (except in reduplicated forms … [and in the cases parenthetically noted above — D.S.]). Any analysis … is obliged to capture this generalization, despite the lack of alternations" (1995: 341, note 69; emphasis in original). The authors capture this generalization with correspondence-theoretic machinery in combination with segment-sequencing constraints.

But however obliged we are to capture the lexical distributional generalization about palatals versus velars in Akan, we are similarly obliged to report on observable phonological distinctions between dynamic versus static phonotactic relations, for it is exactly this distinction that accounts for the linguistic behavior of the reduplicated velars. The relationship between the velars and the palatals is static, not dynamic. Consequently, it should not be surprising that reduplicants do not engage in an alternation that is elsewhere absent from the language.

Note especially that it is exactly due to this lack of alternation that OVERapplication is not found here (*[tɕi–tɕaʔ], *[ɕɪ–ɕawʔ]), and yet corre-

spondence theory offers no principled account of its absence. Thus once again, identity *per se* does not seem to be the driving force behind the maintenance of velars in reduplicants, Instead, it is the static nature of the phonotactic itself that is responsible for their presence here.

5. Madurese reduplication

As exemplified in (19), Madurese has a partial reduplicative process whereby stem-final syllables are prefixed (Stevens 1968, repeated in McCarthy and Prince 1995). McCarthy and Prince (1995) suggest that nasality on vowels may be absent from the underlying forms, since its distribution is predictable: nasality "spreads" rightward until encountering an oral stop (transcription has been changed to IPA).

(19)   Nasalization and reduplication in Madurese
         /neat/   → [j̃ãt-nẽj̃ãt]   'intentions'
         /moa/   → [w̃ã-mõw̃ã]   'faces'
         /maen-an/   → [ẽn-mã(ʔ)ẽn-ãn][8]   'toys'
         /ŋ-soon/   → [ɔ̃n-nɔ̃ʔɔ̃n]   'request' (verb)
   cf. /soon/   → [ɔn-sɔʔɔn]   'request' (noun)

The authors take particular note of the fact that nasality copies upon prefixation despite the fact that no leftward nasal trigger is present. Here then, is a case of traditional "overapplication." Once again, McCarthy and Prince provide a correspondence-theoretic account of the pattern:

[S]uch [nasality copying] effects derive from the impact of reduplicative identity constraints on the independently established phonology of the language. … In this grammar, oral and nasal vocoids are placed in complementary distribution — it is, then, a canonical case of allophonic alternation through constraint inter-action. (The alternation is allophonic because no hypothetical lexical contrast between V_{nas} [nasalized vowels — D.S.] and V_{oral} [oral vowels — D.S.] can survive to the surface. Underlying /bã/ will surface as [ba]; underlying /na/, as [nã]. As a structuralist analysis would assert, no phonemic contrast between /ã/ and /a/ is possible (1995: 281).

McCarthy and Prince are correct in their assertion that oral and nasal vocoids are in complementary distribution (apart, of course, from the reduplicated forms). But while they are also correct in stating that an allophonic relation exists between these oral and nasal vocoids, they have not called attention to the forms (in [19]) that exemplify this characteriza-tion, that is, [ɔ̃n–nɔ̃ʔɔ̃n]–[ɔn–sɔʔɔn]; none of the other base forms in (19) (except the [ãn] in [ẽn–mãẽn–ãn], which, as Stevens (1968) shows,

alternates with an oral vowel) shows that an oral–nasal vocoid alternation is present in Madurese, since all of these are suggestive of a lexical, static complementary distribution. The authors present the tableau in (20).

