The Feature [lateral] and the l/r Alternation in English

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0. Introduction

In recent phonological research on the hierarchical representation of phonological features, the feature [lateral] has been problematic. Among them, it has been an unsettled issue whether the feature [lateral] is a manner feature like [continuent], [consonantal], or a subplace feature like [anterior], [distributed]. In this sense, the traditional view of classification on phonological features is seriously challenged.

However, as Clements (1985, 1989, 1991) repeatedly emphasized, the whole problem of hierarchical representaion of features should be based upon thier behaviors in phonological rules. The empirical decision on the grouping of features in their dependency relation has been amply justified during the development on feature geometry. For example, although the feature [stricent] has been perceived as a manner feature, Lahiri & Evers (1991) argues that this feature should be recognized as a subplace feature dominated by [CORONAL]. This bold attempt in some sense devastates the original notion on the feature [strident] which is acoustically and auditorily defined. This type of generalization is based on the fundamental principle in phonology that phonological notion is, at least partially, independent of phonetic data in its proper sense. In this way, the position of [strident] is justified by the evidence that in no language the feature is distinctive in classifying segments outside [CORONAL] consonants.

1. The Coronal Hypothesis

Generally speaking, there are two claims regarding the position of the feature [lateral] in the feature geometry. The one is the conventional notion that [lateral] is directly dominated by root node like other manner features. This position is still held by Halle (1992) and Shaw (1991).

Another position of Levin (1988) calls our particular attention. The so called 'coronal hypothesis' on the feature [lateral] is erected on the following syllogistic definitions:

[lateral]: Lateral sounds involve lowering or raising one or both sides
of the tongue margins.
[CORONAL]: Coronal sounds involve the tongue blade as an active
articulator.

Cf. tongue blade: The tongue blade includes the action of tongue from
the tip up to the dorsum.

Thus, it is logically necessary to regard [lateral] as belonging to [CORONAL].

Once again, it is necessary to reiterate that Levin's explanation does not stem from her ignorance of the linguistic reality that there are not a few instantiations of lateral sounds outside coronal place. For instances, Levin herself observes velar or labial laterals are attested in many languages such as Yagaria, Kuman, Wagi. Also Ladefoged & Maddieson (1986) argues that velar laterals are widely attested in human languages. However, this observation does not exert direct consequences upon phonological features. According to

Levin, the attested velar laterals are not distinctive in terms of their place of articulation and that velar laterals contain a coronal node at some level of represenation. Unless Levin's analyses of laterals emerging in diverse languages on their phonemic status is incorrect, this type of theorization is largely well-grounded.

In this paper I will try to show that the Coronal Hypothesis on the position of the feature [lateral] contribute to offer an explanatory adequate theory on some phonological processes. Then, the question whether the affixal alternations *il-/ir-* or *-al/-ar* are historic relics of Latinate phonology or an interpretive process rather than a generative process is far afield of the main concern of this study.

2. Implications for the Nasal Assimilation

2.1. General issues

For the explication of the distribution of NC clusters in English, as exemplified in (1), the rule responsible for the process can formulated as (2).

(1)   i[ŋ]potent   co[ŋ]gress
             i[n]tolerable   co[n]cur
             i[n]grateful   co[n]gressional

(2)   Nasal Assimilation (domain: level 1)[1]
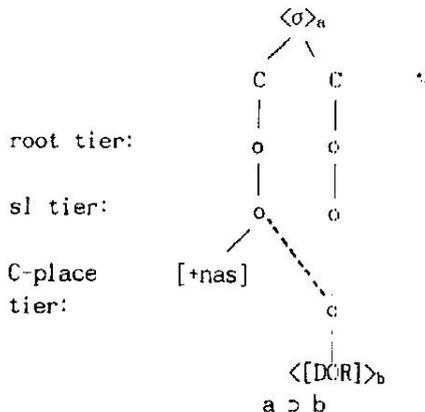
That is, rule 2 accomodates the fact that Nasal Assimilation in English takes place to ensure homorganic sequence, subject to the tautosyllabicity of the sequence involving nasal plus a velar consonant.[2]

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1) Here, concerning the feature geometry I follow the version of Clements (1989), among the diverse models, with slight modification in case it is necessary. The capitalization of major place nodes like [CORONAL], [DORSAL], [LABIAL] represents their privative nature to the exclusion of binariness of other nodes.

