Allomorphy and ION

Mark Aronoff
20E-221, M.I.T.
April 6, 1975
Principal Conclusions

I. Allomorphy

Any rule which effects a phonological change, and
i) which need not follow any phonological rule
ii) whose environment may be stated morphologically

is a rule of allomorphy.

Rules of allomorphy follow the rules of word formation
and provide the input to the phonology.

Rules of allomorphy are not extrinsically ordered.

II. ben-Moshe's Laws of the Root

First Law: Only and most roots which take the marked
form of a suffix exhibit allomorphy.

Second Law: If a root is marked, then all occurrences
of that root take the marked suffix.

Third Law: If any occurrence of a given root exhibits
allomorphy in a given environment, then all
occurrences of that root in that environment
will show the same allomorph.

Thanks To

Morris Halle Richard Oehrle Alan Prince Edwin Williams
Crosley Shelvador ben-Moshe
Susan Martin
This paper had, originally, a very clever introductory paragraph, wherein I noted, somewhat sarcastically, the popularity of theorizing in linguistics, and warned the reader that they would find little of that in the following pages. Despite this salutation, about half-way through the actual body of the work, I realized, to my great chagrin, that I was making, and assuming, some rather strong, and somewhat novel theoretical claims. These claims have to do with morphology, particularly that aspect of morphology which commonly goes under the rubric of readjustment rules (cf. Chomsky and Halle 1968, henceforth SPE). In particular, I will often have recourse to one type of Morphological rule (M-rule), a rule of allomorphy, which states generally irregular phonological changes in the shape of a morpheme in different morphological environments.

Before going further into the notion of allomorphy, let me first elucidate that of morphological environment, or conditioning, one which, though it is tacitly assumed in much work on Generative Phonology, especially in SPE, has not, to my knowledge, been explicitly isolated. Since I am generally concerned with word formation, I will give examples of various types of possible environments for (conditions on) rules of this sort. We
are familiar with syntactic, semantic, and phonological conditions on word formation. An example of a syntactic condition is the fact that the suffix -ment is generally attached to Lexical Items which have the syntactic label Verb. Nominals in -ment thus have the form X+ment, where X is a verb. A phonological condition, first noted by J.R. Ross, and discussed in Siegel (1971), holds on the formation of nouns in -al. Basically, -al may appear after a stressed vowel, followed by an optional glide or sonorant, and no more than one consonant. So denial, appraisal, and dispersal. The stem-word is also generally bi-syllabic. An example of a semantic condition, again a slightly modified version of one in Siegel (1971), is that on the formation of words in -ee. the stem of such a word must be a transitive verb (or the root of a transitive verb), which selects an animate object, or indirect object. So presentee, evacuee, payee, promisee, patentee. The sole exception to this rule is escapee.

A morphological condition, then, is by elimination, one which is neither syntactic, semantic, nor phonological; one which is grammatically arbitrary, in that it depends on some feature which usually plays no part in the derivation of sentences. A good example of a morphological condition is that on the suffix -ity which restricts it to Latinate stems. Morphological features are sometimes relevant to phonological processes. In English, all those
instances of \( k \) which eventually become \( s \) or \( ð \) are found in Latinate morphemes, and are usually orthographically \( c \). The rule, or rules, which take \( k \) to \( s \) must therefore be sensitive to the morphological feature \(+\text{Latinate}\). In SPE, and other works, morphological features are encoded into the phonology by means of rule-features. Thus all Latinate morphemes with \( k \) in the relevant phonological environment will be marked by a rule-feature as undergoing the \( k \) to \( ð \) rule. Whether this is the correct device, or whether morphological features may play a direct role in the phonology, I do not at present know.

A rule of allomorphy is thus a special type of morphologically conditioned rule, which spells out the various forms of a morpheme, and which, I claim is distinct from, and, intrinsically, precedes the rules of the phonology. Allomorphy is not a novel concept. It was widely used in Structural linguistics. However, in the great revolt against Taxonomic Phonemics, allomorphy, which, in that framework, covered both regular and irregular processes indiscriminately, was rejected in all but the most glaring cases of suppletion (\textit{go/went}). When examples of non-suppletive irregularity were later discovered, they were handled by rule-features. But the use of the rule-eature in cases of morphological alternation is very
different from other uses of this device. In general, (cf. Kiparsky 1968) rule -features are used to avoid having to posit abstract phonological units (phonemes) which never appear on the surface. However in the cases of allomorphy which I discuss below, there is no need to posit such new phonemes. A morpheme can have more than one allomorph, but each allomorph has aphonologically regular form, i.e. contains no "abstract" phonemes. The rules of allomorphy thus do not pretend to replace all uses of rule-features, only those which cannot be motivated in terms of abstractness, and which involve morphological alternation. In general, then, the rules of allomorphy take the place of a very specific class of phonological rule (P-rule). These rules have the peculiarity that their environment must (or may) be morphologically marked, and that there is no P-rule which must precede them. There are rules which possess only one of these properties. So the rule which takes $i$ to $y$ in $i\text{vn}$ (SPE p.227) must be marked, for only certain instances of $i\text{vn}$ undergo it. However, this rule must follow phonological rules, specifically stress rules, and therefore cannot be a rule of allomorphy.

One might view the rules of allomorphy as very early P-rules. However, there is some indication that this
is not correct. There seems to be no extrinsic ordering among the rules of allomorphy (with one type of exception which I will discuss below). If this is so, then one can say that these rules precede, but are not included in, the P-rules. They are in fact, as I noted above, more or less equivalent to a class of readjustment rules. So, for example, the rule that spells out the irregular, and single regular variant of the English plural morpheme can be considered a rule of allomorphy.