(20)

/RED + neat/	IDENT-BR (nas)	*NV$_{oral}$	*V$_{nas}$	IDENT-IO (nas)
a. ☞ [j̃ãt-nẽj̃ãt]			*****	**
b. [jat-nẽjat]		*!	*	*
c. [jat-nẽj̃ãt]	*!		***	**

Summing up McCarthy and Prince's take on the matter, the posited constraints will take care of the surface pattern, whether nasal and oral vowels are in lexical complementary distribution or active alternation; the presence of nasality in Madurese reduplicants, then, "… follows, very simply, from the high rank of B-R identity. Because it dominates the anti-nasal constraint *V$_{nas}$, identity of base and reduplicant infringes on the perfection of complementary distribution, so the system is allophonic except in this special circumstance" (1995: 283). The *V$_{nas}$ constraint is, by hypothesis, outranked only in contexts where nasal vowels are indeed found, that is, following nasal stops, and when BR identity becomes active upon reduplication. But the only context in which such a constraint might be relevant is upon allophonic alternation between oral and nasal vowels in morphologically complex contexts, for example, [ɔ̃n–nɔ̃ʔɔ̃n]–[ɔn–sɔʔɔn] In static contexts — that is, lexically — there is no reason to posit any sort of active relationship between oral and nasal vowels. Indeed, under the present approach, that nothing happens to nasality upon reduplication shows that there is no active *V$_{nas}$ phonotactic constraint in this context to be enforced or violated. Finally, if nonidentity were observed here (*[jat–nẽj̃ãt]), McCarthy and Prince could simply rerank their constraints accordingly — there is thus no principled reason why BR identity should be active at all here.

In fact, the patterning of nasality in Madurese, as it is both lexically static and allophonic upon morphological derivation, would seem akin to that of the aforementioned English laterals. However, if this analogy holds, then we might expect reduplication to induce alternation, in the same way that truncation induces l-darkening in English. But this is not what we observe in Madurese. Instead, nasality here patterns as does velarity in Akan, and tenseness in New York. How then to account for nasality copying in Madurese? Recall that the English darker lateral is

found before a consonant or word-finally, both lexically and upon deriva-
tion. Therefore, when the lateral finds itself in word-final position upon
truncation, the darker allophone is found. In contrast, upon reduplication
in Madurese, nasal vowels find themselves in a context in which they are
otherwise NEVER found, either morpheme-internally or upon derivation,
that is, without a preceding nasal stop. Therefore, the dynamic phonotac-
tic constraint on the distribution of nasality is fully inoperative in this
context: such vowels copy from the base, and no actively imposed phono-
tactic constraint exists to alter them. To fully clarify, upon copy of the
final syllable, nasality finds itself present word-initially, without a preced-
ing nasal stop. As copied nasality (and ONLY COPIED NASALITY, but not
other nasalized vocoids) finds itself in a context where there are never
alternations triggered by leftward nasals that induce its presence or
absence, there is no reason for alternation to be induced here. This
characterization of the pattern is summarized in (21).

(21)   a.   [sɔʔɔn]–[nɔ̃ʔɔ̃n]
           Nasality on this morpheme engages in alternation, due to the
           presence or absence of leftward nasality
       b.   [ɔ̃n–nɔ̃ʔɔ̃n]–[ɔ–sɔʔɔn]
           Nasality on this morpheme is not sensitive to the presence or
           absence of leftward nasality; it is nasalized when the base is
           nasalized, oral when the base is oral; IT NEVER ALTERNATES

Regardless of the theoretical particulars, all approaches to reduplication
must recognize the simple fact that reduplication involves copy. The
present approach departs from standard approaches by acknowledging
the distinction between static and active phonotactic constraints. In the
standard approach, recall, both static and active aspects of sound
patterning are treated in a dynamic fashion: even static patterns are
treated as being actively induced by either lexical-redundancy rules or
phonological constraints, rendering lexical phonotactic regularities pho-
nologically indistinct from patterns that actually engage in alternations.
As with "lexicon optimization," the present approach sees no motivation
for dynamically imposing lexically static conditions on hypothesized
underspecified underlying representations. Consequently, in reduplica-
tion, the content of the copied material is insensitive to any supposed
distinctions between it and its hypothesized underlying form. Supposedly
unexpected components observed in the copy, such as nasality in
[ɔ̃n+nɔ̃ʔɔ̃n], are thus not unexpected at all and do not require
commentary.

