CHAPTER 3: THE EXCEPTION THEORY OF GENERATIVE PHONOLOGY.

3.1. INTRODUCTION

The second main chapter of this thesis will be concerned with those subparts of the theory of generative phonology available for handling cases of exceptional behaviour. More specifically, I will have the following three aims. Firstly, I will provide an extensive survey of the proposals advanced, within the theory of generative phonology, towards a theory of exceptionality, using the proposals by Chomsky and Halle in SPE as a starting point, to procede from there to later modifications and additions. In view of the implicit nature of both the SPE-theory and the later proposals, this survey in itself seems a useful endeavour. Secondly, I will argue that at least some of the modifications and additions are incorrect for very simple reasons: they are either unnecessary, or they do not work. As a result of this argument, it will turn out that the original set of proposals in SPE, or a close approximation, constitutes the most likely theory of exceptionality in generative phonology presently available. Finally, I will show how from this theory follows a description of the exceptional Dutch alternations of the types bodem/booiem/boom 'bottom', and kade/kaai/ka 'quay' discussed in the last subsection of the previous chapter.

However, before I embark upon the exposition towards these aims, let me make some observations of an introductory nature. Firstly, as I pointed out already briefly in Chapter 1, if it is useful to make a distinction between 'true' exception devices and, say, 'pseudo' exception devices (where the latter include, for instance, rule ordering constraints, either

language specific or universal, and abstract analyses in the sense of Kiparsky (1973a)), I will be concerned here only with the former.[1] In other words, I will deal in particular with those mechanisms provided by the theory of generative phonology whose sole function is to account for those cases in grammatical analysis where all explanation fails and mere description remains, such as, typically, the situation where one particular rule in one particular grammar must be blocked for one (or only very few) particular input string(s).

Secondly, although the point is certainly worth making (Dougherty, 1973: 443) that (1) formulates an important linguistic (scientific) heuristic principle:

(1) It is essential that we do not mistake a property of our model (i.e., a natural class, an exception, assumptions, etc.) for a property of the data under consideration...

and that (op.cit.: 476):

(2) If a grammar accounts for a certain distribution of data by ad hoc description mechanisms, we must realize that this indicates a misalignment between the data (a speaker-listener's knowledge of his language) and the model (the linguist's assumptions about universal grammar and about the structure of the language being described). We must not mistakenly consider a property of our particular formulation to be an inherent property of the data we are considering and therefore be misled into thinking that we are contemplating a quality of the data that is inherently mysterious.

practice in generative phonology is reflected rather by a statement from SPE (172) to the effect that

(3) 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.

Even more so, concern with the psychological reality of phonological hypotheses has led to an important proposal whose effect is in many cases to increase considerably the number of exceptions in the grammar. I refer, of course, to Kiparsky's (1973a) Alternation Condition against abstract analyses involving so-called 'absolute neutralization'. Schematically one has a case of absolute neutralization if a phonological analysis takes the form of (4),

(4) rule (i) A => B / C__D
rule (ii) A'=> A (absolute neutralization)

where the more abstract representation A' for some A's is motivated solely by the fact that these A's do not undergo the change to B in the context C__D. Having discussed several of these cases "where superficially identical phonological segments fell into two classes depending on their morphophonemic behavior" (30), Kiparsky states that

(5) The two classes could in these situations be distinguished either by means of phonological features (entailing absolute neutralization) or by means of rule features [i.e., exception features; see below - WZ]. Whereas the theory of generative phonology at present allows an arbitrary choice between these two alternatives, it will, when amended by adding the alternation condition, enforce the use of rule features in every such case. I presented evidence, mainly consisting of facts about linguistic change, that the rule feature analyses enforced by the alternation condition are the correct analyses. (30)

Precisely in the vein of (5), in some cases attacks on Kiparsky's Alternation Condition have been repelled with the claim that they lack 'external' evidence of the kind adduced by Kiparsky, and therefore merely avoid (or decrease the number of) exceptions in the grammar (on this point, see for instance Crothers, 1973, esp. p.5).

In for present purposes exactly the same spirit, Wang in his 1969 paper on competing changes and lexical diffusion to be discussed at length in the following chapter, also observes as an important consequence of his proposals that

(6) there may be a considerable amount of cross-classification as to which rules are applicable to which morphemes, so that the neat picture of all-rules-apply-to-all-morphemes becomes highly suspect. We need to make much more use of rule features in synchronic phonology in order to capture the diversity in the lexicon that is due to the various cross-currents of sound change. (21) [emphasis WZ]

One important moral of such remarks should be, therefore, the paradoxical statement that exceptions are looked upon as quite normal in generative phonology.

