

language. More generally, this entails that only features which play a distinctive role in the language could be generalized by phonological analogy.

Further implications of lexical phonology for phonological change will be examined in the next section.

14.4. On the nature of lexical diffusion: a conjecture and a case study

Proponents of lexical diffusion do not question that sound change of the neogrammarian type exists as well.⁵⁴ The question arises how the two types of change can be differentiated. Labov (1981) argues in detail that we must recognize both types of sound change, with the characteristics listed in (9):

(9)	<i>'Neogrammarian' change</i>	<i>Lexical diffusion</i>
Discrete	no	yes
Phonetic conditioning	fine	rough
Lexical exceptions	no	yes
Grammatical conditioning	no	yes
Social affect	yes	no
Predictable	yes	no
Learnable	yes	no
Categorized	no	yes
Dictionary entries	1	2

The properties in (9) differentiate two types of phonological rules. Do those rule types *result* from the two kinds of sound change, or is the existence of two rule types itself the reason why there are two kinds of sound change? We shall here argue for the latter position. The typology presented in (9) closely resembles the distinction between lexical and postlexical rules (Kiparsky 1982a, b; Kaisse & Shaw 1985; Mohanan 1986) and we propose to identify the two.

An alternative is that the distinction between neogrammarian sound change and lexical diffusion is intrinsically connected to the particular phonological feature involved (Labov 1981). Labov suggests that lexical diffusion is found most often in changes in phonological features that define 'subsystems' in that their phonetic realization involves several phonetic features, while phonological features with a more 'concrete' phonetic manifestation will tend to change in neogrammarian fashion:

. . . where lexical diffusion does occur, it is to be found most often in changes across subsystems – particularly lengthenings and shortenings

⁵⁴ 'The neogrammarian conception of language change will probably continue to be part of the truth' (Wang 1979: 369).

in vowels, and changes of place of articulation in consonants.

Diphthongization and monophthongization appear to be intermediate cases.

We find regular sound change in a wide range of vowel shifts that represent movements within the subsystem of short vowels, or the subsystem of up-gliding diphthongs, or in-gliding diphthongs: raising, lowering, fronting, backing, rounding, unrounding, nasalization.

In consonants, Labov suggests that change in manner of articulation is typically regular.

Such a relationship between the modality of change and the substantive character of the feature involved would be a purely empirical one; there is no theoretical reason to expect it. But in any case, it runs counter to a number of reasonably well-documented cases of lexical diffusion involving raising, voicing, and other features with intrinsic phonetic interpretation (Kiparsky 1980: 412; Phillips 1984: 321).

The position to be defended here is that lexical diffusion is a property of lexical rules. That is, we take the differences in (9) not as *results* of the two types of sound change but as *preconditions* for them. This relationship, we propose, is a principled one because the theory of lexical phonology already specifies as one of the essential distinctions between lexical and postlexical rules that only the former may have lexical exceptions. It follows that lexical diffusion must be a redistribution of phonemes among lexical items and cannot create any new phonological contrasts. This prediction is borne out by the attested examples of lexical diffusion, which invariably involve *neutralization* processes, i.e. processes whose output can be lexicalized – an observation which suggests that lexical diffusion is the ‘selective progressive lexicalization of the output of neutralizing variable rules (Kiparsky 1980: 412). In addition, this hypothesis fully reconciles lexical diffusion with Bloomfield’s ‘stray sounds’ argument against the possibility of lexically sporadic sound change (see p. 366).

Our hypothesis further predicts that the very same feature, indeed the same rule, should be subject to lexical diffusion in one language or dialect and not in another depending on whether the feature is lexically distinctive or not. We will now show that this is borne out in a well-known English example, the tensing of short /æ/.