6. Malay reduplication

Malay possesses an unusual version of overapplication, as exemplified in (22) (Onn 1976, repeated in McCarthy and Prince 1995).[9]

(22) hamɔ̃   h̃ãmɔ̃-h̃ãmɔ̃   'germ/germs'
      waŋĩ   w̃ãŋĩ-w̃ãŋĩ   'fragrant/(intensified)'
      aŋãn   ãŋãn-ãŋãn   'reverie/ambition'
      aŋẽn   ãŋẽn-ãŋẽn   'wind/unconfirmed news'

Observe that underived forms have nasality only on vowels following the nasal stop, but derived forms possess nasality throughout. Here, nasality appears to copy from the base, spread across the morpheme boundary, and then copy again, culminating in fully nasalized forms. This scenario is presented in serialized fashion in (23), an approach that McCarthy and Prince argue against.

(23) i.   base: waŋĩ
      ii.   copy: waŋĩ-waŋĩ
      iii. spread: waŋĩ-w̃ãŋĩ
      iv.   copy: w̃ãŋĩ-w̃ãŋĩ

In the nonserial approach of optimality theory, once again, overapplication is subsumed under the high ranking of the BR identity constraint, in conjunction with various phonotactic and faithfulness constraints on the distribution of nasality, (24).

(24)

/waŋi–RED/	IDENT-BR(nas)	*NV$_{oral}$	*V$_{nas}$	IDENT-IO (nas)
a. ☞ w̃ãŋĩ-w̃ãŋĩ			******	***
b. waŋĩ-waŋĩ		*!	**	*
c. waŋĩ-w̃ãŋĩ	**!		****	*

Again, observe that there is no principled correspondence-theoretic reason why underapplication (*[waŋĩ-waŋĩ]) is not found, (25a), nor, for that matter, is there a principled reason why BR identity should be active at all here ([waŋĩ-w̃ãŋĩ]); it could just as readily be outranked by the phonotactic constraints, (25b).

(25)   a.

/waŋi–RED/	IDENT-IO(nas)	*V_nas	*NV_oral	IDENT-BR(nas)
a. w̃ãŋĭ-w̃ãŋĭ	**!*	******		
b. ☞ waŋĭ-waŋĭ	*	**	*	
c. waŋĭ-w̃ãŋĭ	*	***!*		**

b.

/waŋi–RED/	*NV_oral	IDENT-IO(nas)	IDENT-BR(nas)	*V_nas
a. w̃ãŋĭ-w̃ãŋĭ		**!*		******
b. waŋĭ-waŋĭ	*!	*		**
c. ☞ waŋĭ-w̃ãŋĭ		*	**	****

In fact, the present-day Malay pattern suggests an internal reconstructive scenario that suspiciously mirrors the serialist approach that McCarthy and Prince argue against. The focus here is on the seeming reapplication of nasality copying that lends the serialist approach its unpalatable flavor. But when recast as history, this recapitulation seems far less unappealing.

I suggest that at some point in the history of Malay, the reduplication of forms like present-day [w̃ãŋĭ-w̃ãŋĭ] may not have overapplied nasal copy: **waŋĭ-waŋĭ. However, just as vowels became nasalized in the context of an immediately preceding nasal, so too may the pattern have generalized to apply across larger domains, to persist within morphemes up to blockers, and may have further generalized to apply across actual morpheme boundaries themselves, both within morphologically derived words, and within compounds such as the reduplicated forms in question, and so a previously lexically static pattern qualitatively changed to a dynamic pattern involving alternation. At this point, then, the entire second form would have been nasalized, with only the initial syllable of the first form remaining oral: *waŋĭ-w̃ãŋĭ.

Subsequently, a new generalization may now have emerged over such forms. Since elsewhere, reduplication involved a largely complete copy of the base, such base-copy disparities involving nasalization were suddenly exceptional in their patterning. In order to conform with other instances of copy, partially nasalized copies thus switched to fully nasalized copies, and the present-day pattern thus emerges: w̃ãŋĭ-w̃ãŋĭ. In particular, there were no lexically static complementary distributions to

inhibit the pattern from falling in line with the majority of other forms: vowel nasalization was allophonic by this time, since it applied upon derivation. This diachrony is schematized in (26).