By separating rules of allomorphy from the phonology proper, I am, incidentally, making a claim that certain alternations are not phonological. One interesting variant of this is the claim that these alternations are not necessarily those which cannot be stated phonologically, i.e. without recourse to morphological conditions, but rather those which need not be so stated. This claim is corroborated by some fascinating work done on the Maori passive morpheme (cf. Hale 1967), and gains some support from a few of the alternations discussed below.

**Remark:** This paper, despite the last five pages, should not be taken as a theoretical polemic in favor of allomorphy. I did not set out with that purpose in mind, but rather to describe a set of data. Allomorphy proved to be a useful tool in the description of that data; it seemed to unite diverse phenomena in an interesting way, and it is with this in mind that I would hope the paper will be read and considered.
1.1 Armed with this forwarning, let me tell the still curious that this is a, hopefully, detailed study of the English nominal marker -At+iVn (ION). This suffix is very widespread. Walker lists about 2000 words ending in it (4% of the items in that dictionary). Normally, it is a deverbal nominalizing suffix (fascination/fascinate), however there are nominals in ION whose stem is not a free word (compunction/compunct, salvation, salivate). There are also some very few which have a corresponding adjective or noun, instead of the expected verb (contrition/contrite, ideation/idea). The suffix is usually restricted to Latinate stems, again with a few exceptions (botheration, flirtation).

Not all instances of orthographic Xion are to be taken as instances of -ION. All forms in which the i is syllabic are not (accordion, ganglion). Also disregarded are words such as onion, companion, million, which can probably be excluded on semantic grounds.

I will not deal in this paper with the actual formation, or analysis (morphological) of words in -ION, and will have correspondingly little to say about the productivity of the suffix. This work is rather a preliminary, in many ways, to a morphological statement.

1.2. The phonology of -ION is dealt with very thoroughly and convincingly in SPE. There an underlying phonological form (+At)iVn is posited for it. iVn must be bi-syllabic because of stress facts, namely the
placement of primary stress on the syllable preceding it (prohibition, SPE p. 87), and the operation of the tri-syllabic laxing rule (decide/decision, SPE p. 182). A later rule takes i to y (SPE p. 225-227). Further rules of spirantization and palatalization yield the correct output.

1.3. On then, to the allomorphs of ION. As many people have, I am sure, noticed, this suffix has several underlying phonological forms, as shown by the following alternations:

realize realization *realization
educate education *education
repeat repetition *repetition *repition
commune communion *communion
resume resumption *resumption *resumption
resolve resolution *resovation

I believe that from these, and other examples, we can demonstrate that ION exhibits the following allomorphs:

+iVn, +At+iVn, +t+iVn, and possibly +it+iVn, +ut+iVn

The distribution of these forms is somewhat complex, but I will try to give as complete a description as possible.

2.1. At+iVn this is the unmarked variant. It is freeest in terms of conditions on its attachment, and also the most productive. As evidence of its productivity let us look at verbs in the suffix +ize. These verbs may,
almost without exception, form nominals in \textit{+At+iVn}. so, if I create the verb \textit{communalize}, I may automatically create the corresponding nominal \textit{communalization}. In the cases where a nominal in \textit{+At+iVn} may not be formed, it is because there already exists a parallel nominal of another form, as for example \textit{criticize}, \textit{*criticization}, \textit{criticism}.

The strong productivity of \textit{+At+iVn} suffixation with verbs in \textit{+ize} can be strikingly compared with suffixation in \textit{+ment}, a Latinate nominal suffix with almost parallel semantics. Walker lists only the following five nominals in \textit{+izen}:

\begin{itemize}
\item af\text{franchisement}
\item advertisement
\item chastisement
\item divertisement
\item aggrandizement
\end{itemize}

So we see an almost exceptionless tendency for verbs in \textit{+ize} to have nominals in \textit{+At+iVn}, as opposed to \textit{+ment}.

How this fact is to be captured formally, I do not at present know.

2.2 As far as I can see, there is no restriction on the final consonant of verbs to which \textit{+At+iVn} may attach. The following list demonstrates this point.
## List of +At+iVn nominals

<table>
<thead>
<tr>
<th>LABIAL</th>
<th>CORONAL</th>
<th>VELAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>perturb(at)</td>
<td>cess(at)</td>
<td>evoc(at)</td>
</tr>
<tr>
<td>form(at)</td>
<td>degrad(at)</td>
<td>purg(at)</td>
</tr>
<tr>
<td>exhum(at)</td>
<td>elicit(at)</td>
<td>prolong(at)</td>
</tr>
<tr>
<td>usurp(at)</td>
<td>accus(at)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>revel(at)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>declar(at)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>examin(at)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>represent(at)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>deport(at)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>manifest(at)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>consult(at)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>affect(at)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>commend(at)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>sens(at)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>indors(at)</td>
<td></td>
</tr>
</tbody>
</table>

There do not appear to be any principled gaps.

### 2.3

There are only a few instances of +At+iVn after a vowel-final stem. This can simply be traced to the relative paucity of vowel-final Latinate stems. Examples are renounce/renunciation, vary/variation, continue/continuation. One interesting class of vowel-final stems does exist. As noted in SPE (p.201), verbs in +fy and +ply generally have nominals in ication, as amplify/amplification, imply/implication. This alternation is covered by the following "ad-hoc" P-rule:

\[ k+f /+C_1f\# \]  

(SPE p.201, rule (b2))

amplify is thus derived from amplii, and the i in amplification is shortened by the rule that shortens
the first a of explanation. The rule is "ad-hoc" in a non-pejorative sense. It is so formulated as to have its structural description met only by verbs with the roots *ly, *ply. Even the + boundary does its job, serving to prevent dis=like from being converted into dis=ll.