The tensing of /æ/ applies in all dialects of American English, but it takes several quite different forms. In the MidAtlantic states it is a lexical rule; the Philadelphia version is stated in (10) (Ferguson 1975; Labov 1981, 1986):

(10) Philadelphia tensing pattern:

æ → Á before (normally tautosyllabic) *f, s, θ, m, n, (d)*

This rule causes stressed [æ] to become tense (we will write the tensed form as A), regularly before certain tautosyllabic consonants (see (11a), in three words before *d* (11b) and in scattered words in open syllables (11c):

- (11) a. grAph, pAss, pAth, hAm, mAn
 b. bAd, mAd, glAd (vs. sæd, dæd, læd . . .)
 c. p[æ/A]l, pl[æ/A]net, person[æ/A]lity

In a given word, Philadelphia speakers either apply or do not apply tensing uniformly. This feature-specifying rule is to be sharply distinguished from the *degree* of tensing and raising with which the tense vowel is pronounced, which varies in a gradient manner depending on style and social class. As shown by the contrast in (11b) between tense *bAd*, *mAd*, *glAd* and lax *sæd*, *dæd*, *læd*, etc., the rule has been subject to lexical diffusion. Labov argues that it is an ongoing change in the dialect, which is currently being extended to words like those in (11c).

A similar tensing process operates in most dialects of American English, such as at least the Midwest and New England, but in those other dialects it operates *categorically* with no lexical conditioning whatsoever. So we may ask why Philadelphia and more generally the MidAtlantic area including New York City and Washington implement the tensing in so radically different a way from the rest of the country.

To begin with, let us establish that tensing in Philadelphia is a rule of lexical phonology, in fact a rule ordered at level 1. The data which shows this was obtained partly from Labov (1981) and partly from native Philadelphians interviewed by Lori Levin and myself.⁵⁵ The relevant facts and their explanation in the framework of lexical phonology are as follows.

1. A syllable that is closed at level 1 retains its tense vowel even when its coda later becomes the onset of a following 'word boundary' suffix or word:

- (12) a. mAnn#ing, tAnn#ing, hAmm#ing, clAmm#y, glAss#y,
 mAdden#ing, scAnn#er, mAdd#est⁵⁶
 b. plAn it, pAss us

This is because tensing operates at level 1 and word boundary suffixes are not added until level 2, while the combinations in (12b) are not formed until the syntax.

2. Because of the inherent cyclicity of lexical derivations we predict that the tenseness of basic words will be retained in words derived from them at level 1 regardless of resyllabification in later cycles. We found this to be the prevalent pattern in the words:

⁵⁵ Labov (1986) reports additional data which is in agreement with our findings.

⁵⁶ The # boundary is written before these affixes merely to show their level 2 status. The same goes for the + boundaries in (13). In lexical phonology boundaries are eliminated from phonological representations.

(13) clAss+ify, gAs+ify, gAs+eous, photogrAph+ic

A number of speakers were found with lax [æ] in these words; and [æ] was even preferred in *massive*. There are several possible explanations for this fact. One is that these speakers treat the words as underived, or as root-based rather than word-based derivatives. Since roots are not cyclic domains, tensing would in that case first become applicable only *after* the suffix is added, at which point the final consonant will already be resyllabified as an onset.⁵⁷ The [æ] may also be a residue of the earlier system where, as I shall argue below, tensing operated at a later stage in derivation. In fact, this pronunciation seems to be characteristic of older speakers in my data, although I do not have enough material for a firm conclusion.

Lax [æ] is correctly predicted for words like *humæn+ity*, *titæn+ic* (since [æ] is unstressed on the first cycle and the syllable is open on the second cycle), and *sæ+n+ity*, *Spæn+ish* (since [æ] is long on the first cycle and the syllable is open on the second cycle).