Thirdly, let me make some preliminary terminological remarks. Thus, we will have to draw a distinction between the notions exception and counterexample. If my understanding of Dougherty (1973) is correct on this point, a counterexample to a particular hypothesis, or set of hypotheses (a grammar, or partial grammar) is a piece of fact that cannot be handled (generated) by that hypothesis or set of hypotheses, although it should (and vice versa: a piece of fact is generated but should not be so). An exception to a hypothesis, on the other hand, is in a sense just that: the piece of fact should be generated, and it is, but it requires a special mark so as to indicate that the particular hypothesis is not valid for this particular piece of fact. It will be clear that once we allow for the notion 'exception' to be part of grammatical description, the class of potential counterexamples to the grammar and its individual rules is considerably decreased, and hence the strength and concomitant interest of the grammar considerably weakened. Given the necessity of having to make this allowance indeed (as shown for instance by the work of Kiparsky and Wang), we can save our grammars from the ill fate of vacuity only by severely constraining the notion 'possible exception' as such. In fact, we will encounter examples of such constraints as the exposition below develops.

Furthermore, it may be useful to make a distinction between exceptional properties of morphemes on the one hand, and idiosyncratic properties on the other. In the words of Dougherty (1973: 474) there is a "subtle shift of perspective" involved in the difference between these two notions. The notion 'exception to a hypothesis' implies that there is something which is not an exception, that is, something 'normal' or 'regular' by the side of something 'abnormal' or 'irregular'. The notion 'idiosyncrasy' on the other hand is the denial of such a bifurcation: there is neither something normal or regular, nor something abnormal or irregular. To give an illustration of the difference:

as I argued in Chapter 2, the fact that a Dutch monosyllabic morpheme ends in a vowel is an 'exceptional' property of this morpheme, something to be held against it in evaluation. This is expressed by specifying a morpheme such as knie 'knee' as [- FINAL VOWEL CONSTRAINT]. On the other hand, the fact that an underlying Dutch morpheme begins or ends in a voiced stop, as opposed to a voiceless one is, as far as I am aware, although unpredictable, not an exceptional but rather an idiosyncratic property of that morpheme: not something to be held against it, but something to be specified in its lexical representation.[2] Of course, idiosyncratic properties may become exceptional ones by decision. In many texts the distinction drawn here between 'exception' and 'idiosyncrasy' is obliterated.

Given these preliminaries, the exposition of this chapter will run as follows. In section 3.2. I will present a survey of the exception mechanisms of the 'standard theory', i.e. the specific proposals by Chomsky and Halle in SPE. In this work, there is one type of rule dealing with phonologically exceptional behaviour, the so-called readjustment rules. Furthermore, under the general label of diacritic features are subsumed three different types of exception features not differentiated terminologically. These are the features of the type [α rule n] 'rule features' in the terminology of Lakoff (1970)); of the type [α deriv] ('morphological features' in the terminology of Postal (1968)); and of the type [α A] ('alphabet features' in the terminology of Coats (1970)), respectively. Illustrations of readjustment rules and of the use of each type of feature will be presented. In section 3.3. I will discuss several alterations of and additions to this subtheory, in particular Lakoff's distinction between major and minor rules, Harms' structural description features, and rule environment features as proposed by Coats, and by Kisseberth. As will be explained, in essence each of these amendations refers to one particular task of SPE's 'alphabet features'. This point will be taken up

in section 3.4., where it will be shown that rule environment features fail the particular task assigned to them. Since 'alphabet features' are the only currently available alternative, and since they are anyway capable of handling cases for which were introduced the distinction between major and minor rules, and 'structural description features', it will follow that the original SPE theory of exceptionality in generative phonology (or, actually, a near kin) approaches necessity and sufficiency most closely. Finally, in section 3.5. I will give a description within this theory of the irregular data from Dutch, as given in section 2.5.

3.2. THE EXCEPTION THEORY OF THE SOUND PATTERN OF ENGLISH.

Disregarding conventions pertaining to rule application in general, which are presently irrelevant (cf. SPE, 174 bottom - 175 top), the theory of exceptions in generative phonology as contained within the standard theory is essentially that described below. This survey is based principally on SPE's section 2.2.2.: "The Treatment of Exceptions" of Chapter 4 (172-6); and on section 7: "Diacritic features" of Chapter 8 (373-80).

