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'Abstractness' in Phonology: Evidence from Change

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1. There has been considerable debate concerning the degree to which underlying phonological representations can differ from surface phonetic representations (1). In the theory of Sound Pattern of English, underlying representations are chosen so as to yield the greatest overall generality in the grammar, even if this results in underlying forms which are quite far removed from their surface forms. In contrast to this so-called 'abstract' approach, a number of 'concrete' theories proposed in the last few years seek to limit the degree to which underlying forms can differ from surface forms. Examples are versions of Natural Generative Phonology incorporating either Vennemann's Strong Naturalness Condition or Hooper's True Generalization Condition, and the theory of 'Upside-Down' Phonology of Leben and Robinson, among others. I will argue that there is evidence from change in Old and Middle English in favour of 'abstract' theories and against theories incorporating such conditions.

2. This evidence involves the status of short diphthongs in the Old English dialect recorded in the Vespasian Psalter. So, consider the paradigm of wer man given in (1):

(1) Short Diphthong Alternating with Monophthong

	<u>Singular</u>	<u>Plural</u>
Nom.	wer, man	weoras
Acc.	wer	weoras
Gen.	weres	weora
Dat.	were	weorum

Notice that the stem vowel is e when a front vowel or no vowel follows, and eo when a back vowel follows. We shall interpret eo as e followed by a back schwa. In (1), the alternation between e and eo can be accounted for by a phonological rule which inserts a schwa before a following back vowel. This rule is traditionally known as Back Mutation, and it is given in (2):

$$(2) \quad \emptyset \longrightarrow \varnothing / \begin{bmatrix} +\text{syll} \\ -\text{back} \\ -\text{long} \end{bmatrix} \quad \text{_____} \quad [-\text{syll}] \quad \begin{bmatrix} +\text{syll} \\ +\text{back} \end{bmatrix}$$

There would be little disagreement in this case, I think, that we can eliminate the diphthong from the underlying representation of the morpheme wer, for we can derive it in the plural forms by Back

Mutation. But not all short diphthongs occur in a surface environment that so transparently meets the structural description of the rule.

For example, the Back Mutation environment is somewhat obscured on the surface by a group of vowel reduction rules. Thus, consider the forms of steadul foundation given in (3):

(3) Non-alternating Diphthong in Sometimes Correct Environment

	Singular	Plural
Nom.	steadul, foundation	steadelas
Acc.	steadul	steadelas
Gen.	steadeles	steadela
Dat.	steadele	steadelum

The digraph ea is generally agreed to be an orthographically shorter form of aea, which we interpret phonetically as ae followed by schwa. In the uninflected forms of steadul, the diphthong precedes the back vowel u, and so is in the correct environment for Back Mutation. In the inflected forms, however, the second vowel is written e. It is reasonable to suppose that this e represents a reduced vowel, phonetically a type of front schwa, and that the alternation in the second syllable is due to a rule of Open Syllable Reduction (OSR) which reduces an unstressed vowel to schwa if it follows an open syllable and is itself in an open syllable. The rule is given in (4):

(4) Open Syllable Reduction (OSR)

$$\left[\begin{array}{l} +\text{syll} \\ -\text{stress} \end{array} \right] \longrightarrow \emptyset / \left[\begin{array}{l} +\text{syll} \\ -\text{long} \end{array} \right] (\emptyset) [-\text{syll}] \text{ ____ } [-\text{syll}] [+ \text{syll}]$$

This rule was evidently still somewhat optional or the result of a recent change at the time that the Vespasian Psalter dialect was recorded, for the unreduced back vowel is occasionally represented in the orthography in the environment of OSR.

It is clear that by ordering OSR after Back Mutation we can derive the correct forms, as in (5):

(5) Sample Derivations

	/staedul+θ/	/staedul+es/	/bleds+a+d+e/	/clep+a+d+e/
Underlying	staedul	staedul+es		clep+a+d+e
Back Mutn(a)	staeðul	staeðul+es		clep+a+d+e
OSR (4)	-	staeðul+es		clep+a+d+e
Surface	staeðul	staeðeles	bledsade	clep+æ+de
Ortho- graphy	steadul	steadeles	bledsade	cleopede

In (5) we also give examples of the preterites of two weak verbs,

bledsade he blessed and cleopede he cried out. Notice that the long first syllable of bledsade blocks both rules, while cleopede undergoes both of them.

