

2.2. TREATMENT OF EXCEPTIONS

As mentioned directly above, vowels in English are generally laxed before consonant clusters. Excluded from the domain of this laxing rule, however, are vowels preceding certain clusters within a single lexical item, in particular, vowels preceding dental clusters. For example, we have words such as *pint*, *count*, *plaint*, in which a diphthong precedes the cluster [nt], and words such as *hoist*, *toast*, *wild*, *field*, with diphthongs before other dental clusters. But a dental cluster with an intervening formative boundary has no special status, and we do have laxing in the boldface position in words such as *conven+tion*, *interven+tion*, *deten+tion*, *absten+tion*, *reten+tive*, *conten+t*, *wid+th*, *los+t*. (Note that laxing does not occur in *plaint+ive*, from the lexical entry *plaint*, or in *restrain#t*, *complain#t*—contrasting with *còntènt* from *contain+t*—which have word boundary rather than formative boundary in the dental cluster, as seen from the fact that stress is not shifted to the left in the noun cycle.) Thus the laxing rule (see rule (20III) and note 2 in Chapter Five for a refined version of this rule) states that, with the exception of vowels occurring before dental clusters within formatives:

$$(8) \quad V \rightarrow [-\text{tense}] / \text{---}C_2$$

Exceptions of the type just noted cannot be easily incorporated into the grammar as developed up to this point. We therefore consider next an extension of the available descriptive devices which would enable us to treat such exceptions in a straightforward manner.

Each phonological rule of the language applies to certain formatives and, in general, not to others, the domain of its application being determined by the feature composition of the phonological matrices. If a certain rule does not apply to a certain formative, this fact must somehow be indicated in the feature composition of the formative at the stage of derivation at which the rule is applicable. It is quite obvious that many of the phonological rules of the language will have certain exceptions which, from the point of view of the synchronic description, will be quite arbitrary. This is no more surprising than the fact that there exist strong verbs or irregular plurals. Phonology, being essentially a finite system, can tolerate some lack of regularity (exceptions can be memorized); being a highly intricate system, resulting (very strikingly, in a language like English) from diverse and interwoven historical processes, it is to be expected that a margin of irregularity will persist in almost every aspect of the phonological description. Clearly, we must design our linguistic theory in such a way that the existence of exceptions does not prevent the systematic formulation of those regularities that remain.¹¹ Furthermore, we must provide means for expressing those regularities that hold within the class of exceptions, however limited they may be. Finally, an overriding consideration is that the evaluation measure must be designed in such a way that the wider and more varied the class of exceptions to a rule, the less highly valued is the grammar.

In short, the most highly valued (simplest) grammar will be that in which the phonological rule $X \rightarrow Y$ (where X and Y are matrices) applies to any string containing X as a submatrix. We are certain to find, however, that in many cases formatives will have to be differentiated with respect to the applicability of the rule in question. Some formatives containing the submatrix X will undergo the rule, and others will not. The wider and more

¹¹ This obvious point is always taken for granted in morphological studies—e.g., no one would think of refusing to incorporate the rule for regular plurals in an English grammar because of *children*, *oxen*, *fish*, etc.

varied the class of cases that do not undergo the rule, the more complex must be the grammar in terms of the evaluation procedure that must constitute part of a significant linguistic theory.

We will deal with this problem in the following way. Each rule of the phonology has a certain identifying number. We associate with each number n a new "distinctive feature" $[\pm n]$. Suppose that the rule numbered n is $A \rightarrow B / C \text{ --- } D$. Then we stipulate that A must be marked $[\pm n]$ if the rule numbered n is to apply to it. Furthermore, we establish the following general convention:

Convention 1: Every segment of a lexical matrix is automatically marked $[\pm n]$ for every rule n .

Since the various decisions just formulated contribute equally to the complexity of all grammars, we may regard their total contribution to the evaluation of a grammar as nil. This is to say that we need not even present these conditions explicitly in a grammar but may regard them merely as conventions for interpreting a grammar. They do, however, play a role in determining whether or not two matrices are distinct.