3. Syllables which become closed only after level 1 do not undergo tensing. For example, the process which deletes an unstressed vowel before an unstressed syllable beginning with a sonorant cannot apply until level 2 at the earliest because it must 'wait' until the word stress is assigned. If it applied cyclically at level 1 we would get **op'rativ* instead of *operativ*, from *op'ra*. This deletion produces a closed syllable but, as predicted, it does not feed tensing.⁵⁸

(14) fæm'ly, cæth'lic, anæph'ra

4. Tensing does not apply to the past tenses of strong verbs (15a), though it does apply to their present tenses (15b) and of course to weak verbs (15c):

- (15) a. ræn, begæn, swæm
 b. stAnd, understAnd
 c. scAnned, hAmmed

So tensing is ordered before the ablaut rule:

(16) i → æ in the past tense of strong verbs

whose output must clearly be æ, not A, because of *sæt*, *spæt*, *drænk*, *sæng*,

⁵⁷ Morphological indeterminacy should accordingly lead to phonological variability. It is not unlikely that speakers should differ in whether they derive a word like *massive* from *mass*. On that hypothesis one would predict educated speakers to have A more often in these derivatives than uneducated speakers, but I do not know whether that is so.

⁵⁸ Hence tensing provides a diagnostic for underlying representations. Words like *camera* regularly have lax æ, suggesting that they are lexically represented as trisyllabic in spite of the fact that they are practically always pronounced as disyllables and have no stress-shifted derivations either, so that the elided middle syllable is actually never heard. It is not necessary to attribute the trisyllabic underlying form to the orthography (though that is certainly a possibility). The unusual cluster *-mr-* might be a sufficient clue to the deleted vowel.

ræŋ, etc. Rule (16) has to apply at level 1 for other reasons;⁵⁹ this entails that tensing must also be at level 1. in (15).⁶⁰

5. Tensing never applies to non-lexical categories, such as auxiliaries or the indefinite article:

(17) *hæd*, *æm*, *cæn*, *æn*

Hence the well-known contrast *I cæn* vs. *tin cAn*. Since word stress is also assigned by lexical rules, the items in (17) get no word stress (as witness the fact that they are liable to vowel reduction unless they receive a postlexical stress in their sentence context) and consequently they do not meet the structural description of tensing.

Given what has been said so far, it follows that we could account for why *æ*-tensing undergoes lexical diffusion in the MidAtlantic states if we could show how it became a lexical rule in the first place. To this end let us look first at the simpler types of dialect.

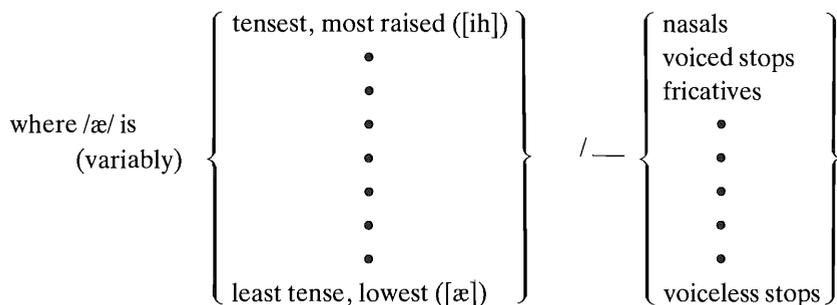
(18) *Midwest*:

a. Backing (lexical)

[+low] → [+back] in env. ___r

b. Tensing/raising (postlexical)

/æ/ → {[æ] [ih]} (continuum of tensing/raising)



In the Midwest (see (18)) there are two phonemes /æ/ and /a/ in *lather* and *father*. The opposition between them is neutralized in favor of *a* before tautosyllabic *r* by the lexical backing rule (18a). The vowel /æ/ is subject to a variable postlexical tensing rule of which an approximate formulation is given in (18b). This rule is totally uninfected by any lexical idiosyncrasy.

In New England the situation is a bit more complicated because lexical backing applies more generally there, not just before *r* but in roughly the

⁵⁹ Because it belongs to level 1 it does not apply to verbs derived from nouns at level 2, e.g. *inked* rather than **ank* (Kiparsky 1982a).