2) For the detail of the implications of the rule formulation (2), refer to Lee (1992).

2.2. *il-/ir-* Allomorphs

2.2.1. Total Assimilation ?

The prefix *in-* emerges as *il-* or *ir-* in the following examples:

(3)   a.   illogical   b.   irregular
                illiberal   irresponsible
                illegal   irreparable
                illegible   irreplaceable

The most notable thing about these examples is that unlike the operation of rule (2), a total assimilatory process seems to be operative, followed by a persistent rule[3] which accounts for the absence of long consonants in English. It follows that another assimilation rule (4) should be enforced.

(4)

```
                    C        C
root tier:         ╪----___  │
                   o     ``-o
                   │        │  ╲
sl tier:           o        o [+cons][+son]
                   │        │
                 [+nas]   [-nas]
```
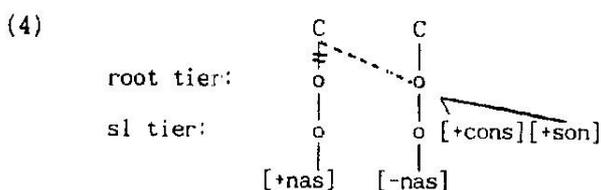
Thus, we have twofold rules to account for the assimilation of a nasal consonant to the immediately following consonant, rules (2) and (4). Needless to say, the proliferation of rules to handle apparently related phenomena is undesirable.

2.2.2. Problems with Borowsky's Analysis

To handle nasal assimilation as in the case of (3), Borowsky (1986) tried to differentiate operations that apply in (3) from those where the ordinary nasal assimilation (2) comes about, depending upon underspecification. The feature specification of the suffix *in-*, she states, is distinguished from other affixes, for instances, *em-* in *embalm, embed, embellish, embrown* etc. in that it is underspecified for the feature [nas] and the feature is filled in by default rule (5).

(5)   a.   /iN-/   b.   /eN-/

```
      V      C                V      C
             │                       │
          [+son]                  [+nas]
```

(6)   Default Rules

$$[nas] \rightarrow [\alpha\ nas] / \begin{bmatrix} \ \\ \alpha\ son \end{bmatrix}$$

$$[son] \rightarrow [\alpha\ son] / \begin{bmatrix} \ \\ \alpha\ nas \end{bmatrix}$$

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3) Myers (1991) defines persistent rule in phonology as follows: operations that apply whenever their structural descriptions are met. In this paper I hold the position that the absence of geminate consonants in English is due to this device, following Myers.

Let us consider the derivations below according to Borowsky's presentation.

(7)   a.   em*ba*lm   b.   1 *l* *l*ogical

```
        C    C                    C    C
        |    |                    |    |
     [+nas] [nas]              [+son][+son]          Nasal
          ````````|                ````````|         Assimilation
             [LAB]   [+lat]

        - - -   C   C
                                   \ /   Shared Features
                                  ┌──────┐   Convention
                                  │ +son │
                                  │ +lat │
                                  └──────┘

        - - -   C   C
                                   \ ✗   Degemination
                                  ┌──────┐   (a persistent
                                  │ +son │   rule)
                                  │ +lat │
                                  └──────┘
```

