This article attempts to establish the identity of the English category-changing affix *en*, which functions both as a prefix and as a suffix and to give a principled explanation for its peculiar behavior within the framework of Lexical Phonology proposed by Halle and Mohanan 1985. It is first demonstrated that *en* is a class I affix. It is also argued that *en* is basically a suffix and that the prefix *en-* is derived by the application of the general rule Copy-α. Finally, by adopting the copying analysis, a principled account is given for the non-assimilation of /N/ in cases like *enlarge* and *enrich*.

0. INTRODUCTION. In this article we provide an explanation for the behavior of the English category-changing affix *en*, focusing our attention on its affixation to adjectives. The behavior was observed by traditional grammarians, including Jespersen, but has received little attention within the generative phonological framework. We want to pose and answer three questions concerning its behavior, adopting as a basis of our analysis the framework proposed by Halle and Mohanan 1985 (hereafter H&M), a version of the theory of Lexical Phonology.

(1) a. Which stratum does *en* belong to in the lexicon?
   b. Is *en* basically a prefix or a suffix?
   c. Why does assimilation not take place when *en* is followed by stems beginning with the liquids /l/ and /r/, while assimilation does take place when it is followed by those beginning with the bilabials /m/ and /b/?

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Question 1a is a theory-internal one; it arises only within the theory of Lexical Phonology (in this article, the framework proposed by H&M). Based on the fact that en shows characteristics typical of class I affixes, we argue that it is a class I affix and thus belongs to stratum 1. As for question 1b, we conclude on the basis of Williams's Righthand Head Rule that en is basically a suffix. The apparent problems that arise from the conclusion, such as the fact that en functions as a prefix in certain phonological environments can be solved by invoking Copy-\(\alpha\). Question 1c will be answered by claiming that the apparent phenomena of assimilation, in fact, involve two distinct rules: One is nasal deletion and the other is assimilation in point of articulation and that the former applies before the latter according to their inherent nature. The important point of our investigation is to provide not a description of, but a theoretical explanation for, the behavior of en. We hope to contribute something to the study of a theory of universal grammar by empirically testing some rules and principles that belong to it. We begin by surveying the framework proposed by H&M.

1. **AN ORGANIZATION OF THE FRAMEWORK.** In the process of development of the theory of Lexical Phonology, H&M propose the following framework as an organization of the lexicon in English.

\[
\begin{array}{c}
\text{underived lexical item} \\
\text{stratum 1 Class I derivation (cyclic)} \\
\text{stratum 2 Class II derivation (non-cyclic)} \\
\text{stratum 3 (cyclic)}
\end{array}
\]

\[
\begin{array}{c}
\text{level 1 phonology} \\
\text{level 2 phonology} \\
\text{level 3 phonology}
\end{array}
\]
H&M assume that there are four ordered strata (or levels) in the lexicon and that each morphological process and each application of phonological rules take place at a designated stratum. Since one of our present concerns is to determine which stratum the derivational affix *en belongs to, the last two strata are irrelevant, so that we focus our attention on strata 1 and 2. The derivation of lexical items goes in the fixed order as indicated by the arrows. The class I derivation must take place before class II derivation. It follows from this ordering that class I affixes (like -ity) may not be attached to stems which contain class II affixes (like -ed) (e.g. *[guard]-ed2-ity1).  

The distinction between cyclicity and non-cyclicity is represented in terms of the difference in the relation between morphology and phonology. At stratum 1, which is cyclic, the relation is reciprocal: A constituent which has undergone the application of a morphological process is an input to phonology, which, in turn, is a potential input to morphology after the application of the phonological rules. On the other hand, at stratum 2, which is non-cyclic, the relation is not reciprocal: All the morphological processes apply before the application of the phonological rules. Notice further that stratum 1, which is cyclic, is constrained by the Strict Cyclicity Condition, which restricts structure-changing processes to derived environments. This is a rough sketch of the framework. See H&M for further details.

We also follow McCarthy 1986 and Halle and Vergnaud 1987 in that a morpheme is to be represented by a family of planes intersecting in a central line, and adopt the idea that cyclic morphemes (like class I affixes) are affixed on a plane different from that of the stem, whereas non-cyclic morphemes (like class II affixes) are affixed on the same plane as the stem. In addition, we assume that in cyclic affixation, the operation of plane conflation takes place at a certain stage of the derivation.