In general terms, for the treatment of exceptional behaviour Chomsky and Halle make use of two devices: so-called "diacritic features", and so-called "readjustment rules", a set of rules which precedes the phonological rules 'proper', and with further properties to be described below. In some cases they use either, in other cases they use both. Diacritic features can be subdivided into three types, not distinguished terminologically, although convenient names have been suggested by others (see the previous section). These three types are:

(7) (i) features of the type [α rule n] ('rule features')
(ii) features of the type [α deriv] ('morphological features')
(iii) features of the type [α A] ('alphabet features')

In the following paragraphs I will give a survey of and illustrate elaborately the use of each of these types of features, the order of (7), and of the so-called readjustment rules.

3.2.1. RULE FEATURES

Chomsky and Halle are rather explicit on the class of diacritic features we will call, after Lakoff (1970), rule features. Both stretches of text referred to above contain a sizeable section on these features, with considerable overlap. Firstly, SPE proposes the following conventions to be part of phonological theory.

(8) Convention 1.

Each rule has associated with it a "rule feature" of the form [α rule n], where α is a variable ranging over the values + and −, and where n is the identifying number of the rule in question in the linear order of the complete list of rules or, expositorily more convenient, its "name".

Convention 2.

One of the features contained in the focus A of a phonological rule of the general form A => B / C___D will be [+ rule n], where n is again the name of the rule in question.

Convention 3.

For each phonological rule n the feature specification [+ rule n] is assigned automatically to each unit, viz. segment or boundary, of each lexical matrix (or: each so-called 'formative').

Convention 4.

In case a formative meets the structural description of a given rule n at the time of application of that rule, but should not undergo its structural change, this formative will be lexically marked as [- rule n].

Convention 5.

All non-phonological features, including rule features, are distributed to each unit of each lexical formative. (The assignment of [-rule n] to an exceptional formative by convention 4 will therefore via convention 5 modify the positive specification resulting from convention 3).

Convention 6.

Rule n of the general form A => B / C__D will be inapplicable to a string C'A'D' not distinct from CAD only if the formative containing A' is specified as [- rule n].

Convention 7.

The "cost" attached to marking a formative as [- rule n] (attached to invoking convention 4) will be the cost of the exceptionality of the formative, that is to say, only "exceptions" and not "regular" [+ rule n] will contribute to the complexity of the grammar. (Within the "markedness" approach to phonology as developed in SPE's Chapter 9, [+ rule n] will be the "unmarked" or "regular" value for a given feature, while [- rule n] will be "marked" or "exceptional" (SPE: 374, fn. 23). In this case only marked values contribute to the complexity of the over-all grammar).

Chomsky and Halle place some tentative, but nonetheless rigorous constraints on the way in which rule features can be employed in grammars of natural languages. Thus, convention 3 implies that the issue whether "the context in which a segment appears should be permitted to block the application of a rule to this segment" (375) is resolved in the negative. Furthermore, it is proposed that rule features must either "appear as a diacritic feature in the lexical representation of an item" (375) when "totally idiosyncratic" (173), or "be introduced by readjustment rules" (375) when "predictable" (173) to a certain extent.[3] Since all readjustment rules are prephonological, this proposal implies that exceptionality can be marked only in the underlying representation, and cannot be introduced in the course of a derivation. As illustrations of these two ways of marking exceptions by way of rule features allowed by the standard theory, consider the following almost classical examples.

SPE assumes that English has a rule of TRISYLLABIC LAXING, a slightly simplified subbranch of which reads as in (9) (SPE: 241, rule (20IV)):

$$(9) \qquad V \Rightarrow [-\text{tense}] \; / \; \_\_ \; C \begin{bmatrix} V \\ -\text{stress} \end{bmatrix} \; C_0 \; [-\text{cons}]$$

Among other things, this rule laxes vowels before the suffix -ity, as in the second members of such well-known pairs as divine/divinity, profane/profanity, serene/serenity. Given this rule, one expects on the basis of the adjective obese to find lax e in the derived noun obesity. However, e in this noun is tense. Since nothing suggests that the form underlying this last pair differs in any crucial way from that of, for instance, the pair serene/serenity vis-à-vis the rule of TRISYLLABIC LAXING, the underlying formative /obese/ will be marked lexically as [- rule TRISYLLABIC LAXING], to enforce its tense vowel in both the adjective and the noun.

