Phonological identity is phonological identity

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1   Introduction

Claim: When phonology assesses identity of segments or features, it does so only within the parameters of a system of phonemic contrasts. That is, phonology does not concern itself with phonetic identity, but rather with something more abstract and more coarse-grained.

Theoretical context: Modified Contrastive Specification (Dresher et al. 1994; Dresher 2009, 2015; Hall 2007, 2011; Mackenzie 2009, 2011; etc.)

Where does phonology care about identity at all?

Input–output correspondence: In OT, faithfulness constraints can mandate identity between aspects of the output and their correspondents in the input.

Here, the claim really is tautological—a phonetic contrast will be lexically contrastive if and only if the relevant faithfulness constraints are ranked high enough to preserve it in at least some contexts (Kirchner 1997).

(1)   a.

/tada/	*VoicedObstruent	Ident[voice]
[tata]		*
[tada]	*	

b.

Lexicon Optimization	Ident[voice]
/tada/ → [tata]	*!
☞ /tata/ → [tata]	

In rule-based theories of phonology, input–output correspondence doesn't need to be enforced at all. Rather, it is the default situation: anything in the input that is not changed by some rule will remain the same in the output.

Reduplicative identity (§2): Reduplication either copies material from the base to the reduplicant (if implemented procedurally) or requires identity between the two (if implemented declaratively). The granularity of identity between the two depends on the level of representation at which these mechanisms apply.

In Correspondence Theory implementations of reduplication (McCarthy & Prince 1995), base–reduplicant correspondence links two parts of the output. If BR corresepondence requires identity of non-contrastive properties, then it can produce over- or underapplication of allophonic patterns.

Harmony (§3): Harmony patterns often avoid co-occurrence of sounds that are similar but non-identical. As in the case of reduplication, the comparison here is between parts of an output.

Loanword adaptation (§4): Loanword adaptation maps a non-native form to the borrowing language's inventory (and phonotactics). Hypothetically, this mapping could be based on phonetic similarity or on the native system of contrast; are there cases where we can distinguish these two possibilities?

2 Reduplicative identity

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i               u
e       ə       o
        a
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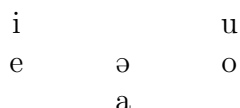
Figure 1: Contrastive vowel inventory of Javanese

Inkelas & Zoll (2005) discuss the interaction of reduplication and vowel allophony in Javanese.

The distribution of tense and lax high vowels is non-contrastive. The lax variants normally occur in closed syllables and the tense ones in open syllables, as in (2):

(2) Distribution of tense and lax high vowels (Schlindwein 1991: 99)

a. Unaffixed nouns
   i. murɪt̪   'student'
   ii. bibɪt   'origin'
   iii. ʤərʊʔ   'citrus fruit'
   iv. bəduk   'mosque drum'

b. Nouns with demonstrative suffix
   i. murid̪-e   'student'+DEM.
   ii. bibit-e   'back'+DEM.
   iii. ʤəruʔ-e   'citrus fruit'+DEM.
   iv. bədug-e   'mosque drum'+DEM.

Reduplication is used to mark plurality. In the unaffixed reduplicated forms in (3a), both copies have lax vowels in closed syllables as expected. But in suffixed forms like those in (3b), both copies of the relevant vowel are tense, even though only one is in an open syllable:

(3) Plural forms corresponding to (2) (Schlindwein 1991: 101)

a. Unaffixed plurals
   i. murɪt̪-murɪt̪   'students'
   ii. bibɪt-bibɪt   'origins'
   iii. ʤərʊʔ-ʤərʊʔ   'citrus fruits'
   iv. bəduk-bəduk   'mosque drums'

b. Plurals with demonstrative suffix
   i. murid̪-murid̪-e   'students'+DEM.
   ii. bibit-bibit-e   'backs'+DEM.
   iii. ʤəruʔ-ʤəruʔ-e   'citrus fruits'+DEM.
   iv. bədug-bədug-e   'mosque drums'+DEM.

In (3b) we have apparent **underapplication** of allophonic laxing; we find [i] and [u] in contexts where we would expect [ɪ] and [ʊ] based on the pattern established in (2).