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1 The numeral subscript stands for the stratum each affix belongs to.
2 Note, however, that the phonological rules of stratum 1 which apply to underived forms (e.g. stress assignment rules) are structure-building operations.
2. *En* as a Class I Affix. The affix *en* is attached to a large number of monosyllabic adjectives and forms verbs with them. In this section, we will see some pieces of evidence for the claim that the affix *en* is a class I affix.

2.1. The Prefix *en*- . First consider the prefix *en*-. In the previous section, we mentioned that, although class II affixes can be attached to stems containing either class I or II affixes, class I affixes cannot be attached to stems containing class II affixes, as shown below:

(3) a. \([\text{un}_2\text{-[lucky]}_2\text{]} \ [\text{un}_2\text{-[conditional]}_2]\]
   b. *\([\text{un}_2\text{-[technico]}_1\text{-ity]}_1\]

In 3b, the class I suffix -ity cannot be attached to *untechnical* since *un-* is a class II prefix.

The prefix *en*-, on the other hand, can be attached to a stem containing the class I suffix -ity, as shown below, which suggests that it is also a class I affix.

(4) \([\text{en-largeability}]_1\text{-ity]}_1\]

Furthermore, H&M note that class I and II affixes behave differently with respect to assimilation: The class I prefixes *in*- and *con*- are assimilated to the following stem, whereas the class II prefix *un*- is not, as illustrated below:

(5) Class I prefix: iN- kɔN-
   N→ m/ ____ [+lab] p: impossible compress
   [−cont] b: imbalance combine
   m: immature commeasure
   N→ r/ ____ r : irregular correlate
   N→ l/ ____ l : illegal colocate
   N→ n/ elsewhere : insane confederate

(6) Class II prefix: uN-

unpleasant, unbelievable, unmoved, unrestricted, unlawful

The prefix *en*- behaves like *in*- and *con*- in this respect, as shown below, which clearly supports the claim that it is a class I prefix.

(7) *en-*
   N→ m/ ____ [+lab] embrown empurple
   [−cont]

---

3 Throughout this paper, /N/ stands for the archi-segmental ‘nasal’—a segment underlyingly specified only for the feature [nas].
It is different from in-, however, in that it does not appear to be assimilated to /r/ or /l/, as shown below:

(8) enrich    enlarge

This difference poses a problem we will tackle in section 4, but the assimilation exemplified in 7 seems to provide evidence for claiming that en- is a class I prefix.

2.2. The suffix -en. Let us turn to a consideration of which stratum en as a suffix belongs to.

Consider the verbs moisten and soften as examples. The suffix -en is phonetically realized as [ən], so that its underlying form seems to be either /-N/ (-[+nas]) or /-VN/.

If the underlying form of -en is /-VN/, there is no natural account for the deletion of the stem-final /t/ in verbs like moisten and soften: The sequences /-stVN/ and /-ftVN/ are both permissible in word-final position in English, so that there is no conceivable motivation for the deletion of /t/. Thus, on this assumption, unattested forms such as *[moystən] and *[softən] would be derived.

On the other hand, if the underlying form of -en is /-N/, the verbs are properly derived as shown in 9:

(9) a. moisten [moysən]  b. soften [sofən]

<table>
<thead>
<tr>
<th></th>
<th>suffixation</th>
<th>t-Deletion</th>
<th>N→n</th>
<th>Empty Vowel</th>
<th>Insertion</th>
</tr>
</thead>
<tbody>
<tr>
<td>[moysN]</td>
<td></td>
<td>[(moysN)]</td>
<td>[moysn]</td>
<td>[moysVN]</td>
<td>[moysVN]</td>
</tr>
<tr>
<td>[softN]</td>
<td></td>
<td>[(softN)]</td>
<td>[softn]</td>
<td>[softN]</td>
<td>[softN]</td>
</tr>
</tbody>
</table>

After suffixation, the stem-final /t/ is deleted on the grounds that neither /-stN/ nor /-ftN/ can occur in the word-final position of English words. At the next stage, the archi-segment /N/ is converted into /n/, the unmarked realization of /N/. And finally, the independently motivated rule of Empty Vowel Insertion, formulated as in 10, applies, and the empty vowel is later realized as schwa.