      e[m]balm          i[l]ogical          output
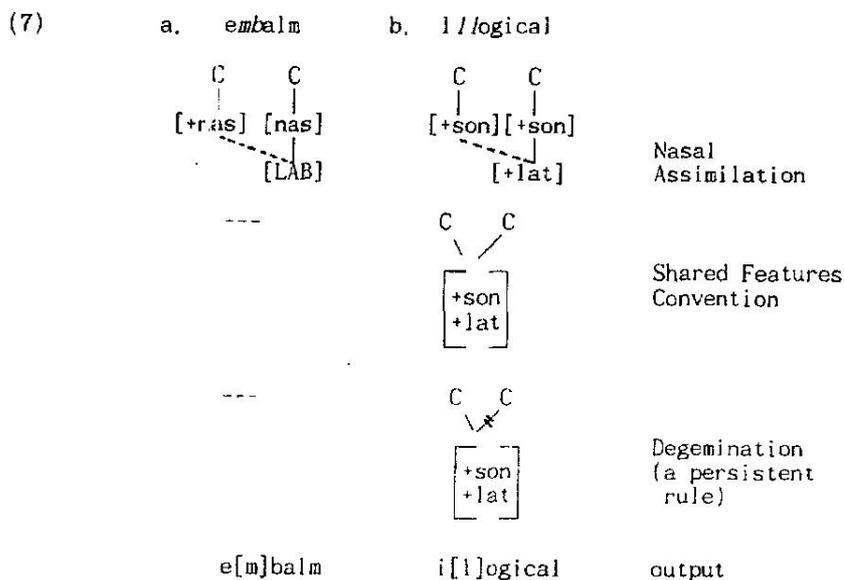
Although Borowsky's analysis seems to be feasible, the analysis is easily subject to criticism.[4]   First, the underlying feature specification (5) is somewhat arbitrary.   In particular, when we underspecify the feature [nasal], it may lead to jeopardizing the universal generalization that nasal consonants tend to be homorganic with the following consonant. Another problem in the derivation given above is that the rule responsible for the operation in (7a) is distinct from that in the case of (7b). That is to say, the nasal assimilation in (7b) refers to the manner node [lateral] rather than the place node.  But the coverage of the rule is restricted to the sequence of lateral plus a consonant among the diverse manifestation of the NC cluster. Thus, it is unreasonable to postulate the rule of lateral assimilation to account for the limited examples.

### 2.2.3. Maximal vs. Minimal Scansion

To account for the nasal assimilation phenomena in English in a consistent way, the notion of maximal and minimal scansion presented by Archangeli & Pulleyblank (1986, 1987) appears to be helpful. That is, if one scans the target of a rule, the language-specific parameter of maximal or minimal scansion determines the specific point of feature geometry as its application domain. Maximal scansion means that the target of a rule is the skeleton or rhyme tier, while in minimal scansion the specific feature node crucially relevant to a rule becomes the target.

Let us consider  nasal assimilation in terms of the parameter, maximal and minimal scansion. First, in the ordinary case of nasal plus non-liquid sequence, the parametric option is minimal scansion.

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4) In the illustration of nasal assimilation in (7), of course, Borowsky did not subsume the Coronal Hypothesis.  However, for the sake of convenience, I assume this hypothesis in these derivations.

(8)           :.*m*patient

```
                    C         C
                    |         |
  root tier:        o         o
                    |         |
 ┌─────────────────────────────────────┐
 │ sl tier:         o         o         │
 └─────────────────────────────────────┘
                  /      ⋅.
            [+nas]          ⋅⋅⋅
  C-place tier:                  ⋅o
```
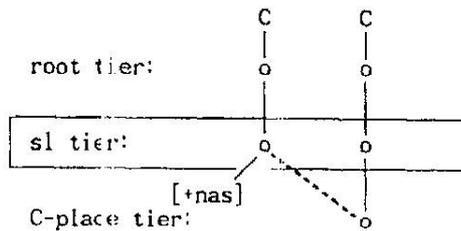
Rule (2) scans the supralaryngeal node as their relevant tier and place assimilation comes about in the NC cluster.

On the other hand, in the case of the nasal plus liquid cluster, the scansion parameter should be maximal as illustrated in the following:

(9)   i *l*logical

```
 ┌──────────────────────────────────┐
 │ skeleton tier:    C         C     │
 └──────────────────────────────────┘
                     ┌⋅⋅
  root tier:         o    ⋅⋅⋅⋅ o
                     |         |
  sl tier:           o         o
```
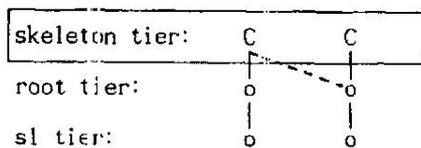
The root node of the righthand sonorant spreads, coupled with delinking of the root node of the lefthand segment and results in total assimilation.