(26)

Early form:	Cross-morpheme nasal spread:	Statistically derived leveling:
hamɔ̃–hamɔ̃	hamɔ̃–h̃ãmɔ̃	h̃ãmɔ̃–h̃ãmɔ̃
waŋĩ-waŋĩ	waŋĩ-w̃ãŋĩ	w̃ãŋĩ-w̃ãŋĩ

time →

While this is certainly not the only possible way in which the present-day pattern may have come about, it is nonetheless a reasonable hypothesis. But note especially here that BR-identity *per se* is not the driving force behind this hypothesized diachronic change. Rather it is a statistical calculation over exemplars displaying allomorphic and allophonic regularities that may have induced the change (see especially Nosofsky 1986; Frisch 1996; Frisch et al. 2001, forthcoming): since almost all copies were identical to their bases, partially nasalized copies simply fell in statistical line with the norm.

The issue remains, of course, whether such a historical scenario is in any way relevant to the present-day system. I answer this question with a resounding "yes," and an equally resounding "no." Certainly, the present-day system is the direct culmination of its history: the pattern would not be in evidence today if history had not progressed the way it has. Thus, as the present-day pattern involves full nasality across both base and reduplicant in forms like [w̃ãŋĩ-w̃ãŋĩ], quite simply, this is all that learners of Malay need to observe. They hear reduplicants of this form, and they consequently produce reduplicants of this form: through their experience with reduplicated forms, they are able to conclude that reduplication involves copy in full; this is all they need to know to produce novel forms. Indeed, as I have just hypothesized, it is just such a statistically derived (over-)generalization over exemplars that may have resulted in such fully nasalized forms in the first place.

7. A note on learning

Although the intent of this paper is to provide the correct generalization about the nature of identity effects in reduplication and truncation, in this brief section I offer a largely pretheoretical proposal on the nature of the knowledge that underlies this patterning. I subscribe to a theory of the lexicon variously known as "episodic," "exemplar," or "multiple

trace,'' according to which perceptual categories are defined as the set of all experienced instances of the category, such that variability across exemplars actually contributes to the categorical properties themselves. I further assume that learners engage in probability matching when organizing the variable exemplars of a category, such that they statistically model the type and extent of variability within a category, largely reproducing this variability in their own speech. However, for the present I forgo exploring these theories' theoretical and experimental intricacies. Readers may consult, for example, Gluck and Bower (1988), Goldinger (1997, 1998), Johnson (1997), Kruschke (1992), Nosofsky (1986, 1988), and Shepard et al. (1961) for detailed explorations of this and related theoretical approaches to categorization, lexical or otherwise. For now, the work of the Gestalt psychologists (for example, Köhler 1929) — largely pretheoretical by today's standards — should suffice, as their approach is expressly concerned with the perceptual significance of dynamic functional relationships among physically disconnected elements of a systemic whole.

Consider the hypothetical set diagram in (27), from language X.

(27)
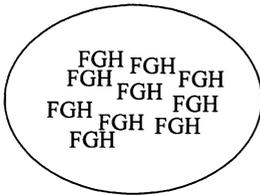
Here, the letter strings should be interpreted as some linguistically significant (=morphemic) psychoacoustic events with characteristics F, G, and H. While there is variability in the psychoacoustic properties of these events (stemming from the articulatory variability inherent in speech production — represented in [27] as a clouding effect), the events are nonetheless nonconfusable with other morphemes. Moreover, there are no alternations that result in allomorphy: variants FGH are always grouped with FGH (indicated by their being grouped in a circle). So, from the point of view of pairing these FGH psychoacoustic events with a particular meaning, it is not at all clear that FGHs need be treated as anything other than a functional whole. That is, given that bi-uniqueness holds between FGHs and a particular meaning, there is little functional motivation for learners to break the whole into component parts. Apart from their rampant homophony, Chinese languages more or less exemplify this sort of morphological system, and indeed, it has been experimentally shown that educated Chinese adults unfamiliar with the Roman

alphabetic Chinese orthography (hanyu pinyin) have great difficulty when asked to break down Chinese morphemes into segment-like chunks (e.g., Read et al. 1986).