The rule is peculiar, though, in that though *ly lists it among the P-rules, there is no other P-rule that must precede it (Vowel shift must follow it). It could be the first rule of the phonology. This leads us quite naturally to ask whether this is indeed a P-rule at all.

Perhaps it is a rule of allomorphy. Is there any evidence for this proposal?

First of all, stating (62) as a rule of allomorphy would immediately account for its ordering properties, for such rules must precede all P-rules.

Secondly, (62) could just as easily have a morphological as a phonological environment, since its domain of application is limited to two roots. Stating the environment phonologically does, however, make a certain prediction, namely that no word of the form #X+C,IK# will ever reach the surface in English. As noted above the + is crucial. There are words such as dis=like and outpsyche. These = boundaries have a nasty habit of fading away to +. If, perchance, outpsyche, a very common
verb, did lose its =, would it then become *awts\|.
Doubtful. This intuition is a strong indication
that the environment for the k-dropping is indeed
not C, but rather the two roots in question. If
we persist in stating the rule as phonological, we
must mark them with a rule feature as +(62). If
we simply regard (62) as a rule of allomorphy, we
lose a rule-feature and minor rule combination. The
rule-feature in question is, in addition, not
motivated on grounds of abstraction.

Words in +fy provide us with another example
of a rule-feature minor rule combination which may be
included in the rules of allomorphy. As mentioned in
SPE, certain verbs in +fy have nominals in +faction
(putrefy/putrefaction). SPE accounts for this by having
the verb marked by a rule-feature for undergoing
Short Vowel Shift, the minor rule that accounts for
the sing/sang alternation. More precisely, the rule that
assigns the rule-feature (+SVS) must assign it only
to the morpheme +fy, in order to avoid having the
other vowels of the word in question undergo SVS.
The _derivation of satisfaction_ thus proceeds as follows
(cf. SPE pp.201-202):
There is some doubt as to the status of SVS. The sing/sang alternation has been claimed (Hoard & Sloat 1973) to be the result of other distinct rules. There is also a question as to whether rule features may be assigned to constituent morphemes, rather than entire Lexical Items (SPE 373 ff.). The rule-feature is also, incidentally, of the non-abstract variety. This suggests that the fik to fak process may be morphological. In this case, there is very strong evidence, from the form of the ION suffix, that this is so.

All nominals in +fak are of the form X+faction (liquefaction/*liquefacation). All nominals in +fik, with the sole exception of crucifixion, are of the form X+faction. +fak is thus a root with the property that the A of At+IVn drops after it. This property is very common; +t+IVn is the marked form of the suffix, after non-coronals, as will be seen below. There are, furthermore, no cases where the rule that assigns the marked suffix must make reference to a derived phonological property (other than perhaps the root final consonant.) We must, therefore, presume that it is the feature (+SVS) which determines the form of the suffix here:
R1. \( \text{At+iVn} \rightarrow \text{t+iVn} / \text{fIk}(+\text{SVs})+ \)

But there is no other case of a rule feature determining the form of the suffix either. (R1), which must be posited if the fIk/fak alternation is phonological, is thus a very singular rule. If, on the other hand, we state the alternation at a morphological level, we obviate the need for both such a bizarre rule as (R1), and the suspect rule feature and minor rule. The morphological solution is thus to be preferred on several grounds.

2.4. I can feel the critical reader, squirming in their seat, hand outstretched in objection; it appears that sufficient evidence has not been presented with regard to the last two issues. The alternate solutions have not been discredited; both generate the required output. I will remind this reader, though, that the question here is not one of generation, but of evaluation: when presented with a form, which may be dealt with in either of two ways, which one does the grammar choose? I have tried to show that when faced with the dilemma, rule-feature plus minor rule, or morphological rule, the grammar chooses the latter. Of course this decision calls into question the status of rule-feature minor rule pairs. If they can be eliminated from the grammar entirely, then there is no longer a dilemma.
2.5. The proposed derivation of nominals from stems in +fy and +ply provides us with one case in which there is an ordering between morphological rules. The fǐk/fak rule must apply to the stem before the condition on the attachment of At+iVn can be stated, for the marked variant t+iVn is attached to fak, and not to fǐk. It is probable, however, that rules of stem allomorphy always precede rules of suffix allomorphy. If this indeed turns out to be the general case, then we can say that though there may be ordering among morphological rules, the ordering may never be extrinsic. In any case, the issue awaits further evidence.

3.1. We have now encountered a set of ION nominalizations, the X-faktion type whose formation, or analysis is not purely agglutinative. I shall turn then to other forms in which there appears to be a change in the suffix from the unmarked form At+iVn, and sometimes, concomitant change in the root of the stem verb. In this regard, we have already seen that fak is the marked nominal forming variant of fy: it only appears with certain verbs, such as satisfy, and with others which are marked by the purely non-phonological presence of an e before the *fy (liquefy, putrefy). It is this marked variant which takes the marked form of the suffix. This
phenomenon is quite general. Many of the roots which take marked forms of the suffix exhibit morphological variation. This is called ben-Moshe’s first law of the marked root.