As an example of a readjustment rule introducing a rule feature, consider the following. For several reasons, the lexicon of English is divided according to Chomsky and Halle (173-4) into two classes of formatives depending on whether or not they enter into the "Romance" derivational system. Those that do are specified [+deriv], that that do not are [-deriv] (on the status of this feature see below). The phonological rule of VELAR SOFTENING (SPE: 224) generally applies to forms which are [+deriv]: critic will be [+deriv] in order to derive criticism by VELAR SOFTENING, next to critical; similarly, medic will be [+deriv] in order to derive medicine next to medical, and so on. Therefore, the fact that [-deriv] forms such as gill, kennel, and kill are exceptions to VELAR SOFTENING is a direct consequence of their being [-deriv] on independent grounds (i.e., they do not, as a rule, take "Romance" suffixes). In order to capture the fact that this is not an entirely idiosyncratic sort of exceptionality, but rather a partly predictable one, Chomsky and Halle propose to add to the grammar of English a readjustment rule of the form

(10) [-deriv] => [- rule VELAR SOFTENING]

(cf. SPE: 174).

As yet another example of these same mechanisms consider the fact that vowels before clusters of dental consonants in English may be exceptions to a rule laxing vowels before consonant clusters in general (field, hoist, toast, wild, and so on, cf. SPE: 241). This systematic phenomenon need not be held against the individual lexical items ending in dental clusters, but again may be expressed in a readjustment rule as in (11) (cf. SPE: 175):

(11) $V \Rightarrow$ [- rule CLUSTER LAXING] / ___ $\begin{bmatrix} C \\ +ant \\ +cor \end{bmatrix} \begin{bmatrix} +cons \\ +cor \end{bmatrix}$

3.2.2. MORPHOLOGICAL FEATURES.

A second type of feature acknowledged by SPE is, in the terminology of Postal (1968: 129ff.), the so-called morphological feature. An example of a morphological feature is, for instance, the feature [deriv] encountered in the previous subsection, whose task in SPE is both to separate the English formatives that enter in the Romance derivational system from those that do not, and to govern the correct application or failure of application of the phonological rule of VELAR SOFTENING. This multi-purpose functioning is typical of morphological features vis-à-vis rule features, as appears also from SPE's discussion of the features [Slavic] and [Russian], introduced by Lightner (1965) in a description of the phonology of Modern Russian. Chomsky and Halle comment (373-4):

(12) In these instances the categories to which lexical items are assigned account not only for their phonological peculiarities but also for their behavior with respect to various morphological processes such as the choice of derivational affix and freedom of compounding.

Other morphological features postulated in SPE are, for instance, "native" and "foreign" (174), features for declensional classes (373), and features distinguishing "items of Germanic origin from other items" (373) in English. In Chapter 2 above I introduced a feature [± NATIVE] for Dutch phonology, and in doing so I tried to conform as closely as possible to Chomsky and Halle's multi-purpose requirement. Thus, the feature [-NATIVE] on the lexical item Zwaab (cf. subsection 2.4.1.2.) was intended to explain both the failure of WEAKENING in the plural Zwaben as the unexpected long vowel before b. Also in relation to FINAL VOWEL CONSTRAINT (111) this task of the feature [-NATIVE] is

apparent for many forms. For instance, both gnoe [xnu] 'wildebeest', and show [ʃo:] 'id.' will be non-native for two reasons: firstly because of their final vowels, and secondly because of their initial consonantism. Similarly, go [go:] 'id.', and Guy [gi] 'Guillaume' will be [-NATIVE] because of their initial non-Dutch [g] and their final vowels. In those cases where I did not provide independent evidence for the use of the feature [NATIVE], my implicit guess is that further research will surface such evidence. If not, the use of the feature is incorrect in these cases, and plain rule features should be used, as described in the previous subsection.

Chomsky and Halle do not make concrete proposals as regards the evaluation of lexical markings by means of morphological features, that is to say, they give no indication of how these markings are to contribute to the complexity of the grammar (if at all). Proposals on this point, however, have been been made by Postal (op.cit.), and in particular by Saciuk (1969). Since I will not be further concerned with morphological features in this thesis, I refer the reader to these works for further details.

3.2.3. ALPHABET FEATURES.

The third type of diacritic feature made available by the standard theory is, in the terminology of Coats (1970), the alphabet feature. The precise function of alphabet features within the framework of SPE remains rather vague, since Chomsky and Halle throughout their work merely provide illustrations as to their various tasks. Some cataloguing will have to be performed, therefore, in order to make the raison d'être of this type of feature more precise. As far as I have been able to make out, the following alphabet features actually occur in SPE:

(13) (i) [±H] in Nez Perce and West African Vowel Harmony (377-80);
(ii) [±D] in Stress Retraction in English (138-41);
(iii) [±F] in the English Vowel Shift for lax vowels (201-3);
(iv) [±ʔ] in Final Fricative Devoicing in English (232-3);
(v) [±D] in Jer Deletion in Russian (379-80).