The parametic approach to nasal assimilation is appealing, although it is rather arbitrary to allow two incompatible parameters in the account of a unitary process in the same language. Let us leave the matter as it stands and examine another possibility to account for nasal assimilation in English.

2.3. A New Perspective

By making use of the Coronal Hypothesis, nasal assimilation in English can be accounted for in a more consistent way. Rule (2) handles operations involving the nasal followed by a lateral consonant as in (3a). Note the following:

(11)   illogical

```
                    C         C
                    |         |
  root tier:        o         o
                    |         |
  sl tier:          o         o
                  /      ⋅⋅
            [+nas]     ⋅⋅⋅ ⌐
  C-place                   o
  tier:                     |
                         [COR]
                           |
                         [+lat]
```
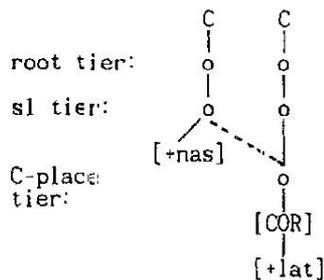
The argument is made possible by the dependency relation in feature geometry (McCarchy 1988, Mester 1986): the spread of any node is regarded as a set of rules that includes the spread of each of its daughter nodes. So, any rule of place assimilation which applies to the configuration in (11) automatically includes assimilation in the feature [lateral].

This section aims to show that on the basis of the Coronal Hypothesis regarding

laterals, nasal assimilation rule (2) can account for an operation occurring in the sequence of nasal-liquid without any ad hoc stipulations. A similar proposal was briefly suggested in Myers (1991a: 332-333, fn. 23). In this section I develop the idea as a full-fledged theory. In the course of analysis, this paper will pursue the following subplace nodes in feature geometry.

(12)

```
                    C-Place
                   /   |   \
                  /    |    \
              [LAB]  [COR]  [DOR]
                    /  |  \
                   /   |   \
               [ant] [lat] [retro]
```
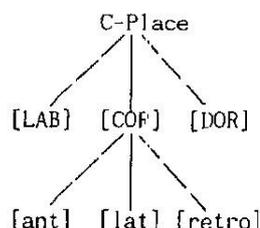
Following SPE, I discard the feature [distributed] as a node dependent to [coronal] in the structure of place nodes. Instead I adduce the subnodes [lateral] and [retroflex], after the Coronal Hypothesis.[5] And the following distinctive matrix will be pursued as the characterisation of English coronal consonants (features irrelevant to our discussion are omitted):

(13)

	t, d, n, s, z	θ, ð	ʃ, ʒ	r	l
anterior	⊕	⊕	-	⊕	⊕
lateral	⊖	⊖	⊖	⊖	+
retroflex	⊖	⊖	⊖	+	⊖

The circled underspecified feature values are filled by redundancy rules.

(14)   Redundancy Rules for Coronal:
            [| ·   [+ant]
            [| ·   [-lat]
            [| ·   [-retro]

These assumptions imply that the underlying representation of the liquids *l,r* should be as given below.

(15)   a.   l   b.   r

```
                     C                              C
                     |                              |
root tier            o                              o
                    /|                             /|
sl tier:    [+son] o                     [+son]  o
                    |                              |
C-place             o                              o
tier:               |                              |
                  [COR]                          [COR]
                    |                              |
                 [+lat]                         [+retro]
```
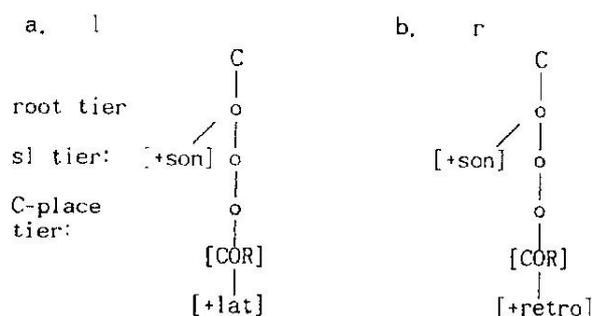
However, there is one stumbling block in using this account of assimilation of nasal-liquid

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5) Although Levin (1988) does not discuss the coronal property of retroflexes, the hypothesis can readily be extended to them, since retroflexes have been regarded as a place feature unlike the feature [lateral].

sequences in terms of rule (2). Note the derivation below.