3.2. Verbs in +At (equivocate, prevaricate), form ION nominals about as productively as those in +ize, with a corresponding lack of nominals in +ment (only abatement and (rein, mis, under)statement. As has been observed before (Siegel 1971), the derived nominals do not reduplicate the At (equivocation/*equivocation, prevarication/*prevarication). It appears that the restriction does not merely hold on *+At+At sequences but on any XAt+At; so relate must be analyzed as re+lāt, yet we have relation and not *relatation. Contrary to this tendency, however, we have dilatation, where the unanalyzability of +lāt seems to indicate that the narrowform (+At+At) of the restriction holds. Similarly with natation. The existence of dilatation, though, does point to a preference for the extended form. Perhaps a look at other unanalyzable Latinate stems in XaTe will help here. There are three, to my knowledge: abate, sate, and state. Sate has an alternate satiate from which the nominal satiation is formed. Tricky. With abate and state something quite fantastic happens.
They are, as noted above, the only verbs of the form \textit{Xate} which form nominals in \textit{+ment}. I can only conclude from this that faced with the crucial case, which will decide between two possible versions of a rule, the grammars equivocates, and avoids having to make a decision. 

Other cases of the extension of an environment from morphological to phonological have been discussed by Prince (1972). He points out firstly that nouns in \textit{osis}(arteriosclerosis) have adjectives in \textit{otic} and never \textit{otical}. However the environment covers all cases of \textit{Xot}, and not just \textit{X+ot}; hence \textit{idiotic(*al), despotic(*al)}. \textit{Idiotical} and \textit{despotical} were possible words not too long ago. This suggests a historical change in the rule, from restricted to extended, morphological to phonological. Similarly, verbs in \textit{i+fy} have adjectives in \textit{i+fic} (specify/specific), and not \textit{i+fic+al} (*specifical). This has been extended in some cases (\textit{scientific(*al)}), but not all (\textit{Pontiff,*pontific,pontifical}).

It appears, then, that there is a constraint prohibiting \textit{+At+At} or \textit{xAt+At} sequences. How one might ask, does the constraint operate? Does some rule delete the first \textit{At}, or the second? From looking at other suffixes we can gain some insight. It appears that stem final \textit{+At} deletes generally before suffixes, so \textit{celebrate/celebrant, nominate/nominee}. If we wish to make a general statement,
we can say that +At deletes before a suffix, i.e. it is the first At that deletes. One might claim as a rule that at+IVn, being the unmarked variant of the suffix ION, is also the only productive form of the suffix, and the fact that it is the first At which deletes in the formation of this very productive class of derived nominals (Xate/Xation) is evidence for this claim. However, in order to have any strength, the claim should have relevance to other suffixation processes. If one could show that, in general, the unmarked form of a suffix is the only productive form, then this particular case would be decided by the theory. I am, at present, not in any position to discuss the matter further.

4. The Marked Roots

4.1. We come now to those cases which I consider the most interesting, the marked roots. I have already mentioned that fak is such a root. It is marked, and takes t+IVn, rather than At+IVn. Note that fak is not a lexical item, it is a morpheme, distributionally determined, with very little semantic content (compare the semantics of putrefy and satisfy, in particular, what does satisfy mean?). One might think that this is an exceptional case, and that when a given lexical item has a nominal in At+IVn, the form of the suffix is determined by that individual and entire lexical
item. This is not so. It is rather the last morpheme of the stem, which can usually be called the root, which determines the form of the suffix. If a root is marked, then all occurrences of that root take the marked suffix. This ben-Moshe's second law of the root. Furthermore, if any occurrence of a given root exhibits allomorphy (/_At+iVn), then all occurrences of that root will show the same allomorph. fy/fik/fak is the only exception to this last rule.

I will give an example. Take the list of all verbs of the form +sume:
subsume, resume, presume, consume, assume
The first elements of these verbs are common Latinate prefixes, which may be isolated distributionally. The verbs have very little in common semantically, and there is no possible way in which, by giving the morpheme +sume some meaning, however broad, we may derive the meanings of the separate verbs compositionally. sume is therefore a distributionally determined morpheme, with little, if any, semantic content. Now all of these verbs have nominals in ION:
subsumption, resumption, presumption, consumption, assumption
The form of the suffix must be t+iVn (as with fak), and is never At+iVn (consummation, as in Shakespeare is from consummate). This fact is not determined
phonologically, for we have exhumed/exhumation, deplume/deplumation. Yet every verb in +sume takes the same marked form of the suffix. We can conclude either that this fact is the product of chance, or that it is determined by +sume. Further examples will demonstrate that it is no matter of chance. We must therefore conclude that the root +sume is marked to form nominals in+t+ivn.

The verbs in+sume provide a good example of another phenomenon too. If a verb containing a marked root permits nominalization by ION, it is usually the case that all verbs in that root will have a parallel nominal form. This is a tendency, and not so strict as the second law.

4.2. What are the marked forms of the affix ION?
For roots ending in non-coronals, i.e. labials and velars, the marked form is +t+ivn. +fak and +sume are two examples of this. Others are listed below

<table>
<thead>
<tr>
<th>verb root</th>
<th>/_+ION</th>
</tr>
</thead>
<tbody>
<tr>
<td>dik+e</td>
<td>dik</td>
</tr>
<tr>
<td>skrīb</td>
<td>skrīb</td>
</tr>
<tr>
<td>sēv</td>
<td>sep</td>
</tr>
<tr>
<td>ēm</td>
<td>ēm</td>
</tr>
<tr>
<td>sorb</td>
<td>sorb</td>
</tr>
<tr>
<td>stroy</td>
<td>struk</td>
</tr>
</tbody>
</table>
These are the marked non-coronal roots. By ben-Moshe's laws, no verb containing any one of these roots will have a nominal in At+iVn. This is the case. The point about +sume having little or no intrinsic meaning holds for these roots too, as well as the tendency for all verbs in a given root to have ION nominals. A list of the verbs and ION nominals in +ceive and +duce demonstrates these two independent points quite well:

- receive reception
- deceive deception
- conceive conception
- perceive perception
- apperceive apperception
- deduce deduction
- reduce reduction
- seduce seduction
- ? induce induction
- ? conduce conduction
- produce production
- introduce introduction
- reproduce reproduction

4:3: Marked coronal-final roots comprise the most irregular and complex class, especially with regard to changes of the root. Even the form of the marked ION suffix after coronals is unclear. Many investigators (cf. Schnitzer (1971), Householder (1972)) list it as
+t+iVn, i.e. the same suffix as with marked non-coronals.
This cannot be so. Rather the suffix must be +iVn, as
in SPE, for the following reasons.

