

On the Segmental Derivation of *resignation*, *condemnation*
and *convention**

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In this paper I take a look at the segmental derivations of several forms where, in one environment a consonant appears, but in another it does not. I take a brief look at the 'standard' analyses of these data, and proceed to formulate a different approach to the data which is both descriptively and explanatorily more adequate. For more details of the 'standard' analyses, readers are referred to the primary works.

I stand firmly in a lexical-phonological framework (see Halle & Mohanan 1985 and references therein for details) — the division of the lexicon into strata, a point fundamental to this framework, proves to be the key to the simplicity of my treatment.

1. Methodology.

In English there exists an alternation between *g* and \emptyset as seen in the pair *resign* [rəzain] / *resignation* [rezignɛɪʃən]. In Chomsky & Halle (1968; hereafter *SPE*), the following three rules account for this alternation.

(1) $g \rightarrow [+cont] / _ [+nasal]\#$ (*SPE* p.234)

(2) $\begin{bmatrix} +high \\ v \end{bmatrix} \rightarrow \begin{bmatrix} +tense \\ -round \end{bmatrix} / _ [x, \gamma]$

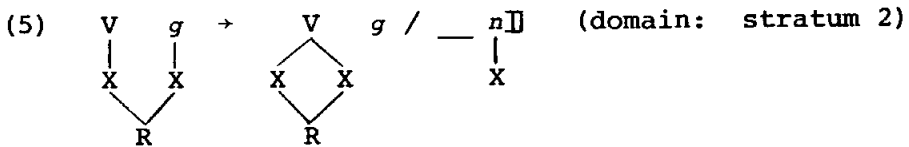
(3) $[x, \gamma] \rightarrow \emptyset / _ C$

Later in the derivation [+tense] vowels undergo Vowel Shift and Diphthongization, accounting for the alternation between the diphthong [aɪ] in *resign* from tense *i* and the short [ɪ] in *resignation* from lax *i*. Rule (2) tenses only high vowels, accounting for the vowel alternation in (4a) with underlying [+high] vowels, and the lack of it in (4b) with [-high] vowels.

(4) a.	resign	resignation	/...sign/
	sign	signature	/sign/
	malign	malignant	/...lign/
	impugn	impugnatory	/...pugn/
	paradigm	paradigmatic	/...digm/
b.	syntagm	syntagmatic	/...tægm/
	diaphragm	diaphragmatic	/...frægm/
	phlegm	phlegmatic	/flegm/

There are, however, some exceptions to these rules. One is the alternative pronunciation of *paradigm* as [pærədɪm]. Speakers with this pronunciation have the pair [pærədɪm] / [pærədɪgmætɪk]. This can be accounted for by having this lexical item marked as an exception to rule (2). A more serious exception is the pair *impregn* [ɪmpri:n] / *impregnable*. What we appear to have here is an underlying /e/ which is tensed even though it is [-high]. It would seem necessary to mark this lexical item as exceptionally having to undergo rule (2) although the structural description is not met, or else a special rule will have to be formulated for this form.

Let us now take a look at a more recent treatment of the *g* / \emptyset alternation. Halle & Mohanan (1985; hereafter H&M) give the following rule where X is the skeleton and R the syllable rhyme (rime).



In (5), *g* is disconnected from the skeleton and the vowel before *g* is lengthened (and later undergoes Vowel Shift and Diphthongization). The *g* is not reconnected to the skeleton by any rule later in the derivation, and, as with all unconnected material, is not phonetically realized. In rule (5) *g*-deletion is simultaneous with compensatory lengthening.

H&M treat only words ending in *n* and unlike *SPE*, no distinction is drawn between [+high] and [-high] vowels. From

the data given above, it seems that all vowels are indeed lengthened before $-gn\]]$, so (5) would seem to be adequate. *Impregn* is no longer an exception under H&M's analysis. However, to account for those forms in (4) which end in m , it is necessary to postulate rule (6).

$$(6) \quad \begin{array}{c} V \quad g \\ | \quad | \\ X \quad X \\ \diagdown \quad / \\ R \end{array} \rightarrow \begin{array}{c} V \\ | \\ X \\ | \\ R \end{array} \quad g / \text{---} \begin{array}{c} m \\ | \\ X \end{array} \quad (\text{domain: stratum 2})$$

The forms in (4b) are correctly derived by (6), but the [pæɹədaɪm] pronunciation of *paradigm* is an exception in that the i has apparently undergone compensatory lengthening (and subsequently Vowel Shift). A potentially more serious problem is the glaring similarity which exists between rules (5) and (6). Why should there exist two rules which are so similar?