Although the derivation of (5) is quite straightforward and involves only well-motivated rules, the effect of OSR is to make the surface environment of Back Mutation opaque in the sense formulated by Kiparsky, as short diphthongs are now appearing in an environment other than before a back vowel. Hence, it is no longer true that short diphthongs must occur before back vowels at the surface. A theory which sets very tight constraints against surface opacity would rule out the grammar of (5) as a possible grammar. Instead, the short diphthongs in steadul and cleopade would have to originate in the underlying structures of these words.

An example of such a theory is one containing a condition which Hooper calls the True Generalization Condition. The True Generalization Condition requires "that all rules express transparent surface generalizations, generalizations that are true for all surface forms." (1976, 13).

It is possible to argue that the grammar of (5) is compatible with a somewhat weaker version of the True Generalization Condition, since some surface manifestations of the morpheme steadul contain a back vowel in the second syllable. However, even a weaker version of this condition would require the positing of an underlying diphthong in morphemes like heofen heaven, whose paradigm is given in (6):

(6) Non-alternating Diphthong in Never Correct Environment

	Singular	Plural
Nom.	heofen, heaven	heofenas
Acc.	heofen	heofenas
Gen.	heofenes	heofena
Dat.	heofene	heofenum

In this paradigm, the diphthong never appears in the correct surface environment, for it is never followed by a back vowel. In a theory which posits a classical autonomous phonemic level meeting the condition of biuniqueness, forms such as heofen are enough to demonstrate that eo cannot be an allophone of /e/, but must be a different phoneme. This position was in fact argued by Hockett (1959).

That the diphthongs in words like steadul and heofen must be underlying follows also from a theory incorporating Vennemann's Strong Naturalness Condition. This condition requires that "lexical representations of non-alternating parts of morphemes are identical to their phonetic representations." (1974, 346-7). A similar result follows from a theory such as that of Leben and Robinson, in which the only function of phonological rules is interpretive, to

"permit the morphology to relate words that superficially are phonetically dissimilar." (1977,1). Presumably, weras would be related to wer, in this theory, by Back Mutation applying in reverse; but Back Mutation will not apply in any way to steadul and heofen, for these words are not morphologically related to words whose stressed vowel is a monophthong.

Thus the various theories and constraints discussed above all lead to the same result in this case - namely, a grammar in which there are underlying short diphthongs.

3. In a theory which does not impose any of these constraints, however, having noticed that many short diphthongs can be derived by rule, we can proceed to ask if there is any evidence that even the short diphthong in heofen is derived by Back Mutation. For Back Mutation to operate, we require a back vowel in the second syllable. Yet, if there is such a back vowel in the representation of heofen at some stage in the derivation, it appears at the surface as a vowel that is represented by e. Is there any independent evidence, then, that another vowel reduction rule is involved in the derivation of heofen? There is such evidence, involving the rule of Epenthesis.

Consider the words weter water, and fugul bird, given in (7):

(7)	Stems with Second Vowel Alternating with \emptyset	
	Sing.	a. water b. bird
	Nom.	weter fugul
	Acc.	weter fugul
	Gen.	wetres fugles
	Dat.	wetre fugle

Notice that in uninflected forms the stem is disyllabic, while in inflected forms it is monosyllabic. There are arguments in favour of analysing these morphemes as underlying monosyllables /wetr/ and /fugl/, and having a rule of Epenthesis insert a vowel when no vowel follows. Epenthesis applies before sonorants l, r, m, and n, and the epenthetic vowel matches the stressed vowel in backness. Thus, in weter, with a stressed front vowel, the epenthetic vowel is e, while in fugul, with a stressed back vowel, it is u. A simplified version of Epenthesis is given in (8), with derivations as in (9):

(8) Epenthesis (simplified)

$$\emptyset \longrightarrow \left[\begin{array}{l} +\text{syll} \\ \alpha\text{back} \\ \alpha\text{hi} \\ -\text{lo} \end{array} \right] / \left[\begin{array}{l} +\text{syll} \\ \alpha\text{back} \end{array} \right] C_0 \text{ --- } [+son] \text{ (} [-\text{syll}] \text{ X) \#}$$

(9) Sample Derivations

Underlying	/wetr+θ/	/wetr+es/	/fugl+θ/	/fugl+es/
Epenthesis(8)	weter	-	fugul	-
Surface	weter	wetres	fugul	fugles

It should be noted that when the stressed vowel is a diphthong, the epenthetic vowel is u, which shows that the second element of Old English diphthongs is [+back], unlike the schwa in unstressed syllables. The distinction is recognised in the orthography.