(10) Empty Vowel Insertion

4 This rule applies in cases like (ia), where the rhyme node dominating the consonant is not branching, and does not apply in cases such as (ib), where the rhyme node dominating the consonant is branching.
The advantage of this analysis is that it provides a natural account for the deletion of the stem-final /t/ in both of the above derivations. This leads us to take /-N/ rather than /-VN/ as the underlying form of the suffix -en.

Note that the rule of Empty Vowel Insertion is assigned to stratum 2 in the lexicon of English, since the rule does not apply to lexical items to which a class I affix is attached, but does apply to underived lexical items and items to which a class II affix is attached, as shown in (11):

(11) a. [rhythm]ic, [riðmik/*riðemik]
    b. [rhythm]y2 [riðemi]
    c. [rhythm] [riðem]

Furthermore, the application of t-Deletion must precede that of Empty Vowel Insertion; otherwise, we have no more natural motivation for the deletion of /t/ than we have when /-VN/ is assumed as the underlying form of -en. We may further argue that the deletion of /t/ in cases like moisten and soften takes place at the end of stratum 1, if /t/ is assumed to be erased by convention, whereby segments not incorporated in syllable structure are erased at the end of a derivation (in a stratum). In these cases, /t/ is not syllabified in the course of derivation and then erased at the end of that derivation, for it is the least sonorous in the sequences /-stN/ and /-ftN/, which, as mentioned above, are not permitted in English. Cf. Harris 1983 and Lawrence 1986. Since, as mentioned above, t-Deletion must precede Empty Vowel Insertion, which is assigned to stratum 2, it must take place at the end of stratum 1.

The above arguments lead us to conclude that the suffix -en must be a

(i) a. ORR
    b. OR
    This means that an empty vowel is inserted before a syllabic consonant. Cf. Harris (1983: 29). In (ia), /m/ becomes syllabic because it is more sonorous than the fricative /ð/ and thus cannot be contained in the same syllable as /ð/. In (ib), on the other hand, /m/ is less sonorous than /l/ (cf. Selkirk 1984: 112), so that both of them may be contained in the same syllable.

5 For those speakers who pronounce soften as [soften], the suffix -en must be underlyingly /-VN/ in order to prevent t-Deletion from applying. Similarly, speakers who pronounce the word often as [oftan] will have the underlying form /oftVN/, and those who pronounce the same word as [ofən] will have the underlying form /ofN/, or if synchronically derived from oft, /oftN/.
class I suffix. For, in order for /t/ to be deleted in moisten and soften at the end of stratum 1, -en must be attached to the words at stratum 1.6

Finally, on the basis of the above arguments, we show below the complete derivation of the verbs moisten and soften.

(12) a. moisten   b. soften
    stratum 1 suffixation       [[moyst]]N       [[soft]]N
    t-Deletion                 φ                     φ
    N → n                      n                     n
    Bracket Erasure            [mɔysn]               [sɔfn]
    Convention
    stratum 2 Empty Vowel V V
    Insertion
    V → ə                     ə                     ə
    Output mɔysən               sɔfən

3. WHY DOES THE AFFIX en OCCUR BOTH AS A PREFIX AND AS A SUFFIX?

3.1. DISTRIBUTION. First let us consider the distribution of -en as a suffix, which is given in 13 below.

   ( ) represents an accidental gap. (rich-en) indicates that richen is an archaic form, so that we might plausibly assume that accidentally there are no words comprising adjectives ending in /ɛ/ and /ʃ/ and the suffix -en in present-day English.
The suffix -en is not attached to adjectives ending in /b/, /m/, /n/, /g/, or a vowel. Cf. Jespersen (1942: 351-9). This restriction is expressed as in 14:

(14) a. *[+son]-en
b. *[+voice]
   [-cont] -en
   [-cor]

Interestingly, most of the adjectives to which the suffix -en cannot be attached take the prefix en-, as indicated in 15, so that the distribution of these two affixes is near complementary.