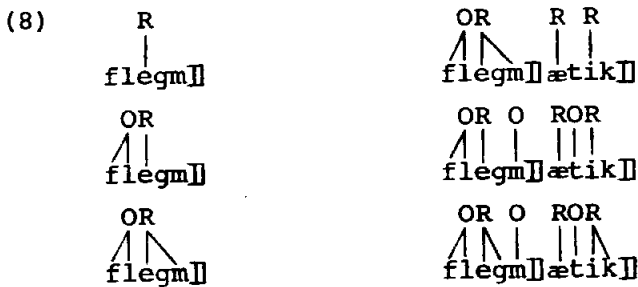
I propose the following treatment which is very general, making use of very general processes which are independently motivated, covering a wider range of data than previous treatments, and leaving no exceptions. Let us first take a look at the pair *phlegm* / *phlegmatic*. Why must g be deleted in *phlegm* but not in *phlegmatic*? The reason is that m is not syllabifiable after g . m is syllabified after l and r (*film* and *farm*), and the pairs of words in (7) show that m is syllabified after non-labial voiced continuants:¹

(7)	rhythm	rhythmic
	algorithm	algorithmic
	prizm	prismatic
	microcosm	microcosmic

but the absence of such pairs with m following other consonants shows that the rules of English syllabification do not allow m to be syllabified in such environments. In the case of *phlegm*, the g should be syllabifiable as there exist syllables of the type *leg*, *beg* etc in English, and because m following g cannot be syllabified, the leftover m should be deleted. This would give us the form *[fleg] which is incorrect. In order to de-

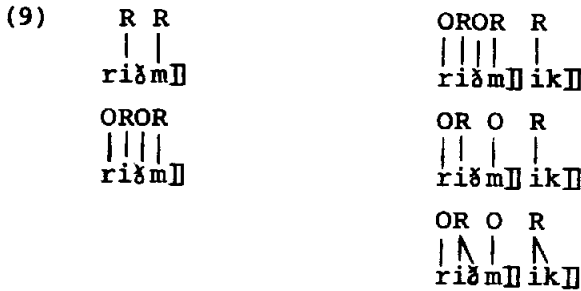
rive [flem] it is necessary to syllabify the *m* first and then delete the unsyllabified *g*. Why should *m* be syllabified before *g* can be? This is evidently because *m* is more sonorous than *g*.

I propose that the syllabification of a string of segments into the rhyme (R) of a syllable takes place (i) from left to right, and (ii) in order of sonority. Syllabification of *phlegm* and *phlegmatic* takes place as in (8), where O is the syllable onset.

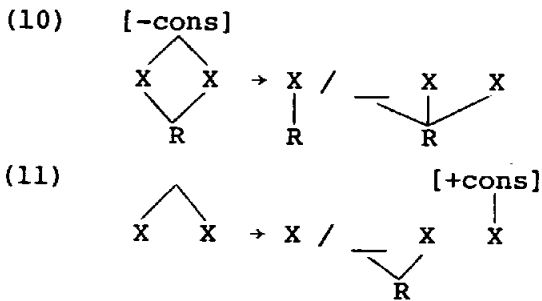


First the most sonorant segments are syllabified. The onset is syllabified next.² Syllabification then proceeds from left to right *in order of sonority*. The next most sonorous segment in /flegm/ is *m* so this is syllabified. The rhyme has now been extended to *m*, and because syllabification takes place from left to right, *g* cannot now be syllabified. It remains unconnected until it is deleted. In the case of *phlegmatic* the syllabified /flegm/ is conjoined with /ætik/ and the syllabification process is repeated with the result that *m* is syllabified as the onset of the second syllable, removing it from the rhyme, and next the rhyme is extended to the right, syllabifying the *g*. In contrast to *phlegm* / *phlegmatic*, the syllabification of *rhythm* / *rhythmic* is assumed to proceed as in (9) where the main difference is that *m* following *ð* (and also *z*) is made a rhyme. Later in the derivation an empty vowel slot is inserted before rhyme-initial consonants (cf. Harris 1983: 29-30) and this surfaces as *ə*.

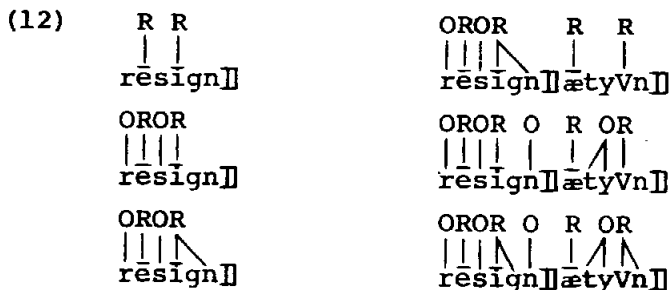
Under this analysis, the forms *drachm* [dræm], *drachma* [drækmə], *drachmal* [drækməl] all fall out from the underlying form /drækm/ with no further devices.