Of course, there may be a lexical distributional regularity in language X such that H is found only after G, but I is found elsewhere. However, as there are no alternations involving H and I, they do not share a functional identity, and so there is no functional reason for them to be treated as the same for any linguistic purpose.

By contrast, now consider the set diagram in (28), from language Y.

(28)
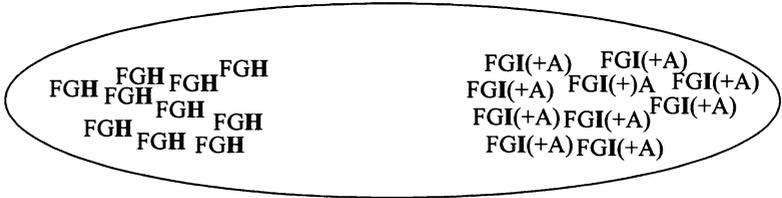
In language Y, there is a conditioned allophonic alternation: H→I/_____+A (where A is an event associated with a different morpheme, and thus it is parenthesized in [28]: it does not belong to the set of exemplars that are morphemically grouped with FGH). H and I are quite distinct psychoacoustically, and so, at least in these terms, FGH and FGI cannot be grouped together (indicated by the two separate clouds). However, in FUNCTIONAL terms H and I are identical: whether the psychoacoustic events contain (variants of) FGH or (variants of) FGI, the meaning associated with these forms does not change. Thus, H and I are psychoacoustically distinct, but functionally identical. Learners must figure this out. In order to do so, the patterns FGH and FGI must be analytically broken down (at least) to the extent that H and I are foregrounded from the psychoacoustic background (in this case, the background is FG; foregrounded information is indicated in bold). Indeed, this foregrounding is an emergent consequence of H and I's psychoacoustic distinctness in combination with their functional identity. That is, exactly because of the interaction of their psychoacoustic and functional relationships, H and I are foregrounded for (and by) learners.

In this way, knowledge of allophony may emerge through knowledge of allomorphy. In contrast, nonalternating patterns do not promote the foregrounding of subcomponents of the morph, and so there is little if any functional reason for learners to take note of any subcomponents thereof.

The patterns of reduplicative and truncatory morphology discussed herein seem to provide unique linguistic evidence for the special functional

import of alternations in determining allophonic relations. As shown for each of the four cases discussed, it is the absence of alternation that drives identity effects upon reduplication and truncation. Since lack of alternation does not promote the foregrounding of psychoacoustic sub-components of morphs, there is little if any functional reason for learners to deconstruct these morphs into smaller linguistically significant parts, even when phonotactic regularities are "violated."

8.   Other patterns, other explanations

Many other reduplicative patterns have been claimed to support the correspondence approach to reduplicative identity. In this final brief section I consider two such cases, Southern Paiute and Japanese. While the correspondence approach to the Southern Paiute pattern has basic empirical problems (discussed in Gurevich 2000), the Japanese case shows that reduplicative identity may be a consequence of a phonological word boundary between a base and its copy (Kim 1999). Indeed, as will be argued, identity effects are the trivially expected result if both the base and the copy are subject to word-level phonological processes such as stress and pitch accent placement.

8.1.   *Southern Paiute (Gurevich 2000)*

In Southern Paiute word-initial [w] is realized as [ŋʷ] if it finds itself in intervocalic position upon morphological concatenation (data in [29] [and transcriptions] are from Sapir 1930).

(29)   Southern Paiute [w]–[ŋʷ] alternations:
   wa'aŋi   ti·'ŋʷa'ŋi   'to shout/to give a good shout'
   waiχa-   nɪa·'vɪŋʷaiχapˑɪ 'to have a council/council (of chiefs)'

However, if [w] ends up in intervocalic position due to reduplication, it does not alternate with [ŋʷ], as can be seen in (30).