(15) b: ( )
m: ( )
n: brown: en-brown; *brown-en
r: sure: en-sure; *sure-en
l: noble: en-noble; *nobl-en

From the above observation, we conclude that the two kinds of occurrence of en are mutually related, specifically, that one is derived from the other. In the next section, we will consider the question of which is the more basic.

3.2. En is a suffix. In this section, we will be concerned with the second question raised in 1, repeated as 16 below:

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8 Notice that there are suppletive forms for some of the lacking forms. Consider the cases in (i). *longen, *strongen, and *highen are all prohibited by the constraints in 14. In these cases, the verb is formed not through the prefixation of -en to its corresponding adjectives but through the suffixation to its corresponding noun.

(i) a. long: lengthen *longen
   b. strong: strengthen *strongen
   c. high: heighten *highen
(16) Is *en* basically a prefix or a suffix?

We will argue that *en* is basically a suffix.

The clue that can help us to answer question 16 lies in the fact that the distribution of the prefix *en-* and the suffix -*en* is near complementary. To capture this fact, a movement analysis suggests itself. Under such an analysis, *en* would be suffixed to an adjective but when this concatenation is not permitted, the suffix would be moved to word-initial position where it is phonologically realized. This analysis is untenable, however: It cannot account for such examples as 17, where the prefix and the suffix *en*'s are attached to an adjective.

(17) embolden  enlighten

Suppose, then, that the suffix -*en* is copied to word-initial position by the general rule Copy-*a*. This analysis can account straightforwardly for the existence of cases like 17. It also accounts for the existence of cases like *embrown*, where the word-final -*en* is erased after the application of Copy-*a* because the concatenation of an adjective ending in a sonorant and the suffix -*en* is not permitted.

If *en* is assumed to be basically a prefix, the peculiar behavior of *en* cannot be accounted for even in a copying analysis. This is because there is little motivation for copying the prefix *en-* to word-final position. Note that the copying of the suffix -*en* to word-initial position is mainly due to the fact that the concatenation of an adjective and *en* is not permitted.

Free application of the rule Copy-*a* is untenable. Consider the derivation of cases like *deepen*, an unmarked form. If we assumed that the rule Copy-*a* applies freely, we should obtain *endeepen*, *deepen*, and *endeep* through the optional application of the erasure of *en* in the latter two cases. On the other hand, if the rule does not apply somehow in this case, we can obtain *deepen* alone, which is the correct result. In order to explain this fact, we can resort to what Chomsky 1988 calls the Least Effort Principle, which says that shorter derivations are always chosen over longer ones; in other words, a rule applies only when it needs to for some reason. If this proposal is plausible, then the rule Copy-*a* does not apply in unmarked cases like *deepen*. This argument leads us to claim that *en* is basically a suffix rather than a prefix and that, under certain limited environments, it is copied to word-initial position.

A more theoretical motivation for our claim that *en* is basically a suffix is Williams's (1981: 248) Righthand Head Rule (RHR), which is restated as 18:

(18) Righthand Head Rule
The head of a morphologically complex word is the rightmost element of that word. If the RHR is valid for English, the above-mentioned verbs would be very strange, for these verbs apparently violate the rule. In these verbs the head is the leftmost element or the prefix *en*-*. On the other hand, if *en* is basically a suffix and the prefix *en*- is derived by Copy-α, as we assume, the affix is no longer an exception to the RHR.

4. An explanation for the non-assimilation of /N/

4.1. Phonological rules. As was observed in section 2.1, *en*- behaves like a class I affix, with /N/ assimilating to following labial consonants, but *en*- is unlike class I affixes in not assimilating to liquids. In adopting the position that *en* is a class I affix, we are left with the non-assimilation of *en*- to /r/ and /l/ to explain. It will be shown below that a copying analysis, in addition to explaining the near complementary distribution of prefix *en*- and suffix -*en*, and bringing *en*- forms into line with the RHR, provides an explanation for the non-assimilation of *en*- to liquids with no language specific stipulation. Let us first take a close look at the processes involved in the regular stratum 1 assimilation seen in illustrated in 19.