Let us now consider the derivation of the *resign* / *resignation* pair. I have so far made no use of compensatory lengthening, so I would derive *[rɛzɪn] with a short vowel for *resign*. In *SPE* and *H&M* it is assumed that the underlying vowels in the forms in (4) are short. I suggest that in *resign* the underlying vowel is long, and is shortened as necessary in *resignation* by the same rule that shortens the underlying vowel in *intervention*. *H&M* shorten the /ē/ in *intervention* using a rule of Cluster Shortening (10), but with the view of syllabification adopted here, this rule must be changed to (11) (see appendix II).



This requires further investigation, but I think that it makes the overall picture look much clearer. Assuming an underlying long /ī/ in *resign*, the basic derivation is as follows.



We now have a simple account of the apparent lengthening thought to be compensatory lengthening. It is not lengthening at all. The vowels which surface long are underlyingly long. Those who pronounce *paradigm* / *paradigmatic* as [pærədaɪm] - [pærədɪgmætɪk] have underlying /pærædɪgm/, and those with [pærədɪm] - [pærədɪgmætɪk] have underlying /pærædɪgm/. The problematic *impregn* [ɪm-pri:n] is underlyingly /ɪnprēgn/. All exceptions disappear.

This treatment can also account for the *n* / \emptyset alternation observed in the following forms.

(13)	condemn	condemnation
	damn	damnation
	autumn	autumnal
	solemn	solemnify, solemnity, solemnize
	column	columnar, columniation, columnist
	hymn	hymnal, hymnary, hymnist, hymnology

In H&M a special rule of *n*-deletion is used, but we need no special rules. *Condemn* and *condemnation* are derived as follows.

(14)	$\begin{array}{c} R \quad R \\ \quad \\ k\grave{o}ndemn\]] \end{array}$	$\begin{array}{c} OR \quad OR \quad R \quad R \\ \quad \quad \quad \\ k\grave{o}ndemn\]]\grave{a}tyVn\]] \end{array}$
	$\begin{array}{c} OR \quad OR \\ \quad \quad \quad \\ k\grave{o}ndemn\]] \end{array}$	$\begin{array}{c} OR \quad OR \quad O \quad R \quad OR \\ \quad \quad \quad \quad \quad \\ k\grave{o}ndemn\]]\grave{a}tyVn\]] \end{array}$
	$\begin{array}{c} OR \quad OR \\ \quad \quad \quad \\ k\grave{o}ndemn\]] \end{array}$	$\begin{array}{c} OR \quad OR \quad O \quad R \quad OR \\ \quad \quad \quad \quad \quad \\ k\grave{o}ndemn\]]\grave{a}tyVn\]] \end{array}$

H&M's rules of *g*-deletion (5) and *n*-deletion apply at stratum 2 in the lexicon, i.e. the rule's structural description is met before stratum 2 boundaries (SPE's #). It is considered that (-at)-ion, (-at)-ive, (-at)-ic, -ify etc are affixed at the first lexical stratum, and other derivational affixes (-ness, -hood, -less etc) are added at later strata. As the lexical item leaves one stratum to enter another, all internal boundaries are erased so that at stratum 2, stratum 1 boundaries (SPE's +) no longer exist.

There are also suffixes which conjoin with the stem at

both stratum 1 and stratum 2 with different phonological and semantic effects.³ One such suffix is *-able* (Aronoff 1976: 121-9). Stress is assigned at stratum 1, so the presence of *-able* at stratum 1 may affect the position of the stress, but later addition of stratum 2 *-able* cannot affect stress. An example is

compáre (stratum 1 stressing)
cómparable (stratum 1 affixation, stratum 1 stressing)
compáreable (stratum 1 stressing, stratum 2 affixation)

Now let us consider the following example.

(15) a. *expugn* [ekspju:n] b. *expugnable* [-ʌg-] c. *expugnable* [-ju:-]

The stratum 1 and stratum 2 representations of (15) are as in (16).

(16) a. *ekspāgn*] b. *ekspāgn*]Vb1] c. *ekspāgn*]

ekspāgn] *ekspāgnVb1*] *ekspāgn*]Vb1]

H&M's rule (5) applies at stratum 2 so (b) is left unaffected and the *g* in (a) and (c) is erased giving the correct output.

It is important to keep in mind that, as argued persuasively by H&M, in English the first stratum is cyclic and the second stratum is non-cyclic. It is demonstrated by H&M that structure-changing processes must observe the Strict Cyclicity Condition (H&M 94-7) at cyclic strata, whereas structure-building processes do not. This means that structure-changing processes (rule (5), cutting an association line, is such a process) may not apply to underived words at stratum 1 in English, but they can at stratum 2 which is not cyclic. Structure-building processes (such as syllabification, foot construction etc), on the other hand, may apply to all forms at the cyclic stratum 1. Rule (5) must apply at stratum 2, but where does my analysis take place? First, there is much evidence that English word stress is assigned at stratum 1. Now, stress is realised through the construction of feet, and feet are constructed on syllables, so it follows that syllabification must be ordered before foot construction at stratum 1. And when is unsyllabified material erased? Harris (1983: 35) formulates the erasure convention (17).