I will refrain here from discussing the role of the alphabet feature [±H] in relation to Vowel Harmony phenomena as in Nez Perce and West African, i.e. case (13i). For an, as it appears, convincing and generally accepted rebuttal of this sort of analysis, the reader is referred to Kiparsky (1973a: 32ff.). My main concern, then, will be with the remaining four cases, where it will turn out to be useful to make a distinction between cases (ii)-(iv) on the one hand, and case (v) on the other. I will discuss these cases in the order of (13).

3.2.3.1. STRESS RETRACTION.

Leaving aside some presently irrelevant details, English has, according to SPE, a STRESS RETRACTION rule of the form of (14).

(14) $V \Rightarrow [1\text{stress}] / [X \_\_\_ C_0 (WS) [-segm] C_0 \overset{1}{V} C_0]_{NSPVA}$

where WS stands for "weak syllable" (a lax vowel followed by C_0^1), and NSPVA for Noun, Stem, Prefix, Verb, and Adjective, respectively (SPE: 138). The rule retracts stress from the suffix onto the stem in, for instance, anniv$\acute{e}$rs^1+$\acute{a}$ry^2 (< anniv-ers^1+$\acute{a}$ry^1), and ap$\acute{o}$thec^1+$\acute{a}$ry^2 (< apothec^1+$\acute{a}$ry^1), where the latter has an intervening weak syllable. On the basis of rule (14), one also expects *m$\acute{o}$ment^1+$\acute{a}$ry^2, and *l$\acute{e}$gend^1+$\acute{a}$ry^2, from intermediate m$\acute{o}$ment+$\acute{a}$ry^1 and l$\acute{e}$gend+$\acute{a}$ry^1, respectively. Likewise, one expects

*veterin+ary from intermediate veterin+ary, and *stereo+scope from stereo+scope. In each of these cases, however, stress actually falls one syllable further to the left: momentary, legendary, veterinary, stereoscope. In order to account for these peculiarities, Chomsky and Halle propose to

(15) postulate a readjustment rule that inserts the diacritic feature [+D] in various positions, in particular [in the prefix-forming element +o, cf. SPE: 138, WZ], in forms with sonorant-consonant clusters in the second syllable followed by -Ary or -Ory .... and in trisyllabic forms terminating in a weak cluster followed by /Ary/. We stress that this readjustment rule is introduced ad hoc to account for what appears to be exceptional behavior. Perhaps there is a deeper explanation of the facts that can eliminate the rule; however, even as it stands there are clear subregularities that can be exploited to account for the exceptions in a fairly simple way. (141)

At the same time, the optional sequence $(\begin{bmatrix} V \\ +D \end{bmatrix} C_0)$ is introduced in between ...WS [-segm]... in (14). Thus the correct application of STRESS RETRACTION is ensured even in these exceptional cases, which now meet the structural description of the rule as in (16).

(16) SD: $[\ X\ V\ C_0\ (WS)\ (\begin{bmatrix} V \\ +D \end{bmatrix}\ C_0)\ [-segm]\ C_0\ \overset{1}{V}\ C_0\ ]_{NSPVA}$

m	o	m			e	nt		+		a	ry
l	e	g			e	nd		+		a	ry
v	e	t		er	i	n		+		a	ry
st	e	r		e	+o			+	sc	o	pe

3.2.3.2. VOWEL SHIFT.

Case (13iii), English Vowel Shift in lax vowels, somewhat resembles irregular stress retraction. For ease of exposition, let me give SPE's VOWEL SHIFT rule in its "nearly final" form of p. 190. I also add a table of changes brought about by the rule.

(17) $$\begin{bmatrix} V \\ \gamma\text{back} \\ \gamma\text{round} \end{bmatrix} \Rightarrow \left\{ \begin{array}{lll} [-\alpha\text{high}] & / & \left[\begin{array}{c}\alpha\text{high}\\ -\text{low}\end{array}\right] \\ [-\beta\text{low}] & / & \left[\begin{array}{c}\beta\text{low}\\ -\text{high}\end{array}\right] \end{array} \right\} \left[\begin{array}{c}+\text{tense}\\ +\text{stress}\end{array}\right]$$ (a) (b)

(18)

input:	ī	ū	ē	ō	ǣ	ɔ̄
output (a):	ē	ō	ī	ū		
output (b):	ǣ	ɔ̄			ē	ō

As appears from the formulation of (17), the application of VOWEL SHIFT is constrained to (stressed) tense vowels (in (18) the bar over the respective vowels represents tenseness). Yet, there is a small class of lax vowels to which VOWEL SHIFT apparently applies as well. These are, for instance, the stem vowels of some irregular (strong) verbs in past tense. Thus, i in sit and sing shows a change parallelling the change in the leftmost column of (18) in their past tenses sat and sang. Similarly, the past tense ran can be accounted for by feeding /rin/ (itself derived from /run/, cf. SPE: 209) into VOWEL SHIFT if this rule were allowed to apply to lax vowels as well as tense ones.