(19) a. irregular b. informal c. improper

19a is representative of the case where /N/ appears to assimilate completely to the adjacent [+son, -nas] consonant. 19b represents the case where there is no assimilation, and /N/ is realized as the unmarked nasal /n/. This is the case where the adjacent consonant is [−son, +cont]. In 19c we see assimilation of /N/ to a nasal with the same place of articulation as the adjacent consonant which may be [+nas] or [−son, −cont]. This disjunction of features is necessary to exclude /l/ ([+son, −cont]) from the structural description of the rule effecting 19c. However, if we assume that the three processes which are seen in 19 are ordered, with that responsible for 19a coming first, the environmental description of 19c is simplified to [−cont]. This allows us to simplify the environment in 19a to [+son], and that of 19b to [+cont]. We now have the processes in 20 which apply in the order given.

(20) a. [+nas] assimilates completely to adjacent [+son]
   b. [+nas] is given unmarked specification as for place of articulation when adjacent to [+cont]
   c. [+nas] receives place of articulation features from adjacent consonant
A question which arises here is why [+nas] segments should be given unmarked specification (default values) in such a restricted environment, and why all [+nas] segments are not affected. Interpreting unmarked specification assignment as a last resort, the new ordering 21 is obtained where there is no restriction on [+nas] segments receiving default values.

(21) a. [+nas] assimilates completely to adjacent [+son]
    b. [+nas] receives place of articulation features from adjacent [−cont]
    c. [+nas] is given unmarked specification as for place of articulation

21a has the effect of assimilating the /N/ of in- (and con-) to the following liquid or nasal. When the sonorant is a liquid, the [+nas] appears to become [−nas], a feature changing process which sets 21a aside from 21b and 21c which are structure building. We further propose that the phonological rule which is responsible for 21a is roughly 22.

(22) X → φ / ⌒ [+cons]
    [+nas] [−cont]  domain: stratum 1

Archangeli and Pulleyblank (1986: 13–4) assume a position where redundancy rules (of which 21c is an example) apply in the latest possible stratum but as early as possible within that stratum. Class II un- must have its consonant specified as to place of articulation in order to account for its non-assimilation, and this consideration places 21c early in stratum 2.

We shall see in the analysis to be presented here that 21b must apply after stratum 1 plane conflation or it will be prevented from applying to en- (/N/) for the same reasons which prevent 21a from applying. 21b cannot apply at stratum 2 however, or we should expect to see incorrect forms such as *umbelievable. It must therefore apply at stratum 1 but after plane conflation. This conclusion suggests that plane conflation may not only be an automatic process which takes place with the transfer of forms from one stratum to the next, but may take place at strategic places within a stratum, perhaps between blocks of structure-changing rules, which are constrained by the Strict Cyclicity Condition, and structure-building rules, which are not so constrained and therefore require no reference to multiple plane structure. Another possibility which does not require ordering 21b after plane conflation is available if cyclic affixation produces structures of the type in 23, and structure-changing processes act on the stem and the upper plane of the affix, in contrast to struc-
ture-building processes which act on the contiguous lower planes.

(23)

\[
\begin{array}{cccccc}
X & X & X & X & X & X \\
\vdots & \vdots & \vdots & \vdots & \vdots & \vdots
\end{array}
\]

Both possibilities given above will account for the \textit{en}- data under consideration, and an extensive investigation into the nature of the Strict Cyclicity Condition and plane conflation will be necessary to determine the exact device to use. Such an investigation is beyond the scope of this paper, and for present expository purposes, we shall use the ordering solution.

4.2. Universal principles. Several widely accepted principles are crucially involved in our proposed treatment. The first such principle is the Obligatory Contour Principle \textit{24} which has been argued for in recent work (McCarthy 1986, Hayes 1986, and many others).

(24) Obligatory Contour Principle (OCP)

At the melodic level, adjacent identical elements are prohibited.

(McCarthy 1986: 208)

Another universal principle which we shall utilize is the following principle which prevents any process from applying to part of multiply associated (geminated) material.

(25) Any unit in the melodic core which is shared between several skeleton positions should be inaccessible to rules whose structural descriptions are met by only one of the linked matrices.