- (17) Segments not incorporated into syllable structure at the end of a derivation are erased.

Returning to (15) and (16), in my analysis, the segment *g* is deleted only when unsyllabified. In *expugn*, this *g* is unsyllabifiable throughout the derivation so it is deleted as required. In *exp[ʌg]nable*, the *g* is syllabified at stratum 1 so it is not deleted. The problem is *exp[ju:]nable*. At stratum 1 the *g* is unsyllabified, the output of stratum 1 being the verb *expugn*, but when *-able* is affixed in stratum 2, if *resyllabification* should take place, the *g* would be assigned to a syllable and would not be deleted. Three solutions to this problem suggest themselves. The first is that *resyllabification* does not take place (in English) at stratum 2 or later in the lexicon. This would probably be a language specific stipulation (cf. Spanish where segments are "incorporated into prosodic structure by the rules of syllable structure, which automatically (re)apply when new segmental material becomes available from any source"⁴ (Harris 1983: 123)). The second possible solution is that stray segment erasure is ordered before stratum 2 syllabification. This is clearly a language specific stipulation. The third possible solution, and the one I adopt here, is that stray segment erasure takes place at the end of stratum 1 in English. In fact I suggest the strongest possible hypothesis, that stray segment erasure takes place at the end of each lexical stratum. It is unclear whether this can be maintained in the face of more detailed investigation of English and other languages, but even if the strong hypothesis should prove too strong, it is still plausible that in English, deletion takes place at the end of stratum 1. I think it is more natural to have unsyllabified material erased at the end of a stratum where it cannot be syllabified, than to have it erased at the beginning of a new stratum just before it has the chance to become legitimate.⁵

We now have stray segment erasure at the end of stratum 1. This is a cyclic stratum in English so by the Strict Cyclicity Condition structure-changing processes cannot apply to non-derived forms. The forms *resign*, *expugn* etc are nonderived, and

stray segment erasure has applied, so can we say that stray segment erasure is not structure-changing? I think that we can. The erased segments are erased precisely because they are not part of the structure (not syllabified), so the existing structure is not changed. The important distinction is thus not one between structure-changing and structure-building processes, but the distinction that exists between structure-changing and non-structure-changing processes (the latter including structure-building processes).

2. *-ation, -ion*.⁶

Following Aronoff (1976, 100ff), Rubach (1984, 42-4), H&M (97), I take *-ion* (/yVn/) to be basic. *-ation* (/æ̃tyVn/) and *-ion* are phonologically almost in complementary distribution. *-ion* typically appears after the coronal obstruents (especially *t, s*) and *-ation* after other segments (nasals, liquids, labials, velars and vowels). Examples are given in (18).

(18)	<i>coronal</i>	<i>liquid</i>	<i>nasal</i>	<i>labial</i>	<i>velar</i>
	confession	adoration	examination	deprivation	provokation
	confusion	cancellation	proclamation	usurpation	prolongation
	completion			perturbation	vowel continuation

However there are exceptions both ways. There are forms such as *rebellion* (*rebel*) and *communion* (*commune*), where *-ion* is taken by sonorants, although the fact that they are coronal may reduce the degree to which they are exceptions.⁷ There are many more exceptions the other way, and the actual situation is much more involved. For example, almost all verbs ending in *kt* and *pt* take *-ion* (exceptions: *affectation, eructation* (v *eruction*), *expectation, acceptation, adaptation*), but words ending in *lt* take *-ation* (*consultation, exaltation, exultation, occultation*). There are two morphemes ending in *mt*, one of which takes *-ation* (*temptation*) and the other takes *-ion* (*exemption, preemption*), but the form *promptive*⁸ (not **promptative*) suggests that *mt* takes *-ion* in the unmarked case (see section 2.1 on the paral-

lelism between *-ive / -ative* and *-ion / -ation*), and this is given further support in 2.1. Of the verbs which end in *nt*, many more take *-ation* (eg. *presentation*) than *-ion* (eg. *dissension*), but the analysis to follow in 2.1 and 2.2 suggests that in the unmarked case *nt* takes *-ion*. Most of those words which end in *nt* taking *-ation* end in *ment*, so the number of marked exceptions would be drastically reduced if the *-ment* in *experiment*, *pigment*, *fragment* etc is considered to be one morpheme.

All of words in the title of this paper end in *n*, so by the above account they should be expected to take *-ation* in the same way as *examine*, *explain* etc do. *Resign* and *condemn* are as expected, but *convene* appears to take *-tion*.