Firstly, alternations such as rebel/rebellion,
commune/communion, demand the positioning of +iVn, at
least after some occurrences of nasals and liquids.

Secondly, as alternations like decide/decision
revise/revision, argue, the vowel preceding Iu must
be laxed by tri-syllabic laxing. In cases such as
abrade/abrasion, rotate/rotation, this vowel has
further undergone a rule that tenses non-high vowels
in the following environment(SPE p.181):

/\-hi C V\-cons V
   \-low
   \-back
   \-stress

This rule also operates in alternations such as
Canada/Canadian, Abel/Abelian. Crucially, there must be
one and only one consonant after the affected vowel.
If the suffix in abrasion is +t+iVn, the environment
will not be met. There must, therefore, be a rule which
deletes the t, before the above rule applies. Since
this t-deletion rule is not crucially ordered after
any r-rule, the suffix can just as easily be +iVn,
exactly as it is in communion and rebellion. We can
thus have a uniform suffix for all marked coronals.
Note, by the way, that the environment for the rejected rule of t-deletion cannot be stated phonologically, but rather in terms of marked coronal roots, or stems.

The root ven (convene/convention) shows an interesting interaction of the two phenomena just dealt with under the two arguments. One might be tempted to regard the alternation of this root as evidence of the suffix being +t+iVn after at least some occurrences of n. However, if the suffix is +t+iVn, the t must be deleted, in most cases, before the tensing rule applies, as I have just demonstrated. One would, therefore, have to mark ven as an exception to this t-deletion rule. If, however, the root ven has the form vent as an allomorph /_10n, there is no need to mark this root as an exception to any rule. The root change is also equivalent in effect to marking ven as taking +t+iVn, instead of +iVn, like communion. The t-dropping thus requires an extra marking. What, in the t+iVn solution was two separated unrelated marks, thus becomes one uniform morphological change, by a rule of allomorphy. I give the two derivations, for comparison.
**Rival derivations of vention**

<table>
<thead>
<tr>
<th>Morphological markings</th>
<th>+iVn</th>
<th>+t+iVn</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. vēn = vent/At+iVn</td>
<td>vēn+At+iVn</td>
<td>1. At+iVn = t+iVn/vēn</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. vēn is an exception to t-deletion.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>underlying forms</th>
<th>vent+At+iVn</th>
<th>vēn+At+iVn</th>
</tr>
</thead>
<tbody>
<tr>
<td>(mark 1)</td>
<td>(mark 1, 2)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rules of suffix</th>
<th>At+iVn = iVn</th>
<th>At+iVn = t+iVn</th>
</tr>
</thead>
<tbody>
<tr>
<td>/ marked coronals</td>
<td>(mark 1)</td>
<td>(mark 1, +mark)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Phonological rules</th>
<th>vent+iVn</th>
<th>vēn+t+iVn</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. t-dropping</td>
<td>n.a.</td>
<td>vēn+t+iVn</td>
</tr>
</tbody>
</table>

2. Tri-syllabic laxing
(or laxing /g/) | n.a. | ven+t+iVn |

3. tensing          | n.a. | n.a. |

**OUTPUT**

venthin | venthin
Isaid above that the rule of $\ddot{t}$-dropping is suspect, in that there is no $P$-rule which it must follow, and at least one (tensing) which it must precede\(^6\). There is one example in the literature, however, in which the $\ddot{t}$ is put to some phonological use. Schnitzer (1971) attempts to derive succession from sub=$\ddot{g}\ddot{c}d+t+iVm$. He uses the $\ddot{t}$ to devoice the $\ddot{a}$. However there is no way for him to shorten the $\ddot{e}$, and his final form is suk=$\ddot{s}\ddot{e}s+iVm$, the incorrect output. SPE (p. 182) lists ced as exempt from the tensing rule; $\ddot{e}$ is thus shortened by tri-syllabic laxing, and markedly not lengthened. Using the device of root allomorphy, we can list ced as cesa/\_+At+iVm (or shorten the $\ddot{e}$/\_00. The double consonant prevents the $\ddot{e}$ from tensing, and is in accord with the distributional fact that there are no Latinate roots of the form *XVs+.

Thus the only cases I know of where the $\ddot{t}$ has been claimed to perform some phonological function can be dealt with in a principled fashion if the marked coronal suffix is ivm, and if we make use of the device of allomorphy in marked roots (Ben-Moshe's first law). In fact the principal of allomorphy is very strongly supported by both of the last examples (the derivation of Avention and Accession), where formerly items had to be marked with rule features, in one case several unrelated rule features, the same effect can be gained by a simple rule of
allomorphy, which serves in addition to mark the root in question.