(Steriade 1982: 60)

4.3. The analysis. We are now prepared to present an analysis of \textit{en} affixation which derives the correct surface forms. Our analysis is given as 26 where, for the sake of simplicity, we have ignored syllabification and the rhyme status of the affix /N/. Below we give a step-by-step explanation of 26.

First, we assume that -\textit{en} (/N/) is suffixed to the adjective, and being a different morpheme at a cyclic stratum, it occupies a different plane from the stem.

The next step is the Copy-\(\alpha\) rule which places a copy of /N/ at the beginning of words when the /N/ is incompatible with the stem-final segment. Being a copy of /N/, it is on the same plane as the suffixed /N/,
and there being no other material on the same plane, two identical segments will be adjacent to each other. This situation, however, is not permitted by the OCP, so the two segments are fused into one unit. These last two steps, copying and fusion, may be simultaneous, but for the sake of clarity we have kept the two processes apart in 26.

Phonological rules now apply, and the rule relevant here is 22. The structural description for this rule is a nasal segment preceding a sonorant consonant, and in the case of /N/ under this copying analysis, the structural description is met by only half of the (fused) melodic material, and so, by 25, the rule cannot apply. This non-application of 22 sets en- apart from in- and con-, and is directly attributable to the copying analysis.

The next step is plane conflation which produces a form with both prefixed and suffixed /N/. Rule 21b now applies to forms which meet its structural description. As was pointed out in section 4.1, this ordering of structure-changing rules → plane conflation → structure-building rules (or the alternative plane-geometry explanation) is at least in part independently motivated by the fact that in cyclic strata (such as English stratum 1) structure-changing rules require the presence of multiple planes (i.e. derived structure), but structure-building rules are under no such restriction.

During the transition from stratum 1 to stratum 2, the word-final /N/ is automatically erased by a general process which erases segments not incorporated into the syllable structure (see especially Harris (1983: 35), Lawrence (1986: 21-2)). The word-final /N/, although lexically marked as a rhyme, is not incorporated into the syllable structure of the word because it is incompatible with the segments in 14.

Stratum 2 derivation is straightforward, with the application of 21c (the point of application of this redundancy rule being established by universal ordering constraints) and the plausibly universal principle of markedness 10.

(26) stratum 1

\[
\begin{align*}
\text{a. } [r...] & \quad \text{b. } [b...] \\
[+\text{nas}] & \\
\text{suffixed } & \quad \text{[+nas]} \\
X X X X X & \quad X X X X X \\
| | | | | & \quad | | | | | \\
r... & \quad b... \\
\end{align*}
\]
There are some exceptions to the above analysis, and these exceptions 17, repeated here, provide a measure of support for our copying analysis. (17) enlighten embolden These are exceptions only in that they have undergone Copy-a where there is no obvious need to. The fact that the word-final -en appears in the surface structure provides strong support for our copying analysis because it is predicted by our analysis that -en should surface after those consonants not excluded by 14.

5. CONCLUSION. In this article, we have been concerned with a theoretical explanation for the peculiar behavior of the English category-changing affix en. We first posed three questions and, by answering them, we have succeeded in an explanation for the peculiar behavior. There are three new proposals in this article. First, en is a class I affix. Second, en is basically a suffix, and the prefix en- is regarded as a copy of
the suffix -en. And third, in English there is a rule which deletes a nasal before a liquid and which explains apparent assimilation in cases like irregular. Non-assimilation of /N/ in cases like enlarge and enrich can be explained by assuming that the above-mentioned rule applies before stratum 1 plane conflation takes place. These three proposals shed fresh light on the behavior of en. In particular, the third proposal has the possibility of shedding new light on the nature of other morphological and phonological phenomena.

REFERENCES

ARCHANGELI, DIANA, and DOUGLAS PULLEYBLANK. 1986. The content and structure of phonological representations. MS., University of Arizona and University of Southern California.

CHOMSKY, NOAM. 1988. Some notes on economy of derivation and representation. MS., MIT.


KIPARSKY, PAUL. 1983. Some consequences of lexical phonology. MS., MIT.


MCCARTHY, JOHN. 1986. OCP effects: Gemination and antigemination. LI 17.207-63.


WILLIAMS, EDWIN. 1981. On the notions of “lexically related head” and “head of a word”. LI 12.245-74.