⁶⁰ Note that tensing does not *have* to be ordered before (16). It *could* be ordered also after (16), still at level 1. There are indications that this possibility is also realized, in that some speakers have lax [æ̃].

same contexts as the British English broad *a* rule, before fricatives and nasal clusters, in a lexically specified set of words as those listed under (19b).

- (19) a. car, Harvard
 b. half, laugh, bath, pass, ask, aunt, dance, example
 c. father, balm

The vowel is realized as the well-known [a] of *Park your car in Harvard yard*. I will assume this to be characterized by the feature [+ATR], though I will continue to call the rule 'backing' for convenience. There are many *æ*'s to which this backing rule does not apply, either because its context is not met or because they are lexically specified as [-ATR] so that the strict cycle condition will block the lexical rule from applying to them. All these *æ*'s are then subject to tensing *postlexically* by the same rule as in the Midwest. So in this dialect we again have two phonemes but with a rather different distribution because of the more general backing rule.

- (20) *New England*:
 a. Backing (lexical)
 [+low, -back] → [+ATR] / ___ r, C_f (in certain words)
 (where C_f = f, θ, s, N+C)
 b. Tensing/raising (postlexical)
 /æ/ → {[æ] [ih]} (continuum of tensing/raising)

The Mid-Atlantic states, like New England, had a special broad *a* rule before fricatives and nasal clusters, but broad *a* coincided not with the vowel of *car* and *father* – but with the tense *æ* that was also the output of the postlexical tensing rule. The result was that these dialects acquired a *lexical* tensing rule. Now this lexical tensing rule overlapped with the old postlexical tensing rule, and eventually merged with it; the result is precisely the system that prevails in Philadelphia, shown in (21):

- a. Backing (lexical)
 [+low] → [+back] / ___ r
 b. Tensing (lexical)
 [+low, -back] → [+tense] / ___ C_f, in a set of words whose core is the old broad [a] class
 c. Raising (postlexical)
 /A/ → {[æ] [ih]} (continuum of tensing/raising)

As we have seen, having acquired lexical status, tensing then spreads to new

lexical items, that is, it undergoes lexical diffusion. So we see that the lexical status of æ-tensing in the MidAtlantic states is ultimately due to the fact that here and only here it continues in part the lexical backing rule of British English.

There is perhaps some contact between my claim that lexical diffusion is a property of lexical rules, and Labov's claim that lexical diffusion is a property of features defining 'abstract subsystems.' However, Labov identifies the abstract subsystems not by the phonological system of the language but by the phonetic nature of the distinctive features. In his view, features like tenseness and length are subject to lexical diffusion because they do not define any single physical dimension but rather 'a set of features that may include length, height, fronting, the directions and contours of glides, and the temporal distribution of the overall energy' (p. 299), while features like front/back and high/low will *not* manifest lexical diffusion because their physical realization is more direct. On this view it is, of course, mysterious that *a*-tensing, which after all involves the same feature in all dialects, is subject to lexical diffusion in some dialects and not others. By linking lexical diffusion to the *function* of the feature in the abstract phonological system as we have done – specifically with the lexical vs. postlexical status of the rule that specifies it – we predict exactly the observed dialect differences.

I draw the conclusion that the existence of two types of sound change, lexical diffusion and 'neogrammarian' sound change, is a consequence of the existence of two types of phonological rules, lexical rules and postlexical rules.

14.5. Concluding remark

There is no dearth of either data on theoretical alternatives in historical phonology. As usual, the hard part is to connect them in a way which will give us a more precise understanding of 'what really happened,' while narrowing down the theoretical options. When does sound change spread word by word? How is sound change constrained by the phonological system? By the vocal tract? What is the right interpretation of the variable rule technology? These and other basic questions of historical linguistics are at the moment being answered in radically different ways, some of which we have attempted to sort out here. Progress in our understanding of sound change is likely to come from an integration of theories of phonology, phonetics, acquisition, and language processing (perception, production, variation). It is this interplay of mutually constraining factors which gives historical linguistics its focal role in the study of language.