(30)   Southern Paiute reduplication:
   waɣi-   wawa'xˑɪpïɣa'   'several enter/all entered'
   wïn·nai- wïwï'n'nai-   'to throw/several throw down'
   wĭnɪ-   wïwïn'nïqˑu-   'to stand/to stand' (iterative)

McCarthy and Prince (1995) argue that [w]'s alternation with [ŋʷ] is blocked here in order to maintain base-reduplicant identity. However, Gurevich (2000) points out that upon reduplication, such [w]s are gemi-

nated and thus are not strictly intervocalic: VwwV. Since they are not in the proper context for alternation, Gurevich shows that the alternation is not blocked here, but simply that it is never triggered here; BR identity thus has no bearing on the issue.

McCarthy and Prince provide one form that seems to back-copy derived nasality ([31]; morpheme boundaries are not present in Sapir's transcription).

(31) Apparent back-copy:
  wĭnɪ- ya-ŋʷɪ'-ŋʷĭnɪx̣aʻ 'to stand/while standing and holding'

Here, the copied consonant finds itself in intervocalic position and thus appears as [ŋʷ]. Now, in order to maintain BR identity, the base itself appears with [ŋʷ], and thus nasality seems to copy back to the stem. However, Gurevich reports that the form in question is not reduplicative in nature but instead is a compound of two distinct roots, (32).

(32) yaŋʷɪ + wĭnɪ 'to carry' + 'to stand'

Thus, as root-initial [w] finds itself in intervocalic position upon compounding, the phonotactic condition induces the expected alternation. Since the form is a simple compound of distinct morphemes, BR identity plays no role whatsoever in its patterning.

In sum, Gurevich shows that there remains no evidence at all in favor of BR identity constraints in Southern Paiute reduplication.

8.2. *Japanese (Kim 1999)*

McCarthy and Prince argue that Japanese mimetic reduplication provides yet another example of a high-ranking BR identity constraint. They claim that while [g] alternates with [ŋ] intervocalically, the alternation is blocked upon mimetic reduplication, such that BR identity is maintained, (33).

(33) gaɾa-gaɾa 'rattle' (*gaɾa-ŋaɾa)
  geji-geji 'centipede' (*geji-ŋeji)
  geɾa-geɾa 'laughing' (*geɾa-ŋeɾa)

However, Kim (1999), investigating an idea mentioned in Ito and Mester (1996: note 33) originally suggested by Haruo Kubozono, shows that nonalternation in this context is part of a more complicated pattern that can only be understood by considering aspects of the Japanese system that are completely unrelated to BR identity per se. First, Kim observes that the [g]–[ŋ] alternation is only observed in bound forms; free forms never engage in this alternation, (34).

(34) *Alternation in bound forms*:

stem + derivative suffix:	sam-ŋaru	'to be cold'
inflexives:	tomodachi-ŋa	'friend-NOM'
stem + bound stem:	doku-ŋa	'poison fang'

No alternation in free forms:

derivative prefix + stem:	o-geŋki	'healthy'
	fu-gjoːjoː	'misconduct'
	fu-gjoːgi	'bad manners'
	fu-goːkaku	'disqualification'
stem + free stem:	koːtoː-gakːoː	'high school'
	nipːon-giŋkoː	'Bank of Japan'
	sin-gidʒuku	'new technology'

Now, Kim further reports that, according to Murasugi (1988), mimetic reduplication does not consist of two independent words, as the components cannot stand freely. Therefore, we expect alternation to take place here. However, Kim further finds that the alternation is found at weaker morpheme boundaries, but not at stronger morpheme boundaries, as exemplified in (35).