Reduplication also gives rise to apparent **overapplication** of laxing when the root begins with a vowel and ends with a consonant:

(4)   VCVC nouns (Inkelas & Zoll 2005: 148)

    a. Unaffixed

      i. abʊr   'flight'

      ii. apɪq   'good'

    b. Demonstrative

      i. abur-e   'flight'+DEM.

      ii. apiq-e   'good'+DEM.

    c. Plural

      i. abʊr-abʊr   'flights'

      ii. apɪq-apɪq   PL.+'good'

    d. Demonstrative plural

      i. abur-abur-e   'flights'+DEM.

      ii. apiq-apiq-e   PL.+'good'+DEM.

While the other forms in (4) are transparent, the non-demonstrative plural forms in (4c) have lax vowels in both copies, even though the first copy is in an open syllable.

In a Correspondence Theory account, the over- and underapplication of laxing could be driven by base–reduplicant faithfulness (McCarthy & Prince 1995). The required constraint ranking would express the idea that it is more important for the two copies to match in tenseness/laxness—a non-contrastive property—than it is for tenseness/laxness to be determined by syllable structure:[1]

(5)   IDENT-BR[TENSE] $\gg$ $*\begin{bmatrix} +\text{HIGH} \\ +\text{TENSE} \end{bmatrix}$ / CLOSED σ, $*\begin{bmatrix} +\text{HIGH} \\ -\text{TENSE} \end{bmatrix}$ / OPEN σ

Relying on BR faithfulness here means that identity between the base and the reduplicant explicitly requires identity of all features, not just contrastive ones. But there are other ways of deriving the same effects.

Inkelas & Zoll (2005) argue against the BR correspondence approach, proposing instead that Javanese reduplication is best explained in terms of morphological doubling. In their account, reduplication creates two complete copies of the morphological word. Laxing and other processes apply transparently in each copy, but in some affixed forms (such as the demonstratives), one copy is subsequently truncated.

(6)   a. Deriving (3b-i) by morphological doubling (Inkelas & Zoll 2005: 149)

murid̯-murid̯e

murid̯   murid̯e

{murid̯}e   {murid̯}e

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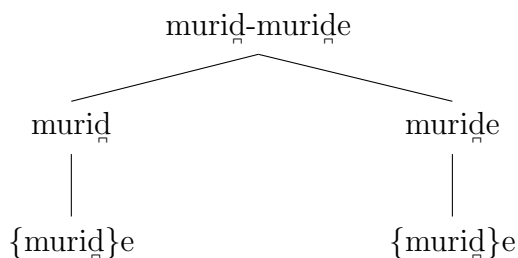
1. We also need some mechanism to ensure that when the base and the reduplicant present different contexts, laxing applies transparently in the base, and any opacity is in the reduplicant.

b. Deriving (4c-i) by morphological doubling

abʊr-abʊr

abʊr   abʊr

{abur}   {abur}
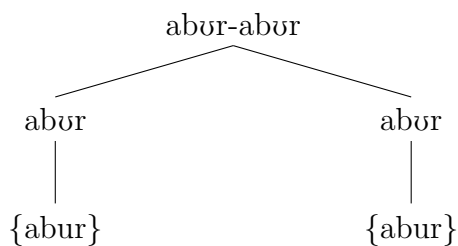
In Inkelas & Zoll's (2005) account, the identity between the base and the reduplicant is accomplished by copying at a morphological level, rather than by making the phonology sensitive to non-contrastive differences.
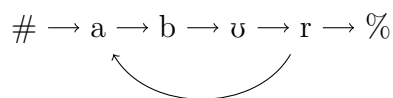
Another approach that would also avoid enforcing identity of non-contrastive features is Raimy's precedence-based phonology (Raimy 1999, 2000, 2011; Cairns & Raimy 2011). Raimy represents precedence relations between segments explicitly, using arrows. Reduplication does not copy morphological or phonological material, but rather adds precedence relations that create loops causing segments to be pronounced more than once:

(7) Precedence-based representations for (3b-i) and (4c-i)

     a. muriḑ-muriḑ-e:

$$\# \rightarrow m \rightarrow u \rightarrow r \rightarrow i \rightarrow \underset{\sim}{d} \rightarrow e \rightarrow \%$$

     b. abʊr-abʊr:
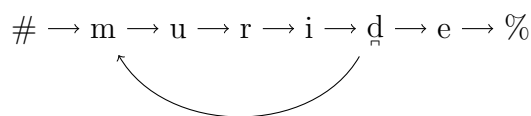
$$\# \rightarrow a \rightarrow b \rightarrow ʊ \rightarrow r \rightarrow \%$$

In (7), the two 'copies' of each vowel are identical because they are, in fact, the same segment.