(16)   a.   illegal   b.   irregular

```
                  C       C              C       C
root tier:        o       o              o       o
                  |       |              |       |
sl tier:          o       o              o       o
                 / `-.    |             / `-.    |        Rule (2)
            [+nas]    `.   |        [+nas]    `.   |
C-place               `.  o                   `.  o
tier:                    [COR]                   [COR]
                          |                       |
                       [+lat]                  [+retro]
```
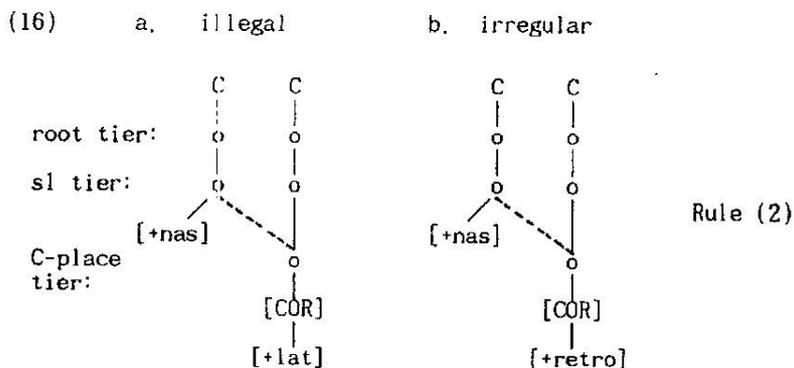
By means of a dependancy relationship among features, as already discussed, all dependent nodes are involved if the dominant node of place node spreads to an adjacent docking site. However, the application of rule (2) fails to lead to a satisfactory result. The outputs of the rule application are the unexpected sequences [+lateral nasal][+lateral] and [+retroflex nasal][+retroflex]. They are, of course, ill-formed surface forms, and any analysis based upon the Coronal Hypothesis seems to be skeptical.

Yet, we can maintain the analyis on the basis of the Coronal Hypothesis without adducing language-specific stipulations. First, as Avery & Rice (1991: 102) observes, like the combination of features such as [+high] and [+low], the combination [+nas] and [+lateral] has been generally assumed to be ruled out by the constraint of co-occurrence of features. Also, although the retroflex nasal is attested in some languages, as Ladefoged (1990) points out, it is disallowed in English as a phonologically contrastive segment.

At this point the universal principle of the Minimal Modification Principle (Goldsmith 1976) is invoked to convert the ill-formed output into a well-formed sequence.[6]

(17)   The Minimal Modification Principle:
        Representation is minimally modified to resolve violations.

Once again, let's look at the configurations in (16). In the hierarchical representation of features, higher-branching categories tend to be more independent than lower-branching categories. Accordingly, to ensure minimal modification of the configurations (16), it is necessary to modify the terminal features rather than class nodes such as [supralaryngeal], [C-place]. There are two terminal nodes in each feature geometry in (16): [nasal] and [lateral] in (16a) and [nasal] and [retroflex] in (16b). By principle (17), changing one of the two features to guarantee a well-formed output is expected. Thus, delinking the terminal [nasal] results in less alteration of the input structure than suppressing of the feature [lateral], which accesses two segments simultaneously.

In this sense, the derivations in (16) should be reconsidered in the following fashion:

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6) The Specification Preservation (Archangeli & Pulleyblank 1986: 136) has the same effect as the Minimal Modification Principle:

A feature α dominated by a particular node β prior to the application of a rule or convention γ is dominated by β after the application γ.