2.1. *-tion*.

Some roots which take *-tion* are seen in the verbs in (19).

(19)	redeem	redemption
	convene	convention
	subscribe	subscription
	resume	resumption
	absorb	absorption

Aronoff (1976) proposes the allomorphy rule (20) to express the distribution of *-ation*, *-ion* and *-tion*.

(20) Allomorphy of *-ion*:

$$+A_{tion} \rightarrow \begin{Bmatrix} +tion \\ +tion \end{Bmatrix} / X \begin{Bmatrix} +cor \\ -cor \end{Bmatrix}$$

where X a cor is one of a set of specified latinate roots.

To account for the fact that *convene* takes *-tion*, he declares the "combinatory allomorph of *vene* to be *vent*" (109). I propose a different way of treating these forms along the lines of section 1. Stems ending in *m*, *n*, *b* etc are expected to take *-ation* and exceptions are expected to take *-ion*. But because the verbs in (19) take *-tion* they are very exceptional. However do they really end in *m*, *n*, *b*, and take *-tion*? Consider again the pair

condemn [kændem] / *condemnation* [kɒndemneɪʃən]. No one considers this to be a verb ending in *m* and taking the affix *-nation*. We have seen how the *n* is part of the stem and is deleted through a general process. Can this same process be at work in the forms in (19)? That is, could it be that the verbs in (19) end in a consonant which is not syllabified but which takes *-ion* and not *-ation*? For the moment assume that this is indeed the case and that the phantom consonant is *t*. In English it just so happens that monomorphemic syllables of the structures $-\bar{v}mt$, $-\bar{e}nt$ [-i:nt], $-\bar{v}pt$, $-\bar{o}rpt$ are not permitted, so, as argued in section 1, the least sonorant segment in such a sequence is not syllabified, or if there are 2 segments of the same sonority, the outside one is not syllabified and is deleted upon leaving the first lexical stratum. This allows us to set up a stem-final consonant which is not realised when the word is nonderived. And how can this stem-final consonant be identified as *t*? Note the following.

- | | | |
|------|-------------------|-------------------|
| (21) | <i>absorption</i> | <i>absorptive</i> |
| | <i>resumption</i> | <i>resumptive</i> |

The morpheme-final *t* is not abstract — it surfaces unchanged before /iv/ and is regularly spirantized and palatalized before /yVn/. I assume that the underlying forms of the verbs in (19) are as in (22).

- | | | |
|------|------------------|-------------|
| (22) | <i>redeem</i> | /rēdēmt/ |
| | <i>convene</i> | /kɒnvēnt/ |
| | <i>subscribe</i> | /sʌbskrībʔ/ |
| | <i>resume</i> | /rēsāmt/ |
| | <i>absorb</i> | /æbsɔrbʔ/ |

The presence of this *t* explains why *-ion*, not *-ation*, is taken. *Convene*, being /kɒnvēnt/, behaves like *invent* (/invent/), and *redeem*, *resume* (/rēdēmt/, /rēsāmt/) are on a par with *exempt* (/eksemt/) (see p.23). The presence of *t* in the underlying forms also explains the fact that the 'allomorphs' used before *(-at)* *-ion* and *(-at)* *-ive* are the same; that is, that we have (21) and not something like (23).⁹

- (23) absorption *absorbive
 resumptive *resumption

In an allomorphy treatment, the fact that parallel rules are necessary for both (-at)-ion and (-at)-ive is a coincidence, but it falls out from my treatment. All stratum 1 suffixes which allow *t* to be syllabified before them are predicted to have the same stem-final *t* realised. This is confirmed by the forms *redemptor*, *redemptress* where the stratum 1 suffix /r/ allows the preceding *t* to be syllabified. An allomorphy treatment would require a rule exactly parallel to (20) to describe the distribution of +r and +tr.¹⁰

The derivation of *convene* and *convention* is basically as follows:

(24)		<i>convene</i>	<i>convention</i>
Stratum 1 (cyclic)		OR OR	OR OR
	syllabification	 kɔnvɛnt]]	 kɔnvɛnt]]
	affixation	—	OR OR kɔnvɛnt]] yVn]]
	syllabification	—	OR OR OR kɔnvɛnt]] yVn]]
	cluster shortening	—	OR OR OR kɔnvent]] yVn]]
	stray erasure	OR OR kɔnven]]	—
Stratum 2 (non-cyclic)		OR OR	
	vowel shift	 kɔnvɪn]]	—
	spirantization, palatalization, <i>y</i> -deletion	—	OR OR OR kɔnvenʃvɪn]]
	vowel reduction	OR OR kɛnvɪn]]	OR OR OR kɛnvenʃɛn]]

Other rules necessary for other forms in (19) are voicing assimilation, *s*-voicing, and the optional, probably phonetic, process

which inserts a voiceless stop homorganic with a preceding nasal between the nasal and a heterorganic voiceless obstruent.