Chomsky and Halle propose to account for these alternations among the lax vowels by adding the conjunctive environment [___, +F] to the VOWEL SHIFT rule. Furthermore, they postulate a set of readjustment rules, the particular tasks of which are

described in two separate passages. Very early in SPE, in the chapter "Setting" of their "General Survey", they state (11):

(19) The readjustment rules would replace past by d, as a general rule; but in the case of sang, would delete the item past with the associated labeled brackets, and would add to the i of sing a feature specification indicating that it is subject to a later phonological rule which, among other things, happens to convert i to æ.

In subsection 4.3.5. "Vowel Shift for Lax Vowels", they comment on the sit/sat and sing/sang alternations as follows (201):

(20) These verbs will be marked in the lexicon as belonging to a special lexical category, and by Convention [5] this lexical category will be distributed as a feature of each segment of these verbs, in the appropriate context. Thus, in particular, the vowel of sit will have a certain feature [+F] when it is the syntactic context ___ past.

Visualizing this approach for the sake of exposition, Chomsky and Halle appear to propose here, then, a lexical readjustment rule much like (21), which prepares the past tenses of, among others, sit and sing for VOWEL SHIFT.

(21)

[	[	C_0	V	C_0	]	past	]	
1	2	3	4	5	6	7	8	=>
ø	2	3	$\begin{bmatrix} V \\ +F \end{bmatrix}$	5	6	ø	ø	

3.2.3.3. FRICATIVE DEVOICING.

Case (13iv) of alphabet features in SPE again resembles the former two in that again an already existing rule is extended with an environment containing the alphabet feature. Chomsky and Halle propose to add to an independently motivated rule of FRICATIVE DEVOICING before +ive (cf. eva[z]ion vs. eva[s]ive) the conjunctive environment [___, +φ], in order to devoice the final fricatives of the derived nouns and adjectives such as advice, house, life, clothe, and safe. In this case, if I interpret SPE's highly informal account correctly, it is the rule of derivational morphology which derives these nouns and adjectives from underlying voiced fricative-final verbs that will introduce the feature [+φ].[4]

In summary, the three cases of alphabet features in SPE discussed so far, part of the English phenomena of Stress Retraction, Vowel Shift, and Final Fricative Devoicing, have in common a "two step" approach in which a readjustment rule (or a rule of derivational morphology "functioning as" a readjustment rule) inserts an alphabet feature (and in the case of Vowel Shift reduces some structure at the same time), and by doing so feeds its output into an independently motivated rule, extended with a subcase containing the relevant alphabet feature. Schematically, this similarity can be set out as in (22).

(22)

	/leg end ary/	/s i t/	/hou z e/
READJUSTMENT RULE	+D	+F	+φ
PHONOLOGICAL RULE	1	a	s

3.2.3.4. JER DELETION

The remaining case of the use of alphabet features in SPE, JER DELETION in Russian, is of a different nature.

According to Chomsky and Halle, one of two things can happen in Russian to an underlying lax high vowel ('jer') i or u: it is either deleted (before the word-boundary or, simplifying slightly, before C_1V), or it is lowered (elsewhere). Thus, /lid+u/ goes to [led] by deletion of u before the word-boundary, and lowering of i which, through the earlier application of final deletion, is not any longer in the environment for pre-C_1V-deletion. Given these rules, the behaviour of the vowel of the suffix -isk is sometimes unexpected. On the one hand, one finds regular deletion in for instance [sibírskəy] 'Siberian', and [rímskəy] 'Roman', where i precedes C_1V (in particular: CCV), but on the other hand the "vowel of this suffix is not deleted by the rule if the stem to which the suffix is attached ends with a velar or palatal consonant..." (SPE: 379), as in [gréčeskəy] 'Greek'. Apparently, such a situation calls for a readjustment rule of type (11), which would exempt the vowel of -isk from deletion after non-anterior consonants, but there is more to it than this: "In addition there is a further layer of exceptions to the exceptions just cited, namely, forms in which the suffix /isk/ follows a non-anterior consonant but in which the vowel of the suffix is deleted: e.g., [mužskóy] 'manly'..." (380). In order to account for these unexpected facts, Chomsky and Halle add an alphabet feature to the environment of the readjustment rule, which now reads as in (23) (SPE: 380):

(23) $$\begin{bmatrix}+\text{voc}\\-\text{cons}\\+\text{high}\\-\text{back}\\-\text{tense}\end{bmatrix} \Rightarrow [-\text{ rule (134)}] \;/\; \begin{bmatrix}+\text{cons}\\-\text{ant}\\-\text{D}\end{bmatrix} +\_\_\ \underline{\text{sk}} +$$

where 'rule (134)' is SPE's rule of JER DELETION. This readjustment rule formulated as in (23) "exempts the vowel of the suffix /isk/ from deletion by rule (134) if the stem to which the suffix is attached ends with a velar or palatal consonant,

unless the stem is marked with a special diacritic feature [+D] which indicates that it is an exception to the readjustment rule..." (380).