(18)   a.   illegal   b.   irregular

                C   C   C   C
                | | | |
root tier: o   o   o   o
                | | | |
sl tier: o   o   o   o
              /   \   \   /   \   \   Rule (2) &
C-place   [+nas]   \   [+nas]   \   Delinking by (17)
tier: o   o
                       | |
                    [COR]   [COR]
                       | |
                    [+lat]   [+retro]

                C   C   C   C
                 \   /   \   /   Shared Features
root tier: o   o   Convention

                C   C   C   C
                 \   ⚡ C   \   ⚡ C   Degemination
root tier: o   o

             i[l]egal   i[r]egular   output
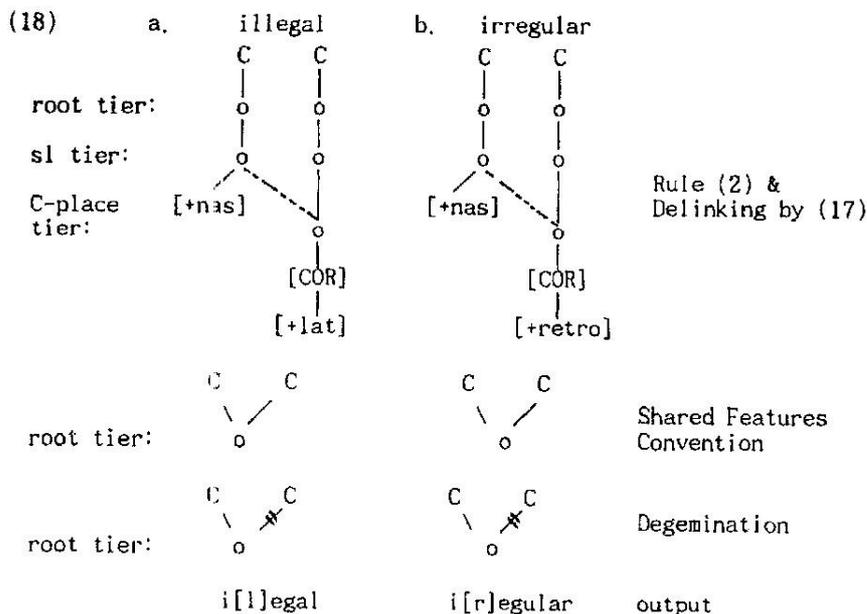
Likewise, the apparatus of the above analysis can handle nasal assimilation in words such as *syllable, syllogism, colloquial, collide,* etc.

The plausibility of our analysis is revealed when we compare the analysis based upon the Coronal Hypothesis of laterals with Borowsky's account, as discussed in 2.2.2. In that section I pointed out a couple of problems involved in Borowsky's argumentation: arbitrariness in undespecification and random occurrences of assimilation, i.e. place assimilation and manner assimilation. These problems no longer arise in my analysis.

In sum, this section has shown that another rule formulation to account for nasal assimilation in the liquid-consonant cluster is obviated and rule (2) applies consistently to this case. Needless to say, the present analysis is made possible by assuming that the feature [lateral] belongs to the place node [coronal], contrary to the traditional notion on the feature.

2.4. Residual Problems

In this discussion of nasal assimilation in English, we assumed that the application domain of rule (2) is restricted to level 1 to prohibit the application of the rule to examples such as *unmarked, unlikely, unconcerned, nonproductive, nonbelligerent.* Nevertheless, the analysis still encounters a problem in accounting for the alternation of the following examples.

(19)   a.   enbalm   b.   enlist
               enbellish   enliven
               enbitter   enrich
               enbrown   enrage

Seeing that rule (2) applies to the case of (19a), suffixation with the prefix /eN-/ occurs at level 1 in our framework. However, the application of the rule the right column does not work out. If the rule is applied to the examples in (19b), it will give rise to an ill-formed

output as shown below:

(20) a. enlist b. enrich


```
                  C     C           C     C
                  |     |           |     |
root tier:        o     o           o     o
                  |     |           |     |          Rule (2) &
sl tier:          o     o           o     o          Delinking by
                 /   .   |          /  .   |         (17)
C-place    [+nas]     . |    [+nas]     . |
tier:                   o                 o
                        |                 |
                      [COR]             [COR]
                        |                 |
                      [+lat]            [+retro]

                  C     C           C     C
                   \   ↗             \   ↗
roo tier           o                 o              Degemination

       * e[l]ist        * e[r]ich        output
```
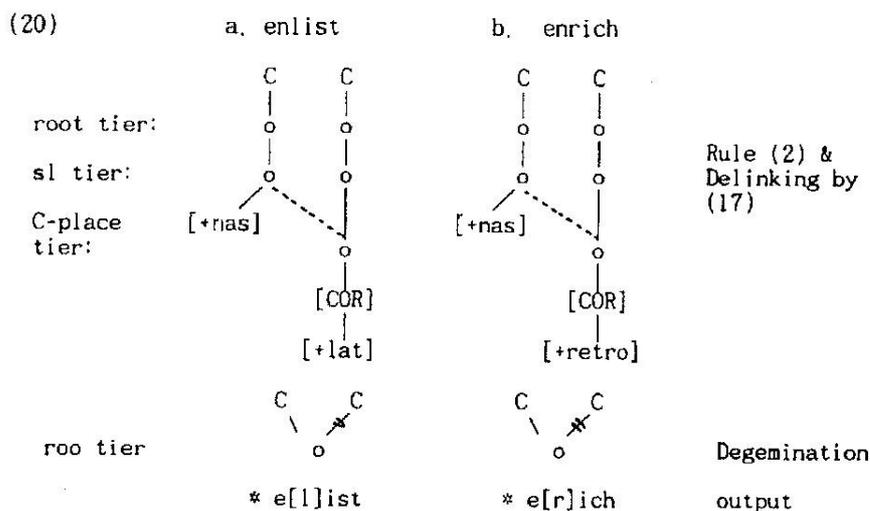
Here we can resort to the level ordering of morphology. As seen in the blocking of the nasal assimilation in examples such as *enmesh, enplane*[7], it is possible to assume that there are two kinds of homonymic suffixes /eN-/ in English. In one case, as in (19a), the suffixation occurs at level 1 and the output of the word formation undergoes the application of rule (2), whereas in another case as in (19b), nasal assimilation has no opportunity to apply, since suffixation takes place at level 2 and the rule (2) is already shut off at the end of level 1. Although further justification for level ordering in word formation with respect to the suffix /eN-/ should be enforced, it may be a possible solution to the deviation noticed in the examples.

3. Implications for the Long-Distance Dissimilation

3.1. *-al/-ar* Alternation

The distribution of the adjectival suffixes in the following is remarkable:

(21) a. tidal b. circular
          global   popular
          choral   regular
          national   titular
          colossal   singular

It seems resonable to assume that the superficially distinct suffix *-al* and *-ar* derives from a single form by a phonological process rather than to postulate two distinct morphemes. Since the allomorphs are predictable, the phonological account is superior to the purely morphological or idiosyncratic characterisation. And by the rule of thumb, the basic form would be *-al*.

The clue to the phonological account is the stem-final consonant: when the stem ends in lateral, the allomorph *-ar* appears, otherwise, the basic form *-al* remains. As we discussed above, the vowel of the suffix is underspecified for [lateral]. Thus, the OCP

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7) Here I ignore the British variant *e[m]plane*.

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violation occurs during the suffixation in the case of (21b), as illustrated in the following:

(22)   circluar

                [circ |] a |]   Suffixation
    root tier: o   o   o
    sl tier: o   o   o
    C-place tier: o   o
    V-place tier: [COR]   o [COR]
               [+lateral]   [+lateral]
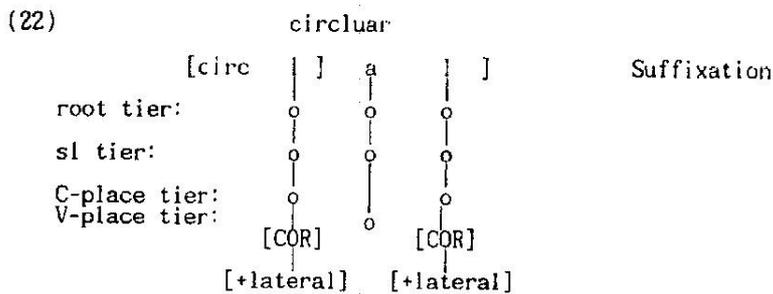
The conflict between two adjacent [lateral] is removed by the reduction of the rightward [lateral] to conform to the output condition of OCP. But one problem remains in the derivation of (22). We must settle the question of why the segment that goes through the reduction triggered by the OCP appears as the retroflex *r*, to the exclusion of others. In this case the Minimal Modification Principle (17) discussed above is once again invoked to resolve the problem. Among the consonants in English, the sound derived from minimal modification of *l* is *r*, which is a single alternative among liquids in English. Other segments are ruled out. For instance, the unmarked consonant *t* requires a change of other features and is more complex.

3.2. *-er/-le* Alternation

In a similar way, the allomorphy of the following can be accounted for:

(23)   a. batter   b. clatter   c. drizzle
           chatter   flitter   prattle
           shimmer   flutter   sparkle
           jabber   glimmer   spirtle
           mutter   glitter   wriggle

Marchand (1969:273) defines the mimetic suffix *-er/-le* semantically as 'forms of disyllabic verbs expressive of sound or movement. It is suggestive of reiteration, continuation or the like.' Although the suffixation is unproductive in present English, it may make sense to offer a phonological account for the alternation.

First of all, it is imperative to determine the basic form of the allomorphs. Considering the fact that the form *-er* is unrestricted as shown in (23a,b), it may be possible to assume that the form *-er* is basic. Thus, we can generalise that when the stem contains *r* in certain positions, the offending sequence against OCP arises with suffixations and reduction takes place as the result of being enforced by OCP.

(24)   drizzle

                C X$_0$ C   Deletion   C X$_0$ C
    root tier: o o o   o o o
    sl tier: o o o   o o o
    C-place tier: o   o   o   o
    V-place tier: [COR] o [COR]   [COR] o [COR]
              [+reto]   [+retro]   [+retro] [+retro]
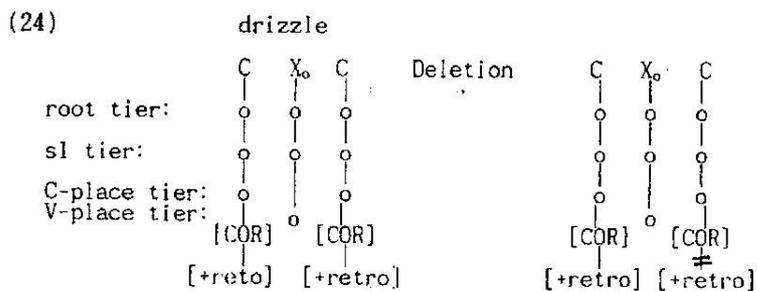
The empty slot resulted from the reduction is filled by the feature [+lateral] by the Minimal Modification Principle (17). And as noted by the symbol X_o, any number of intervening non-liquids can be ignored when we scan the OCP violation at the individual palce node, because the features [lateral] and [retroflex] are not contrastive in those segments.

4. Conclusion

In this paper I argue for the view that the feature [lateral] is a dependent to the node [CORONAL]. The so called Coronal Hypothesis is supported by a couple of phonological phenomena in English: Nasal Assimilation attested in examples like *illogical, irregular.* Another is the allomorphic alternations between *-al/-ar, -le/-er* in *circular/tidal, clatter/drizzle.* In the course of analyses, I have tried to show that the Coronal Hypothesis contributes to offer an explanation in a rational way. That is, combined with the Minimal Modification Principle, the Coronal Hypothesis for the feature [lateral] is successful in providing unified theory for Nasal Assimilation in English. Next, for the exploration of the long-distance dissimilatory operations like *-al/-ar, -le/-er,* the categorization of [lateral] at the place node is requisite to provide a consistent theory of *r/l* alternation therein.

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