If a certain formative is not subject to rule n , its segments must be marked $[-n]$. In the light of the decisions on the form of grammars that we have so far adopted, we must conclude that this fact is not a feature of any segment of the formative but of the formative as a whole. That is, the formative as such must be marked in the lexicon as belonging to the category of exceptions to rule n , and, consequently, the feature $[-n]$ must be marked in each of its segments. But in accordance with Convention 1, each of its segments is marked $[\pm n]$. Thus we must add a new convention, to be applied after Convention 1 and having the following effect:

Convention 2: Every segment of a lexical matrix μ is marked $[\alpha K]$ for each category $[\alpha K]$ to which μ belongs.

Thus, in particular, if a formative belongs to the lexical category $[-n]$, each of its segments will be marked $[-n]$ by Convention 2, after automatically having been marked $[\pm n]$ by Convention 1. Thus every time a certain formative is an exception to a rule, there is a certain "cost" associated with this fact, namely, a certain category assignment must be given the lexical entry. But an item that does undergo a rule need not be specially marked. Thus only exceptions to a rule contribute to the complexity of the grammar in this connection.

Furthermore, notice that the less "predictable" the class of exceptions, the greater the contribution to complexity. For example, if the class of formatives belonging to the category $[-n]$ is totally idiosyncratic, then each such category assignment must be given in the lexicon. But if this class plays some other role in the grammar, in whole or in part, then the category assignment need not be given as an independent lexical property. Thus in English, for example, there are many items that must be marked in the lexicon for the fact that they do not enter into the Romance derivational system. We shall designate such formatives as belonging to the category $[-\text{deriv}]$. A phonological property connected with the independently motivated category "subject to derivational processes" will contribute less to the complexity of the grammar than one that is entirely idiosyncratic, since its occurrence in lexical entries can in part be stated by redundancy rules. Consider rule (6), for example, which, when appropriately generalized, will have the effect of changing $[k]$ to $[s]$ and $[g]$ to $[j]$ (in a series of steps) when these segments appear before a high or mid front vowel ($[i]$, $[e]$, $[\bar{i}]$, $[\bar{e}]$). This rule applies to the boldface segments of *reciprocal*, *receive*, *general*, etc., but not to the boldface positions of *kill*, *kennel*, *lackey*, *gill*, and so on. Yet there is good

reason to mark all these items as velar stops in the lexicon. Thus the items *kill*, *kennel*, *gill* (but not *reciproc-*, *-ceive*, *general*) will be marked in the lexicon as belonging to the category [–rule (6)].¹² However, this is not an entirely idiosyncratic classification since it is, in part, an automatic consequence (therefore statable by a redundancy rule instead of having to be independently marked in each case) of membership in the category [–deriv], characteristic of a formative which must anyway be specially marked in its lexical entry.¹³ The lexical category [–rule (6)] will, by Convention 2, be marked as a segmental feature of each segment of the items belonging to this category, and these items will thereby be automatically excluded from the application of rule (6). This is a rather typical example of a characteristic aspect of English grammar to which we shall make reference again below.

Alongside of the partially systematic class of exceptions to rule (6), we also find purely idiosyncratic exceptions. For example, consider the rule that makes vowels nontense before certain affixes (e.g., compare *serene* and *serenity*, *obscene* and *obscenity*). There are exceptions to this rule (e.g., *obese*–*obesity*, in most dialects) which must simply be categorized as such in the lexicon, these lexical features becoming segmental features by Convention 2. Each such example contributes to the complexity of the grammar, but there is obviously no question of rejecting the rule. Doing so would amount to treating *each* item as an exception, in the manner of item-and-arrangement grammars (see Chapter Three, Section 16), and there is surely no point to such a decision.

Convention 2 asserts that each lexical category of a formative automatically becomes a distinctive feature of each of its segments. This will be true, then, even of the syntactic and semantic features (“animate,” “proper,” particular semantic properties, etc.) which ordinarily have no phonetic effects. No harm is done, however, by allowing Convention 2 to apply quite generally. In fact these lexical categorizations may indeed have phonetic effects occasionally. (See Chapter Eight, Section 7, for some examples.)