Conclusion: Under either Morphological Doubling Theory or Precedence Theory, we can generate apparent over- and underapplication of allophonic patterns without having to say that the phonology cares about identity of non-contrastive properties.

3   Identity in harmony

Correspondence relations within a single output form have also been used in accounting for harmony (e.g. Rose & Walker 2004). Output segments that are sufficiently similar enter into correspondence relations, and may thus be required to agree in other features as well, or to be wholly identical.

(8) Template for correspondence constraints (Rose & Walker 2004: 491)

CORR-C↔C: Let S be an output string of segments and let C_i, C_j be segments that share a specified set of features F. If C_i, $C_j \in$ S, then C_i is in a relation with C_j; that is, C_i and C_j are correspondents of one another.

	LABIAL	ALVEOLAR	VELAR	LABIAL-VELAR
PLOSIVE	b	d	g	
IMPLOSIVE	ɓ	ɗ		g͡ɓ

Figure 2: Bumo Izon voiced stops (Mackenzie 2011: 1403, citing Efere 2001: 134)

Mackenzie (2009, 2011), however, argues that the relevant generalizations can—and in some cases must—instead be stated in terms of phonologically contrastive features. In Bumo Izon, for example, implosive /ɓ ɗ/ cannot coöccur with pulmonic /b d/, as in (9):

(9) Consonant harmony in Bumo Izon (Mackenzie 2009, 2011, citing Efere 2001)
   a. búɓú   'rub'   *ɓúbú, *búɓú
   b. ɗáɓá   'swamp'   *dáɓá, *ɗábá

As Mackenzie explains, an account of the Bumo Izon facts along the lines of Rose & Walker (2004) would have to say that voiced stops (regardless of place of articulation) enter into correspondence, and that corresponding segments must agree in [±constricted glottis]. However, /g/, which has no implosive counterpart, and /g͡ɓ/, which has no pulmonic counterpart, can each coöccur with either plosives or implosives, as in (10):

(10) Harmony ignores /g/ and /g͡ɓ/ (Mackenzie 2009, 2011, citing Efere 2001)

   a. igóɗ'ó   'padlock'   c. g͡ɓódag͡ɓóda '(rain) hard'
   b. ɗúgó   'pursue'   d. g͡ɓáɓu   'crack'

What is crucial for implosive harmony, then, as Mackenzie argues, is not that phonetically similar segments should have identical airstream mechanisms, but rather that a word cannot contain two different **contrastive** specifications for the feature [±constricted glottis]. Mackenzie proposes that Bumo Izon stops are specified according to the contrastive hierarchy in (11). The narrow scope of [±constricted glottis] means that it is not specified on /g͡ɓ/ and /g/ (or on voiceless stops).

(11) Contrastive hierarchy for Bumo Izon stops (Mackenzie 2011: 1405)
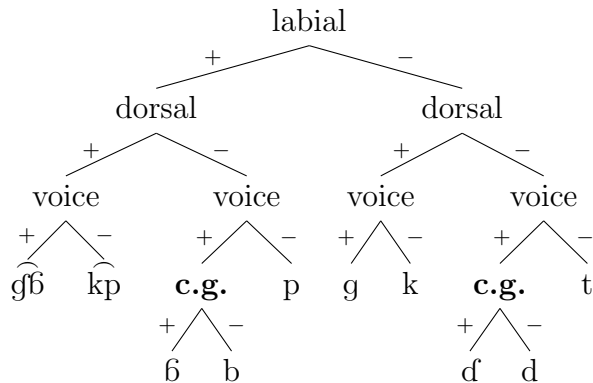
Conclusion: Cases like Bumo Izon and others discussed by Mackenzie suggest that what harmony is sensitive to is not phonetic similarity or identity, but rather matches and mismatches in contrastive feature specifications.

4   Cross-linguistic identity: Loanword adaptation

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    p      k  ʔ              p   t   k
           h                 f           h
    m   n                    m   n   ŋ
    w   l                    w   r
      Hawaiian                 NZ Māori
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Figure 3: Consonant inventories of Hawaiian and New Zealand Māori (Herd 2005)

Examples of phonemic identity taking precedence over phonetic similarity can also be found in loanword adaptation.