Crucial for the use of an alphabet feature rather than a rule feature in this particular case is the circumstance that the 'doubly irregular' formatives such as /muš/ do not contain the vowel onto which (23) focuses: since by convention only the focus of a rule contains the relevant rule feature, an alphabet feature must be invoked in this case in order to make the distinction between those final non-anterior consonants which do trigger deletion ([+D]) and those that do not ([-D]).[5] The resulting tripartite division of Russian formatives vis-à-vis the rule of JER DELETION as regards the suffix -isk is set out in (24):

(24)

	/sibír+isk+əy/	/gréč+isk+əy/	/muš+isk+óy/
		-D	+D
READJ RULE	-	[- rule 134]	-
DELETION (134)	ø	-	ø

Notice that in this particular case, although the analysis contains two steps just as those in (22), it is not the application of the phonological rule itself which is governed by the alphabet feature, but rather the application of the readjustment rule (which in its turn governs the application of the phonological rule via the relevant rule feature). I will return to the differences between cases (ii)-(iv) on the one hand, and (v) on the other in a brief survey at the end of the following subsection.

3.2.4. READJUSTMENT RULES.

Within SPE's theory of exceptions in generative phonology, as described in the previous subsections, we have encountered

the following two tasks of the so-called readjustment rules:

(i) they introduce rule features when some systematic phonologically or morphologically definable class is an exception to an otherwise general phonological rule (cf. (10, 11, 23));

(ii) they introduce alphabet features on irregular formatives, which formatives then undergo the subbranch of an otherwise general phonological rule containing the relevant alphabet feature (cf. (22)).

In this last subsection I will add a third task of readjustment rules in describing exceptional behaviour. In this respect, consider the following (SPE: 209-10).

Some irregular English verbs in past tense, and some irregular nouns in plural, show a change in the stem-vowel as regards its backness. Thus: cling/clung, tell/told, bind/bound, break/broke ([-back] > [+back]), and run/ran, hold/held, mouse/mice, foot/feet ([+back] > [-back]). These changes are accounted for in SPE by "a precyclic readjustment rule switching backness in certain lexical items in certain contexts":

(25) $V \Rightarrow \begin{bmatrix} -\alpha back \\ -\alpha round \end{bmatrix} / \left[\overline{\alpha back}\right]$ in certain irregular forms.

Rule (25) may be called UMLAUT. Most of the forms above are dealt with straightforwardly by (25), and subsequent rules of, among others, DIPHTHONGIZATION and VOWEL SHIFT (cf. SPE: op. cit.). As pointed out above, the past tense form ran will also undergo VOWEL SHIFT for lax vowels, for which it will be marked [+F] by readjustment rule (21). This particular form will then be derived as in (26).

(26)

	[	[	run	]	past	]	]
(25)	[	[	rin	]	past	]	]
(21)		[	$\underset{+F}{\text{rin}}$	]			
(VSH)		[	ran	]			

The difference in analysis between the cases of (irregular) UMLAUT and of (irregular) VOWEL SHIFT for lax vowels, where the latter involves an alphabet feature, appears to be motivated by the fact that there is no general independent phonological rule of English in SPE which could bring about the backness switches of (25), while there is an independent phonological rule of VOWEL SHIFT bringing about anyway the greater part of the change from i to a. Thus, for backness switch a two-step analysis of (i) readjustment rule, and (ii) independently required, though slightly amended, phonological rule, is unmotivated. Hence, readjustment rule (25) effects the backness change required in one step.

In summary, having discussed also this last case of the use of readjustment rules in SPE, we may finally survey the theory of exceptions as contained in SPE as in (27).

(27)(i) rule features

for exceptions to one general rule (may be introduced by readjustment rules);

(ii) morphological features

for exceptions to several general rules (lexical);

(iii) alphabet features

(a) for exceptional forms which undergo a change highly similar to that specified in an independently required general rule (introduced by readjustment rules);

(b) for exceptions to a general (readjustment) rule which do not contain the focus of that rule (lexical);

(iv) readjustment rules

(a) introduce rule features (see (i));

(b) introduce alphabet features (see (iiia));

(c) describe irregular changes not otherwise specified in the grammar.