4.4. Martin's observations

Before delving further into coronals, we must make a short side-trip, and look into the conclusions of some work done by Susan Martin (1972), which will be of great help in the analysis of the data. Martin observes that derived words in the suffixes -ION, -ive, -ory, -or, are built on what seems to be the same form of a given root, a form which, as we have seen in the case of lON, often differs from that of the stem verb. The following alternations demonstrate this point:

| divide    | division | divisive | divisor |
| compel    | compulsion | compulsive | compulsory |
| subvert   | subversion | subversive |
| assert    | assertion | assertive |
| retain    | retention | retentive |
| accuse    | accusation | (accusative) | accusatory |
| excrete   | excretion | excretory |
| apprehend | apprehension | apprehensive |
| percuss   | percussion | percussive |

Let us accept, then, in the light of the above alternations, that the various suffixes are attached to the same allomorphic of a given stem, i.e. to the same underlying phonological form. Since there is so much neutralization of
contrast in the ION forms, we may now discover the underlying final consonant(s) of a root \_ION by inspection of the corresponding +ive or +ory form.

Martin also makes the further point that in general the ION suffixed word is primary. One very seldom finds a +ive or +ory word which does not have a corresponding +ION form, and, even historically, of the ION +ive pairs, the +ION form can generally be shown to have entered the language before the +ive form. This second point of Martin's proves to be crucial when we try to formalize the first one, i.e. at what stage in a derivation do the ION and +ive forms have the same final consonant(s)?

4.5. There is a great deal of allomorphy exhibited by coronal final stems. I will discuss as best I can all the alternations, and have, as a prelude to this, listed them in the table below. The table may be used as a reference in the discussion that follows.
| Sample verbs                  | verb-final-
|------------------------------|---
| &Xcrete,X+sert               | t
| X+mit (permit)              | t
| X+vert (convert)            | t
| digest                      | st
| connect                     | kt
| decide, explode             | d
| X+cede (concede)            | d
| apprehend                   | nd
| commune                     | n
| scan                        | n
| convene, retain             | n
| prevent                     | nt
| recense                     | ns
| coerce                      | rs
| disperse                    | rs
| submerge, asperge           | rdʒ
| adhere                      | r
| recur                       | r
| rebel                       | l
| X+pel (expel)               | l
| convulse                    | ls
| revise                      | z
| percuss                     | s
| admonition                  | ʃ

<table>
<thead>
<tr>
<th>/ +iVn</th>
<th>/ +ive</th>
</tr>
</thead>
<tbody>
<tr>
<td>ʃ</td>
<td>t</td>
</tr>
<tr>
<td>ʃ</td>
<td>s</td>
</tr>
<tr>
<td>ʒ</td>
<td>s</td>
</tr>
<tr>
<td>ʃ</td>
<td>st</td>
</tr>
<tr>
<td>ʃ</td>
<td>kt</td>
</tr>
<tr>
<td>ʒ</td>
<td>s</td>
</tr>
<tr>
<td>s</td>
<td>s</td>
</tr>
<tr>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td>n</td>
<td>n</td>
</tr>
<tr>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td>nt</td>
<td>nt</td>
</tr>
<tr>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td>rs</td>
<td>rs</td>
</tr>
<tr>
<td>rs</td>
<td>rs</td>
</tr>
<tr>
<td>rdʒ</td>
<td>rdʒ</td>
</tr>
<tr>
<td>r</td>
<td>ʒ</td>
</tr>
<tr>
<td>r</td>
<td>rdʒ</td>
</tr>
<tr>
<td>l</td>
<td>l</td>
</tr>
<tr>
<td>l</td>
<td>ls</td>
</tr>
<tr>
<td>ls</td>
<td>ls</td>
</tr>
<tr>
<td>z</td>
<td>z</td>
</tr>
<tr>
<td>s</td>
<td>ʃ</td>
</tr>
<tr>
<td>ʃ</td>
<td>t</td>
</tr>
</tbody>
</table>
We can extract from this list some very general properties of the /_ION and /_ive forms. Firstly, of the full consonants, only s and t occur before +ive. The absence of any voiced full consonants before this suffix can be easily captured by the following ad-hoc rule:

\[ C = \text{voice/} \_ +\text{ive} \]

The fact that there are no voiceless counterparts to l and n might account for two interesting gaps in our paradigm. There are no cases of *Xlive or *Xnive. communion has no corresponding adjective, and rebellion has rebellious. Just as with abatement and statement, the morphology avoids a phonological dilemma.

The second general fact to be noted is that except after l and n, +IVn is preceded only by the palatals ʃ, ʒ, ʒ. This is the result of palatalization, an apparently simple process (but see below, and SPE 229-231).

Looking at the alternations, we note only eight cases where the final consonant (cluster) of the verbal stem is in a one-to-one correspondence (one way) with the consonant(s) preceding ION and +ive. These are vʃ, vʒ, st, kt, nt, nd, ns, ls. Except for nd, all these have exactly the same consonant before +ive as they do word-finally. This suggests that whatever alternation is manifested /_IVn, can be accounted for phonologically. The general correspondence is

\[ z/ʒ \\
\[ t/ʃ \\
\[ s/ʃ \]
After s however, we have t/t (question). these facts can be handled by the following simple rules:

\[
\begin{align*}
\text{palatalization 1} & \quad t = \mathbf{c}/s\_y\_V \\
\text{palatalization 2} & \quad +\mathbf{c}m\_s = \mathbf{\_ant} \\
& \quad -\mathbf{voc} = \mathbf{\_strid}/\_y\_V
\end{align*}
\]

Palatalization before \(y\_V\) seems to be a very general phenomenon; however, the attempt to state it as one rule runs into many phonological problems, which I will not discuss here. Most fo the relevant facts can be found in SPE (229-235).

Turning now to nd, we find the following:

\[
\begin{align*}
\text{nd} & \quad -n\_s\_n\# & -n_s\_i_v\# \\
\end{align*}
\]

There are several roots in -nd

+hend apprehend, comprehend
+tend pretend, contend, extend
+pand expand
+cend ascend

\(n_s\_i_n\#\) tells us that the nominal/adjec-tival stem must be either Xnt or Xns. \(n_s\_i_v\#\) tells us that it must be Xns.