Now, an interesting thing happens when the final sonorant in rule (8) is n or m. In just these cases, the epenthetic vowel does not match the stressed vowel in backness, but is written e no matter what the stressed vowel is. Examples are given in (10):

(10) Stems Ending with a Nasal Consonant

Sing.	a. cloud	b. oven
Nom.	wolcen	ofen
Acc.	wolcen	ofen
Gen.	wolcnes	ofnes
Dat.	wolcne	ofne

To write this condition into the Epenthesis rule itself would involve a considerable complication of that rule. Instead, it is plausible to suppose that the e here is again representing schwa, and that we are dealing with another vowel reduction rule, this time a rule reducing unstressed vowels before nasal consonants. This rule is given as Pre-Nasal Vowel Reduction in (11):

(11) Pre-Nasal Vowel Reduction (PNVR)

$$\left[\begin{array}{l} +\text{syll} \\ -\text{stress} \end{array} \right] \longrightarrow \text{ə} / \text{ ______ } [+nasal] \text{] stem}$$

Adding (11) as a late rule will give the correct forms for the words in (10); but Pre-Nasal Vowel Reduction would also affect underlying back vowels. Assuming for the moment, then, that the form underlying heofen is /hefun/, we would have derivations as in (12):

(12) Sample Derivations

Underlying	/ofn+θ/	/hefun+θ/
Back Mutation(2)	-	heofun
Epenthesis(8)	ofun	-
PNVR (11)	ofən	heofən
Surface	ofən	heofən
Orthography	ofen	heofen

It follows from the grammar of (12) that it is impossible for an underlying unstressed back vowel preceding a stem-final nasal consonant to appear as a back vowel at the surface.

But even if we do want to assign heofen an underlying back vowel in the second syllable, how do we know which back vowel it is? A clue is provided by morpheme structure considerations. For disyllabic nominal morphemes of the class of heofen - traditionally called a-stems - typically end in u followed by a consonant, and only rarely have an o or a as their second vowel. Examples are given in (13):

(13) Nominal Stems Ending in -uC

steadul, eofur, weorud, heorut, heafuc, etc.

A gap in the pattern occurs before n and m, where instead of u we have schwa.

Considerations of generality, then, lead us to posit underlying /hefun/ as in (12), for by doing so we can predict the occurrence of the short diphthong and at the same time account for a gap in a morpheme structure pattern. In a similar fashion, we can go on to eliminate virtually all short diphthongs from underlying representations. (2)

We are now faced with two grammars which follow from two different types of theories: a grammar we will call G_1 , in which all short diphthongs are eliminated from underlying structure, which would be selected by an SPE-type theory which values overall generality in the grammar; and another grammar, G_2 , that follows from a more 'concrete' type of theory which incorporates conditions of the type discussed earlier. The two grammars are contrasted in (14):

(14) a. G_1 - SPE type Theory

Underlying	/weɾ+as/	/stæədul+es/	/hefun+θ/	/ofn+θ/
Back Mutation(2)	weɾ+as	stæədul+es	heʃfun	-
Epenthesis(8)	-	-	-	ofn
PNVR (11)	-	-	heʃfən	ofən
OSR (4)	-	stæədɔl+es	-	-
Surface	weoras	stæədəles	heʃfən	ofən
Orthography	weoras	steadeles	heofen	ofen

(14) b. G_2 - 'Concrete' Theory

Underlying	/wer+as/	/staeðul+es/	/heafanþ/	/ofnþ/
Back Mutation (2)	wear+as	-	-	-
Epenthesis (8)	-	-	-	ofun
PNVR (11)	-	-	-	ofæn
OSR (4)	-	staeðal+es	-	-
Surface	wearas	staeðales	heafan	ofæn
Orthography	weoras	steadules	heofen	ofen

How can we choose between the two grammars, and hence, between the two types of theories? They both generate the same surface forms; however, they make quite different claims about the organization of the lexicon. I will now present some evidence from change which bears on this question.

4. Recall that words such as weter are derived from underlying monosyllabic stems via Epenthesis. However, there were in Old English also words such as yfel evil, and micel much, originally derived from underlying disyllabic stems. The second vowel of such words remained in inflected forms: hence, yfeles and miceles. Thus, at a stage of Old English preceding the stage recorded in the Vespasian Psalter we can recognize three types of stems, as in (15). Rows (a) and (b) contain underlying disyllabic stems, while row (c) lists underlying monosyllabic stems:

(15) Early Old English (Before Vespasian Psalter Dialect)

a. yfel	yfeles	micel	miceles
b. steadul	steadules	eofur	eofures
c. weter	wetres	fugul	fugles

But consider rows (a) and (c), the micel type as opposed to the weter type. Looking only at the uninflected forms, we cannot tell which is underlying disyllabic and which is underlying monosyllabic. In other words, we cannot predict from the uninflected forms whether the second vowel will remain in the inflected forms or not.