Let us be somewhat more precise about Convention 2. Suppose that a formative belongs to the syntactic categories [animate], [nonhuman], [exception to rule *n*]. Alternatively, we might represent these categories as [+animate], [–human], [–rule *n*] within the syntactic component of the grammar. From the point of view of the phonology, each of the categories [animate] (= [+animate]), [nonhuman] (= [–human]), [exception to rule *n*] (= [–rule *n*]) is simply a feature, which may be positively or negatively specified. Convention 2 asserts that each segment of the formative in question receives the specifications [+animate], [+nonhuman], [+exception to rule *n*], that is, the specifications [+animate], [+nonhuman], [+exception to rule *n*]. To simplify the theory of rule application, we may assume that each segment of any formative is, by convention, specified as [–*X*] for any syntactic category *X* that appears anywhere in the lexicon for which it is not specified

¹² Notice that in the case of the unvoiced velar stop [k], the orthographic distinction of *k*–*c* comes close to marking the distinction [–rule (6)] vs. [+rule (6)], for obvious historical reasons.

¹³ Notice that the items subject to derivational processes are further subdivided (ultimately, with respect to Greek or Latin origin) in terms of the categorization provided by rule (6). Thus we have *hierarch* (–*ic*, –*y*), *psych* (–*ic*, –*o*–), and a small number of other formatives which do not undergo softening of velars before –*ic*, etc., in contrast to the large class of regular cases which do. In short, we would certainly expect to find, in a complete grammar of English, that categories corresponding rather closely to Greek, Latin, and Germanic origin appear in lexical entries and that membership in these categories has phonetic effects. English is perhaps unusual in the intricate and complex way in which these categories and their effects have been worked into the grammar, but it is quite generally the case that the lexicon of a language is subdivided, in terms of phonological and morphological processes, into “native” and “foreign,” or something of this sort. See, for example, Lees (1961) and the interesting discussion in Postal (1968).

[+X]. Thus the segments of the formative being considered in our example are specified [-[-animate]], [-[+human]]. We now specify, again by a general interpretive convention, that [+[-rule *n*]] = [-rule *n*]. Thus the feature [exception to rule *n*] as introduced by a lexical feature and as introduced by a rule are indistinguishable from the point of view of the rules of the phonological component. With these interpretive conventions, exceptions are handled in the intended way.

The formal devices just developed seem to be appropriate for dealing with exceptions to phonological rules. As we have noted, the grammar becomes more complex as exceptions increase in number, variety, and unpredictability. The complication is less severe if a class of exceptions can be characterized by a redundancy rule rather than by listing each example, that is, rather than by idiosyncratic lexical marking.

We are now in a position to return to the problem of the laxing rule (8). As noted, this applies to vowels that appear in the context —C₂ unless, among other exceptional cases, the consonant cluster in question is a dental cluster and is internal to a formative. In our framework dentals are marked [+anterior, +coronal]. We must therefore incorporate into the grammar the lexical redundancy rule (9):

$$(9) \quad V \rightarrow [-\text{rule } (8)] \quad / \quad \text{---} \begin{bmatrix} +\text{consonantal} \\ +\text{anterior} \\ +\text{coronal} \end{bmatrix} \begin{bmatrix} +\text{consonantal} \\ +\text{coronal} \end{bmatrix}$$

Being a lexical redundancy rule, rule (9) applies only within a single lexical entry. It specifies that a vowel in the context —C₂ will not undergo the laxing rule (8) if the following cluster is dental. Thus, the effect of the combination of the lexical redundancy rule (9) and the phonological rule (8) is precisely as indicated in the informal description of page 172.

Another possible sort of exception involves “negative contexts.” Thus, when the rule *n*, *X* → *Y*, applies everywhere except in the context *Z* — *W*, we might state this fact in the following form:

$$(10) \quad \begin{array}{ll} (n-1) & X \rightarrow [-\text{rule } n] \quad / \quad Z \text{---} W \\ (n) & X \rightarrow Y \end{array}$$

We have so far mentioned three kinds of exceptions: those indicated by lexical categorization, those given by lexical redundancy rules such as (9), and those that involve negative contexts for rules, as in (10). If we were to use the device of (10) more generally— if, in other words, we were to allow reference in a rule not only to the next rule, as in (10*n* - 1), but to any rule—then we would increase the power and flexibility of the system greatly.