We may therefore posit the following rule:

\[
\text{d} = s/n \quad \text{ion}
\]

This may not be the proper way to state the rule, and I will return to it later.

\(d\)-final stems are curious:

<table>
<thead>
<tr>
<th>abolish</th>
<th>abolition</th>
<th>admonish</th>
<th>admonition</th>
<th>admonitive</th>
</tr>
</thead>
<tbody>
<tr>
<td>punish</td>
<td></td>
<td></td>
<td></td>
<td>punitive</td>
</tr>
</tbody>
</table>
The fact that we have t/+/ive shows that these stems have a combinatorial variant Xt. Here is a case where roots show the same surface segment + in two environments, but where there is good evidence that these two segments must be derived from two distinct underlying segments, in distinct allomorphs. One might try to state the + to t rule phonologically. Note however that the change only takes place before iVn and ive, i.e. in a morphological environment. This is important.

The final stems show interesting alternations. The most common one is t/+/t (excrete, assert, transit). This involves no morphological change of any sort. With the root +mit, however, we find t/+/s (permit, permissive, permission). There are no cases of *mitive or mitative, facts which, we recall, are predicted by ben-Moshe's laws. This can be accounted for by positing for +mit the allomorph +miss /\IOn.

Vert is another root which exhibits allomorphy. Instead of the expected subversin, subvertiv, we get subvertzin, subversiv. The occurrence of tells us that the relevant allomorph must be verz.
From *vert* we may turn to other cases of *r̥̄*:

<table>
<thead>
<tr>
<th>Stem</th>
<th>Stemmed Form</th>
<th>Suffix</th>
</tr>
</thead>
<tbody>
<tr>
<td>coerce</td>
<td>coersán</td>
<td>coersiv</td>
</tr>
<tr>
<td>disperse</td>
<td>dispersán(?̄̄̄n)</td>
<td></td>
</tr>
<tr>
<td>immerse</td>
<td>immerían(?̄̄̄n)</td>
<td></td>
</tr>
<tr>
<td>emerge</td>
<td>emergán(*̄̄̄n)</td>
<td></td>
</tr>
<tr>
<td>asperse/se</td>
<td>aspereán(*̄̄̄n)</td>
<td></td>
</tr>
<tr>
<td>submerge/se</td>
<td>submerían(*̄̄̄n)</td>
<td></td>
</tr>
<tr>
<td>deterge</td>
<td>deterzán(*̄̄̄n)</td>
<td>detersv</td>
</tr>
</tbody>
</table>

With stems in *xrg* we always have *r̥̄*. The *s* in *detersive* suggests a rule similar to that involving *xnd*:

\[ g = z/_{-ION} \]

Note that this orthographic *g* is most likely velar underlyingly (*purge/purgaion*). If we wish to preserve the uniformity of the statement that *+ivn* attaches to coronals and *+t+ivn* to non-coronals, in marked stems, then the *g* to *z* rule must apply before this statement can be made. However, the *g* to *z* rule seems to be phonologically motivated by the glide of *+ivn*, just as with the *nd to ns* rule, and thus to follow the suffix allomorphy rule of *ION* to *+ivn*. Choosing this latter order would force us to state the distribution rule as

\[ ION = ivn */after marked coronals, and marked* \]

(not *k*)

The distribution rule cannot be stated after *g* to *z*, since it feeds it, if the *v* is indeed the phonological trigger. We thus have the following alternative solutions:
1. g=z (allomorphy)  
2. IOw =ivn/coronals (phonological)

The existence of back forms asperse, submerge, is relevant here, for it shows that the g to z rule is opaque. disperse, immerse are also back-formations. dispersion is ME, disperse 1450, immersion is 1450, immerse 1650. This is added evidence for the opacity of g to z, which leads me to support the hypothesis expressed by the ordering in (1)\textsuperscript{7}.

The two roots in r are good examples of roots marked by allomorphy. They are the only r-final roots that take IO\textsubscript{w}, and are both marked by unpredictable allomorphy (kur/kurz, hör/hez). merge is also a good example of the extension of a suffix to all verbs in a given root:

- inhere inhesion innesive
- adhere adhesion adhesive
- cohere conesion conesive

+tain/+tent (retain/retention) is curious. It shows a vowel change; we would expect retention. P\textsubscript{202} accounts for this change by making +tain undergo the short vowel shift rule, as was done with r\textsubscript{ak}. This seems
to be another unwarranted use of a rule feature minor rule pair. An inspection of all the items that undergo \textit{sys} shows that this putatively general process applies only to items which are marked by a non-abstract rule feature to undergo it.

4.6. I have left for last the most regular and puzzling case, the \textit{d}-final roots. At first glance, they appear to be no puzzle at all. Except for the root \textit{cede}, which was discussed above, we always have the same alternation. \textit{d}/\textit{z}/s (\textit{decide/decision/decisive}). There is a rule taking \textit{d} to \textit{z} in some environment. The question is, as in many cases above, how to state the environment, and what sort of rule we are dealing with, phonological or morphological.

Keeping in mind Martin's observation that \textit{+ive} and \textit{+ory}, are secondary, and \textit{ION} is primary, we may disregard \textit{+ive} and \textit{+ory} as environments for the rule's application. The rule applies before \textit{ION orivn}, and the secondary suffixes take their stems from the output of that rule. This way of dealing with the change allows us both to restrict its environment, and formalize the notion of secondary suffix.