2.2. More *-tions*.

In addition to the 5 verb roots treated in 2.1, there are 4 verb roots which are irregular but which can be analysed in a similar way. The verb roots can be seen in the forms in (25).

- (25) a. deduce deduction
 deceive deception
 b. detain detention
 decline declension

The pairs in (25a) exhibit an irregular consonant alternation which is seen only in these morphemes.¹¹ The underlying forms of *deduce* and *deceive* can be set up as /dēdāCt/ and /dēkēCt/ respectively, where the Cs (/k/ and /b/ respectively?) are subject to minor rules (to be formulated below).

The forms in (25b) are more interesting. They exhibit the irregular vowel alternations [eɪ] / [e] and [aɪ] / [e]. The regular vowel alternations which involve phonetic [eɪ], [aɪ] and [e] are:

- (26) [eɪ] / [æ] from underlying /æ/
 [aɪ] / [ɪ] from underlying /ɪ/
 [i:] / [e] from underlying /ē/

The irregularity of the [eɪ] / [e] and [aɪ] / [e] vowel alternations can be captured by having ad hoc rules applying to an underlying vowel. This is probably the same in any treatment, but my treatment allows the underlying vowel to be uniquely (not ad hoc-ly) determined. This is because in English /-ānt/ and /-īnt/ are syllabifiable (as in *faint* /fānt/ and *pint* /pīnt/) but it seems that /-ēnt/ is not. This is assumed in the analysis of *convene* in 2.1, and that it is not simply an accidental gap is given some support by the fact that there also appear to be no /-ōnt/ morphemes (note the existence of /-īnt/ as in *count* /kīnt/). *Detain - detention* is derived from underlying /dētēnt/

with a morphologically conditioned lowering of /ē/ to /æ/, and *decline* - *declension* is derived from /dēklēnt/ with raising of /ē/ to /ī/. (*decline* - *declination* is regularly derived from /dēklīn/ which must be a different lexical entry.)

The minor rules required to account for the irregular alternations of this section are structure-changing rules. These rules apply to nonderived forms and so, by the Strict Cyclicity Condition, cannot be cyclic. This means that they cannot apply at stratum 1, but probably apply at stratum 2. The rules under discussion therefore apply after the morpheme-final *t* is deleted and the consonant changing rules used in (25a) can thus be formulated so as to apply before stratum 2 boundaries as in (27).¹²

- (27) $k \rightarrow s / \underline{\quad} \Pi$ (domain: stratum 2)
 $b \rightarrow v / \underline{\quad} \Pi$ (domain: stratum 2)

3. Conclusion.

In this paper I have made crucial use of syllabification, stray material erasure, the Strict Cyclicity Condition and the stratified structure of the lexicon. I proposed a refinement of syllabification and suggested that stray material erasure universally takes place at the end of each lexical stratum. This all combines to give a maximally simple treatment of the data in (4), (13) and (19) with no language specific rules beyond those required independently for English syllabification. Ad hoc rules are required for (25), but taking into account the facts of English syllabification serves to make the situation less ad hoc, allowing the formulation of a unique underlying representation. Other advantages of my analysis are the explanation of (21) and related data, and the fact that a single treatment can be used for the data in (19) as opposed to the previous treatment (Aronoff 1976) where *(con)vene* must be treated differently.

There are several loose ends to this paper. One is syllabification of the rhyme. What can be syllabified and what cannot? Why is /ɪnt/ a possible rhyme but /ēnt/ not? For many

decades English syllable structure has been investigated, but whereas the syllabification of the English onset is now quite well understood, the rhyme is still largely unexplored. Aside from sonority, what is involved is not known at present. Another loose end is my treatment of Cluster Shortening. A suggestion concerning the function of this rule is made in appendix II of this paper.

This paper can be viewed as a move away from rules towards principles, a direction which has been a major guiding force in syntactic research over the last 20 years, but one which is not so marked in phonological research. For a somewhat different treatment of part of the data discussed here, see Haraguchi (1986: 73-7) which is also an attempt in the same direction.

Appendix I

Save / *salvation*.

When *save* is first acquired by the language learner, it will have the underlying representation /seiv/ or /sēv/. After the rule of Vowel Shift has been acquired, the underlying form will automatically be revised to /sāev/. At a much later stage the word *salvation* will be acquired with the underlying form /sælv/. Semantically /sælv/ and /sāev/ are identical, and formally they are very similar, so it would seem natural to try to collapse to two underlying forms in order to account for their similarity. The language learner can get /sālv/ from /sælv/ for free, as the /ā/ is shortened by Cluster Shortening. In order to collapse the two underlying forms (now /sāev/ and /sālv/), it is necessary to make the underlying representation of *save* /sālv/. However the process of syllabification which I have proposed would give the incorrect output *[seil], syllabifying the more sonorous *l* before *v*. In order to correct this the underlying form must be as in (i), ie. already partially syllabified.