(35) Weaker boundaries:

ge-ŋe	'lowest'
ga-ŋa	'rugged'

Stronger boundaries:

guː-guː	'snoring'
goː-go	'strong windy sound'
gatsu-gatsu	'starvingly'

According to Ito and Mester (1996), mimetics may each possess a pitch accent, whereas the morphological complexes in which alternation is observed may only possess one pitch accent (on the second element). Thus mimetics consist of two prosodic words (divided by a "strong" boundary), whereas the [g]–[ŋ] alternation is only found within single prosodic words (containing a "weak" boundary). In short, when a morphologically complex form consists of a single prosodic word, either [g] or [ŋ] is present intervocalically, depending on the free or bound status of the morpheme to which it belongs. However, when a morphologically complex word consists of two prosodic words, [g] is always found, and [ŋ] is never found.

The case of Japanese mimetics thus does not support the BR identity approach to reduplication at all. Instead the observed identity between base and copy here is a consequence of wholly different grammatical forces, namely prosodic word status. Indeed, only when the strength of

reduplicative boundary is clearly shown to be weak — that is, it does not create two distinct domains for stress or pitch-accent placement or other word-based phonological properties — can base-reduplicant identity be invoked in order to account for stem-level identity: stem-level phonology is simply not expected at word-level boundaries. Both Aronoff (1988) and Silverman (1993) have argued this point in the published literature on reduplication. Thus, any analysis of reduplicative identity that does not thoroughly investigate the stem- or word-level status of the reduplicative boundary must be regarded as incomplete. Additional patterns discussed by McCarthy and Prince that seem amenable to this explanation include reduplication in Klamath (Choi 1999), and Axininca Campa (Prieto 1999), among others.

9. Concluding remarks

Data from patterns of truncation and reduplication suggest that an approach to phonology that recognizes the distinction between static phonotactics and dynamically imposed phonotactics is able to, in essence, explain away certain problems that remain ill-understood within the purview of standard structuralist and generative theories. Thus, in generative approaches such as optimality theory, whether regular, over-, or underapplication is found in any given reduplication or truncation process cannot be effectively predicted; any of these strategies might be observed, with BR or BT identity constraints being higher-ranked only when identity is indeed observed, and lower-ranked in cases of nonidentity. Instead, upon recognizing the dynamic versus static relations among sounds, and incorporating internal reconstructive hypotheses that these morphological processes suggest, a theory of reduplication and truncation is more accurately constrained, more accurately predictive, and more readily testable.

  Finally, I should point out that certain patterns thus far remain resistant to the present approach to identity effects, for example, the patterning of palato-alveolars in Luiseño (Munro and Benson 1973; Wilbur 1973). However, most cases that purportedly support standard proposals are in fact explainable by other, more constrained, and more predictive means, thus suggesting caution in embracing the standard approach in general, and the correspondence-theoretic approach in particular. Indeed, the success of the current approach invites a deeper investigation of those patterns that thus far seem resistant to it.

Notes

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1. Kenstowicz and Kisseberth (1977, 1979) in particular delve into the issue of the recapitulation of lexical redundancy rules (morpheme-structure rules) in the phonological component (phonological rules).
2. 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 these vowels' distribution. However, several years later (1940) he reevaluates the pattern, acknowledging their contrastive status.
3. A superficial counter-example to this claim is "lab"–"laboratory" ['læəb]–['læbɹə͵tʰɔɹi], but "lab" is clearly lexicalized and thus fits the pattern perfectly. Moreover, "ad" [æəd]–"advertisement" ['ædvɹ̩'tʰajzmn̩t] is probably a lexical distinction as well. Note in particular that all "adv-" words possess the lax vowel in New York.
4. 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.
5. Thanks to an anonymous *Linguistics* reviewer for bringing this point to my attention.
6. Inkelas in particular argues for treating alternating and nonalternating forms as disinct in their phonological (and lexical) properties. 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.
7. 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 *ōn*-verbs whose infinitives end in *Cra*" (Orešnik 1985 [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).
8. Despite Stevens's transcribing this form with unresolved hiatus, he reports that glottal stops are regularly present following a low vowel in hiatus. Such intervocalic glottals do not copy upon reduplication, being always treated as codas in the base. (Thanks to Amy Holland for bringing this point to my attention.)
9. I follow McCarthy and Prince in assuming that vocoids (but also h) are nasalized, despite Onn's transcribing these forms orally.

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