For example, Herd notes that English /s z ʃ/ are borrowed as /k/ in Hawaiian, but as /h/ in New Zealand Māori:

(12)   Hawaiian (Herd 2005: 100)

    a.   **k**epakemapa   '**S**eptember'   (s → k)

    b.   lu**k**e   'ro**s**e'   (z → k)

    c.   komi**k**ina   'commi**ss**ioner' (ʃ → k)
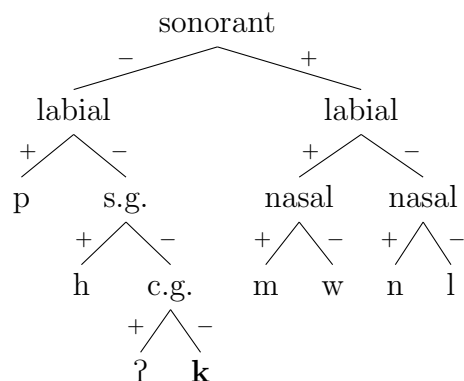
(13)   New Zealand Māori (Herd 2005: 103)

    a.   paraa**h**e   'bra**ss**'   (s → h)

    b.   roo**h**i   'ro**s**e'   (z → h)

    c.   koomi**h**ana   'commi**ss**ion'   (ʃ → h)

Both New Zealand Māori and Hawaiian have both /h/ and /k/, so if the choice were based on phonetic similarity, we would have no reason to expect the two languages to choose differently.

Herd argues that the crucial difference is the system of contrasts into which the consonants enter. Hawaiian /k/ does not contrast with /t/, and so is not contrastively specified as dorsal (or non-coronal); its phonological identity is thus compatible with /s z ʃ/:

(14)   Contrastive hierarchy for Hawaiian consonants (adapted from Herd 2005)

```
                    sonorant
              −               +
          labial           labial
        +     −           +       −
        p   s.g.        nasal    nasal
          +     −      +    −   +    −
          h   c.g.     m    w   n    l
            +     −
            ʔ     k
```

New Zealand Māori, on the other hand, does have phonemic /t/, and so /k/ is contrastively dorsal, and thus not a good phonological match for /s z ʃ/:

(15)   Contrastive hierarchy for New Zealand Māori consonants (adapted from Herd 2005)
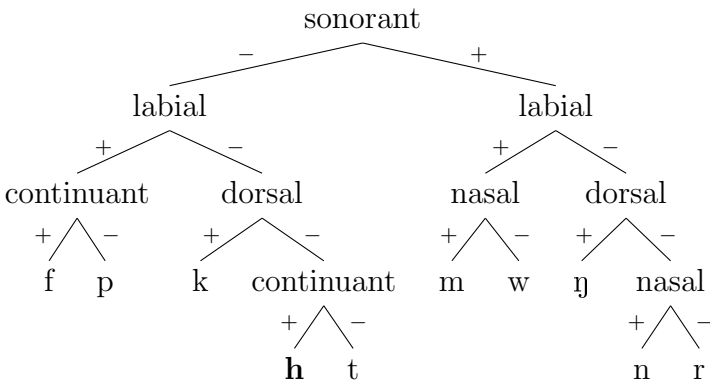
It's not necessarily possible to fully tease apart contrastive specifications from phonetic realization in loanword adaptation. For example, Hawaiian /k/ can be optionally realized as [t] phonetically (Schütz 1995; see also Cowper & Hall 2014 for further discussion). So Hawaiian /k/ doesn't just fail to contrast with a coronal, it actually *is* sometimes coronal itself.

Conclusion: Adaptation of foreign segments is sensitive to systems of contrast and phonemic identity, not solely to phonetic similarity.

5   General conclusions and questions

These disparate sources of evidence all lend support to the strong claim that when phonology concerns itself with the identity of segments, it is concerned with their identities as contrasting members in a phonemic system.

Where else might we look for possible counterexamples?

Albright (2015) argues for output–output faithfulness constraints mandating preservation of non-contrastive features in Lakhota, to account for opaque interactions between ablaut and aspiration.

What other theoretical consequences are there to pursuing this hypothesis?

If OO faithfulness is admitted at all, it's not obvious how to constrain it so as to exclude the possibility of faithfulness to properties that are not lexically contrastive.

Indeed, OT in general tends to make contrast an emergent property rather than a basic one, though Mackenzie & Dresher (2003) have shown how a contrastive feature hierarchy can be translated into a constraint ranking.

If we want to pursue the idea that contrastive representations are what phonology operates on, then it makes sense to do so within a theoretical framework in which insensitivity to phonetic detail comes naturally, rather than having to be stipulated as a restriction.

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