(i)

$$\begin{array}{c} \text{R} \\ \diagdown \\ \text{sālv} \end{array}$$

The *l* in (i) cannot be syllabified at the expense of *v* when the word is nonderived because this would be a structure-changing process taking place at a cyclic stratum, something forbidden by the Strict Cyclicity Condition. On the other hand, the *l* appears in *salvation* because this is a form derived at stratum 1, before unsyllabified material is erased.

Solve / *solution*.

Solve and *-volve* (*revolve*, *evolve*) appear to form their nominal forms with *-ution* in an irregular fashion (the *v* must be deleted). Drawing a parallel with the analyses proposed above, I propose an analysis where *-ution* is not required.

Solve, in its nominal form *solution*, has a *t* (parallel to *convene* / *convention*) so the underlying form becomes /*solvt*/. The *t* is not syllabifiable and is erased in *solve*. In *solution* the *t* is syllabifiable. A rule along the lines of (ii) is required to convert *v* into *z* in *solution*.

(ii) $v \rightarrow z / C_C$ (domain: stratum 1)

(ii) does not apply to the nonderived *solve* because it is structure-changing. *Solute* can be assumed to be *solvt*]t] (see appendix II for more on this /t/) derived at stratum 1 with application of (ii). It must be assumed that the *-ent* in *solvent* is added at stratum 2 in order to prevent (ii) from applying and to account for the fact that the *t* in /*solvt*/ is not realised. This is, however, problematic in that the shortening of *i* and the placement of stress in *resident* (*rēsīd*]ent]) argue for stratum 1 formation. Another problematic form is *soluble*. I am forced to assume the derivation in (iii), but there is no explanation for the non-resyllabification of *t* after the final stage in (iii).

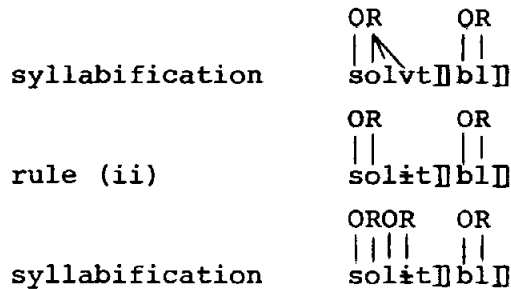
(iii)

syllabification

OR
|
|
|
solvt]

affixation

OR
|
|
|
solvt]b1]

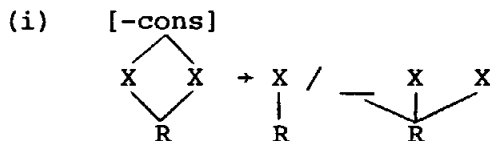


It was pointed out to me by Shoichi Tanaka (personal communication) that there might be two verbs involved here, one meaning 'solve (a problem)', and another meaning 'dissolve'. I assumed above that they are both /solvt/, but it is possible that the latter is /solv/. This would give a straightforward derivation for *soluble* from solv]bl] (and also it would not be necessary to assume that the *-olysis* in *solvolysis* is attached at stratum 2 (cf. *electrolysis* which with its non-syllabic *r* suggests stratum 1 formation (see note 10)). *Solvent* is also correctly derived from solv]ent] (-ent may now be conjoined at stratum 1), and *solute* from solv]t] with application of rule (ii). The problem now becomes *solution* as the expected form would be **solvation*. Here we can assume that *solution* is the nominalised form of /solvt/, but is suppletively also the nominal of /solv/. Note that a parallel situation is found with *revolution*, the regular nominalised form of *revolve* (/revolt/) and the suppletive nominal form of *revolt* (cf. Hawkins 1984: 156).

Appendix II

Cluster Shortening.

H&M's rule of Cluster Shortening (i) (=10) applies at stratum 1.



It is structure-changing so should not apply to nonderived forms,

drought from *drī̄t̄*, ie. *dry* and noun-forming /t/.) Another example is *content* from *kōntēnt̄*, or perhaps *kōntēn̄t̄*. As noted in *SPE* (172), this last example contrasts with *complaint* (from *kōnplān̄t̄*) and *restraint* (from *rēstrān̄t̄*) which do not undergo Cluster Shortening. *SPE* accounts for this fact by associating the suffix in *content* with the + boundary (or in lexical phonological terms, with stratum 1), and the suffix in *complaint* and *restraint* with the # boundary (with stratum 2).