We have no examples that suggest the necessity for negative contexts or for any extension of the device of (10). Therefore, we will make the tentative assumption that the only kinds of exceptions to rules are those given by lexical categorization or by lexical redundancy rules such as (9), and we will restrict the formalism of the theory accordingly.

Although this approach to the problem of exceptions seems to us correct as far as it goes, it is far from definitive. There is, first of all, a certain ambiguity of reference when we specify an item as [-rule *n*]. Consider, once again, the laxing of vowels in English. Rule (8) is really an abbreviation for several rules, one of which applies to a vowel in the context —C^{*m*} (where *m* is the maximum length of a consonant cluster in English), another in the context —C^{*m*-1}, etc., and the last of which applies in the context C². We must decide, then, upon general conventions that determine whether an item marked as an

TABLE 1. *Distinctive feature composition of English segments*

	ɪ	ī	ū	ē	ō	æ	ā	æ̃	ō̃	i	u	e	ʌ	o	æ	ɔ	y	w	ɛ
vocalic	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	-	-
consonantal	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
high	+	+	+	-	-	-	-	-	-	+	+	-	-	-	-	-	+	+	-
back	+	-	+	-	+	-	+	-	+	-	+	-	+	+	-	+	-	+	-
low	-	-	-	-	-	+	+	+	+	-	-	-	-	-	+	+	-	-	-
anterior	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
coronal	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
round	-	-	+	-	+	-	-	+	+	-	+	-	-	+	-	+	-	+	-
tense	+	+	+	+	+	+	+	+	+	-	-	-	-	-	-	-	-	-	-
voice																			
continuant																			
nasal																			
strident																			

exception to rule (8) is an exception to all of the rules abbreviated by (8) or only to a specific one. From some points of view it seems natural to adopt the convention that a specification of [-rule *n*] refers to the rule numbered *n* in the completely expanded system of rules which involves no abbreviatory notations. Items will then have to be categorized as exceptions to one or another rule abbreviated by (8). An item which is an exception to rule (8) applying in the context — CC will not necessarily be an exception to the rule applying in the context — CCC (the consonant cluster being followed by a vowel or a nonsegment in both cases). In the case in question, this seems the correct interpretation. The vowels that are marked as exceptions to the rule laxing vowels in the context — CC are not, apparently, excluded from laxing in the context — CCC (cf. *children, Christmas*, in which the tense vowel becomes lax even before a dental cluster—in the word *Christmas*, the [t] later drops). Examples are so sparse, however, that this observation cannot be taken very seriously. And there is very little doubt that items which are exceptions to certain subcases of a rule will also, under some circumstances, be exceptions to other subcases. What these circumstances may be, however, we do not know, and we therefore leave the problem in this unsatisfactory state.

There are other aspects of the problem of exceptions not taken care of in the system presented above. Occasionally items must be specified not as exceptions to some specific rule but as exceptions to all rules of some general sort. For example, in Hebrew there are several rules deleting vowels, but none of them apply to the high vowels [i] and [u]; and there are several rules modifying vowel quality, but none of them apply to [u]. Thus we want to mark underlying /u/ as immune to all rules affecting quality, and to mark underlying high vowels as immune to all deletion rules. We came across a similar but more marginal problem in English in studying Auxiliary Reduction Rules in Section 14 of Chapter Three. In discussing the immunity to reduction of [əy] and such exceptional cases as the vowel of =*nOt*, we pointed out that such vocalic nuclei are also tense where they would be expected to be lax (e.g., *exploitative, denotative*), and we observed in note 74 (p. 122) that they might be lexically marked as exempt from laxing—that is, exempt from several separate but related rules that make vowels nontense under various circumstances. Here, once again, a principled solution to the problem requires insights into rule classification that go beyond our present understanding.