So \textit{d=z/\_ION orivn}. Is it the suffix or the \textit{i} that conditions this change, i.e. is the rule morphologically or phonologically conditioned? Generally, \textit{d} does not appear before \textit{y}- (\textit{i=y} in \textit{IWN}, as noted above).
in fact, the rule that takes \( i \) to \( y \) after coronals (Spencer p. 225) is idiosyncratically blocked by \( a \) (pavilion/enchiridion). In the only case where \( d+y \) does arise, other than before IOV, we get \( d+e \) (cordial). Thus the rule that takes \( d \) to \( z \) applies only before IOV/ivn, and its derivatives. Note in addition, that \( t \) does not spirantize before IOV. There is no rule taking \( t \) to \( s \), for the \( t \) appears before +ive (secretive/decisive).

Thus, the change, if phonological, is highly marked. It can just as easily be stated with a morphological environment, and, since it follows no \( f \)-rule, as a rule of allomorphy. This rule can also, incidentally, be applied to the instances of \( nd \) discussed earlier. Such an extension would necessitate a rule devoicing \( z/n \). This latter rule does seem to be well motivated. There is only one case of word final \( nz \), bronze, and no cases of \( lz \). X+ulsion (propulsion) and \( z+vulsion \) (revulsion).

The critical hand is rising again. I have argued now, in several distinct instances, against a phonological rule, and have posited instead a rule of allomorphy, which applies to more than one root, \( nd \) to \( nz \), \( d \) to \( t \), \( g \) to \( z \), \( d \) to \( z \). But these cases are really the core of the paper. It appears, from Martin's remarks, that a speaker, when coining a word in +ive
or +ory, takes the requisite word in ION, and performs a kind of unravelling of phonological rules, until they can go no further. It is to this last form, the product of the last unravelling, that they add the suffix +ive, or +ory. Everything beyond is opaque, unavailable. By positing the above rules as morphological rather than phonological rules, I am claiming that this last form is significant, it is the ultimate and first form, the basic phonological form. The rules that produce this form, are, I claim, in every case of an entirely different sort from the P-rules. They are morphological, and their environments are stated morphologically. I have also shown that if we always state these rules as rules of allomorphy, we gain something. We can preserve the generality and position of the statement of suffix alternation. Now any one of these points may be challenged, particularly these last rules of allomorphy; but they cohere.

Take just one away, and the others fall.

5.1. There remains only a little mopping up to be done. Two more possible variants of ION are in need of comment. They are +it+iVN and +it+iVN. Evidence for the first is the following set of alternations:
add  addition  additive
?rend  rendition
vend  vendition
define  definition  definitive
x+pose  x+position  x+positive/ory
compete  competition  competitive
repeat  repetition  repetitive
imbibe  imbibition

These can be handled in one of two ways. Either we mark these rules for a special suffix

ION = it+IVn / root+M

or we change the root by adding it. So, for example

add = addit/ __ ION

The first solution entails having more than one marked suffix. A given marked root will either take (t)+IVn or it+IVn, and will have to be marked for the given variant. This is more complicated than the second. Other than that I can see no factor that determines a choice here.

5.2. The possibility of there being a suffix +t+IVn is provided by the following:

revolve  revolution
resolve  resolution
dissolve  dissolution
solve  solution

The two roots are odd, both ending in Iv. One could simply mark them. The suffix would then be t+IVn, (after a non-cornal), and we would have, for example, revolution. The y could then go to u / _t.
Alternatively, we could have a suffix \( \pm t+iVn \), and drop the \( y \). The first solution seems slightly better. We can use a suffix we have already. Both require an ad-hoc rule.

\[
A^t \rightarrow \left\{ \frac{0}{\pm t+iV_{\pm n}} \right\} / X\{ \pm t+iV_{\pm n} \}
\]
FOOTNOTES

1. The sole exception to the stress condition is burial. Exceptions to the second are trial, rental, cital, quittal, with mono-syllabic stems, and presupposal, disavowal, disapproval with tri-syllabic stems. Note that in the latter cases all are prefixed, and there exist supposal, avowal, approval.

2. The indirect object case is no longer productive, and words formed in it are felt to be somewhat obsolete.

3. The reader should note that such a morphological property as +Latinate is the property not of a phonological form, but of a morpheme. For example there are in English two homophomous morphemes ride. The one is -Latinate, and appears in the verbs ride, override. The other is +Latinate, and appears in the verb deride. The suffix ION attaches to +Latinate roots, and therefore may attach to the latter to form derision, but not to the former, *overrision. I owe this point to Marchand (1960).

4. See Shelvador (forthcoming)

5. The teleological nature of this phenomenon has been taken by E.S. Williams as a sign of the hand of God at work. The gap can be explained, he notes, only as the result of an active intelligence's wish to confuse the investigator.
6. The comparison of digest/digestion with fact/factual will reveal another such rule (cf. SPE 230-233).

7. Some readers may scorn the use of philology, and historical information about the chicken and the egg in arguments about synchronic description. However, we are dealing here with frozen, learned, Latinate vocabulary, not with any general or productive phenomenon, and in such cases, what the linguist often sees as a generalization, may in fact be a mere artifact.
BIBLIOGRAPHY

2. Hale, Kenneth (196?) *Paper on the Maori passive*
6. Martin, Susan *-ive ad other -ion based suffixes* (Ms)
7. Prince, Alan S. *IC* (Ms)
8. Schnitzer, Marc L. *A problem in rule ordering* in *Linguistic Inquiry* (II, 3)
9. Shelvador, Crosley (forthcoming) *The phonetics of = and+
10. Siegel, Dorothy *Some Lexical Transderivational Constraints in English* (ms)