I would like to point out that in all the words where Cluster Shortening has been seen to apply, the situation is such that before Cluster Shortening takes place, the form contains unsyllabifiable material. This is so in all the forms in (iv) (English allows no monomorphemic words ending in [-i:pt], [-i:tt] etc), and also *frost* (no [-i:zt] or [-u:zt]) and *content* (no [-i:nt]). *Restraint* and *complaint*, on the other hand, contain rhymes of the syllabifiable form /*ēnt̄*/. Instead of relegating noun-forming /t/ to two different strata, an explanation for the difference, and indeed the functional motivation for Cluster Shortening, is to be sought in syllabification. It appears that Cluster Shortening is intimately related to syllabification; it applies only when there is unsyllabified material — a last ditch effort to make it syllabifiable.

NOTES

* This paper owes much to the comments and suggestions I received from Shōichi Tanaka, Masao Okazaki and Satoshi Ōta. Satoshi Ōta deserves special thanks as it was discussion with him on details of his work which led to his paper in this volume which started me on this voyage into the realms of syllabification. All inadequacies are my own responsibility.

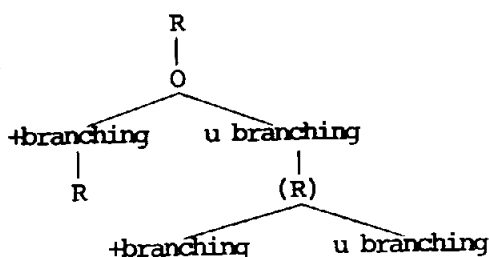
¹ The 'non-labial' part of this characterisation is probably superfluous, as it is no doubt to be derived from the restriction which prohibits two labials in the onset. There are no *pw-*, *bw-*, *mw-*, *fw-*, *vw-*. This also explains the lack of *-vm*. That we have *-mf* (*triumph*) and *-mp* (*lamp*) shows that the *m* in these cases are underlyingly a nasal unspecified for place of

articulation, ie. *-Nf*, *-Np*.

The 'voiced continuant' part of the characterisation may fall out from the role of sonority in restricting possible English syllables, but at this stage I do not understand the details.

² Kaye & Lowenstamm (1981) account for the distribution of syllable types across languages using markedness. They note that no language may have branching onsets unless it also has branching rhymes. This is accounted for by stipulating that where *m* is the maximum markedness value for onsets and *n* is the maximum markedness value for rhymes, $m \leq n$. However this is a stipulation in their framework, and must remain as such in UG. If we take a more parameter-oriented view of syllabification, I think that we can make a first approximation at the nature of syllabification as in (i), where the fixing of parameters proceeds from top to bottom, and *u* is unmarked.

(i)



Here $m \leq n$ is translated into the lack of optionality (parentheses) in taking the rhyme when the onset is branching. As it is, this is just as much a stipulation as $m \leq n$ is, but there is the hope that it will follow from general principles governing the organisation of parameter systems (for example, when a marked option is taken, the next parameter must be fixed in a certain way).

³ In general the processes which take place at stratum 1 are less productive than those which take place at later strata. Being less productive, listing of some type becomes required in the lexicon and when the meaning is listed, the semantics of the form becomes non-compositional.

⁴ The 'automatically' in this sentence may be an overstatement.

⁵ In order to allow for the attractive treatment of French liaison in Booij (1984), it is necessary not to have 'extrasyllabic' segments (segments marked as extrametrical by rule or as part of the lexical entry before syllabification) deleted by the erasure convention. This is not surprising, however, as in general extrametrical material is invisible to the erasure convention.

⁶ I follow Aronoff (1976) in treating *-ition* (in *definition*, *competition*, *composition* etc) as marked. It is taken only by those verbs marked to take it.

⁷ It may be that *rebellion* and *communion* are formed with a different affix, as suggested by Berendt (1972: 43) (but cf. Aronoff 1976: 44), in which case there might be no exceptions where *-ion* is taken where *-ation* is expected.

⁸ Etymologically speaking, *prompt* contains the morpheme /emt/ seen in *preempt* and *exempt*, so *promptive* is to be expected, but I assume that synchronically *prompt* is unrelated to *empt*.

⁹ *Exploitive* (*exploitation*), *preventative* (*prevention*) exist, but there are also *exploitative*, *preventive* which are expected.

¹⁰ As with *rhythm* (p.18), the form *redemptor* has a rhyme-initial consonant, so later in the derivation (at stratum 2) an empty vowel slot is inserted. In *redemptress*, the consonant in question is in the onset so this rule is not applicable if *-ess* /es/ is conjoined at stratum 1.

¹¹ And perhaps also in *approve* (*approbation*), *contrive* (*contraption*).

¹² It is tempting to collapse the 2 rules in (27) into (i).

(i) C → [+cont] / __]

This would have implications for analyses of English which utilise an underlying velar continuant (/x/) (such as SPE, H&M).

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