Neither, apparently, could the speakers of this stage of Old English. For there was great instability in forms of row (a) of (15), and in the Vespasian Psalter dialect, yfel and micel are declined like weter and fugul - i.e. they have been reanalyzed as deriving from underlying monosyllables. It seems that we require a principle to the effect that: if the uninflected forms of underlying monosyllables and disyllables look the same, then it will be difficult to keep the two classes apart.

But consider now row (b). What should we expect here? For these words, the two grammars suggest different predictions. In G₂, where short diphthongs can be underlying, forms like steadul and eofur should behave just like yfel and micel, and we would expect to find forms such as steadles and eofres. In G₁, however, where there are no underlying diphthongs, these forms have a quite different status. For a speaker who has internalized G₁ knows that the second syllable vowel in steadul must be underlying; otherwise, there would be no way to obtain a diphthong in this word - thus, underlying monosyllabic /staedl/ would yield the incorrect *staedel, while underlying monosyllabic /steadl/, with a diphthong, is impossible. In G₁, in other words, the short diphthongs of words like steadul and eofur provide a clue as to the status of the following vowel - namely, they guarantee that it must be underlying. So we would expect, given G₁ but not G₂, that words like those in (15b) would be far more likely to retain the second vowel in inflected forms.

As it turns out, this is exactly what happens. With the exception of one form which cannot be otherwise explained, forms with short diphthongs in the Vespasian Psalter resist the tendency to reanalyze. This result supports G₁, but cannot be accounted for by G₂.

To account for the retention of the second vowel in (15b), the advocate of a 'concrete' theory might appeal to the power of unstructured memory. It might be argued that words with short diphthongs derive historically from disyllabic stems, and that succeeding generations of language learners simply remembered to retain the second vowel in inflected forms. Of course, such an appeal to memory cannot account for the much poorer memory displayed with respect to the words in row (a), which suggested the principle proposed above.

But there is more evidence in favour of this principle. This evidence comes from a stage of early Middle English following the stage of the Vespasian Psalter dialect. In this later stage, short diphthongs merged with monophthongs, and the tendency to reduce unstressed back vowels was carried much further. The result was that this dialect at one point had contrasting forms such as in (16):

(16) Early Middle English (After Vespasian Psalter Dialect)

a.	staedəl	staedələs	efər	efərəs
b.	wetər	wetrəs	micəl	micləs

The distinction between (16a) and (16b) now recreates the situation which held earlier with respect to (15a) and (15c). Without short

diphthongs and Back Mutation, the uninflected forms of (16a) cannot be distinguished from those of (16b).

What happened? This time, the system collapses completely: all forms are restructured as underlying disyllables, and the rule of Epenthesis is done away with. Examples from the dialect of The Life and Passion of Ste. Juliane, which represents a later stage of the Vespasian Psalter dialect, are given in (17).

(17) Life and Passion of Ste. Juliane Dialect (After 16)

<u>heouene</u> dat. sg.	heaven	Cf. VP <u>heofene</u>
<u>fuheles</u> pl.	birds	Cf. VP <u>fuglas</u>
<u>michel</u> <u>muchele</u>	much	Cf. VP <u>micel</u> <u>micle</u>
<u>water</u> <u>watere</u>	water	Cf. VP <u>weter</u> <u>wetres</u>

The facts are quite striking - where there is no independent way of determining from the surface uninflected cases whether or not a word undergoes Epenthesis, there is a great amount of leveling - in the earlier stage towards Epenthesis, and in the later stage away from it. Just in that stage where there are words for which there exists an independent way of telling whether or not they are susceptible to Epenthesis, these words strongly resist leveling. Since it is only in an 'abstract' theory that the short diphthongs can serve as such evidence, it follows that the historical facts of every stage support this type of theory and count against a more 'concrete' approach. We conclude, then, that generalizations deeper than those allowed by the various 'concrete' theories are in fact captured by speakers, and that the theory of phonology must contain an evaluation measure which chooses grammars in which these generalizations are expressed.

Footnotes

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²There are other rules which introduce short diphthongs, and quite similar considerations hold for these diphthongs as for the ones introduced by Back Mutation. See Dresher (1978) for further details.

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