The survey in (27) will be used as a chart of reference throughout the exposition in the following sections.

3.3. MODIFICATIONS OF AND ADDITIONS TO THE SPE THEORY.

After 1968, the SPE theory of exceptions in generative phonology, in its barest form sketched as in (27), and in fact the first attempt to define the notion 'possible exception' within generative phonology, was modified in several works in various ways. These modifications resulted in the introduction of the distinction between so-called major and minor rules, of structural description features, and of rule environment features (plus the concomitant distinction between maxi and mini rules). It will be the purpose of this section to outline the arguments which initially motivated the introduction of these various devices. This will be done in three separate subsections, each of which will be further subdivided into two parts: for each of the above devices I will discuss the contents of the first work to argue for its introduction, plus some of the more important later works on the subject. Thus, in subsection 3.3.1. I will be concerned with Lakoff's (1970) proposals as to the distinction between major and minor rules and with, among others, Lightner's elaborations upon them. Furthermore, in subsection 3.3.2. I will briefly discuss Harms' structural description features (which are little more than a suggestion), and similar proposals by for instance Kenstowicz (1970). In subsection 3.3.3. I will go more elaborately into rule environment features, argued for simultaneously (although apparently independently) by Coats (1970) and Kisseberth (1970). Finally, in each subsection I will indicate as precisely as possible at which part of (27) the relevant modification or addition is aimed, and how it is intended to replace that part.

3.3.1. THE DISTINCTION BETWEEN MAJOR RULES AND MINOR RULES.

3.3.1.1. LAKOFF (1970).

A first important post-SPE work for the theory of exceptions in generative phonology, in spite of its title(s), is Lakoff's 1965 Indiana University Ph.D. dissertation: On the Nature of Syntactic Irregularity, also known as a 1965 Harvard Computation Laboratory Report of the same name, and as the monograph Irregularity in Syntax, published in 1970. It is clear, in spite of its early date, that this work should be considered post-SPE since, firstly, it is not referred to in SPE and, secondly (and more significantly) Lakoff quotes extensively from prepublication versions of SPE.[6] In his thesis Lakoff sets himself the task of defining "the notion 'possible irregularity' in natural language"(xii), although his main concern is the more specific task of defining "the notion 'exception to a transformational rule'" (ix). However, towards this aim Lakoff provides phonological examples as illustrations at various points, and it is these examples which lend his work phonological interest, and which will be recorded in this subsection.

Firstly, consider Lakoff's description of some of the exception mechanisms developed by Chomsky and Halle in SPE. Having given obesity as an example of how negatively specified rule features will exempt a form from a rule (he christens such forms "simple exceptions"), he goes on to observe (17-8):

(28) The theory as stated so far, cannot handle two common cases in phonology: (1) Cases where an otherwise very general rule does not apply in some simply stated environment; to take a hypothetical example, consider a case in which a penultimate vowel is shortened

unless preceded by an /h/. (2) Cases like foot-feet ... in which a rule does not generally apply, but applies only in isolated cases.

In order to handle cases like (1), Chomsky and Halle set up the following device. They allow rules that say that the next rule does not apply in one environment. That is, they allow rules equivalent to those of the following form: (2-4)

Rule k: [ ] => [-Rule k+1]/in some environment

Thus, in case (1) above, suppose that the vowel shortening rule were rule 89. Rule 88 would read:

Rule 88: [ ] => [-Rule 89] / h ___ (2-5)

Although Chomsky and Halle did not set up their system for cases like (2), we can handle such cases in their system by using a null environment in a rule of the form of (2-4). Suppose the rule that produces geese from goose is rule 374. Rule 373 would then read:

Rule 373: [ ] => [-Rule 374] (2-6)

This says that all normal words do not undergo Rule 374. Cases like goose can now be looked at as exceptions to Rule 373, rather than to 374. That is, we can mark goose [-Rule 373] in the lexicon. It, like all normal words, will be marked [+Rule 374]. Unlike normal words, goose will not undergo Rule 373, will remain marked [+Rule 374], and will undergo Rule 374.

Although Lakoff's analysis as outlined here does not seem, at first glance, at all odd within an SPE framework, it is not quite accurate. In particular, the fact is that Chomsky and Halle, as noted in the previous subsection, in attempting to constrain their theory of exceptionality, do not allow phonological rules of Lakoff's 'minus next rule' type, remarking (374-5):

(29) One might also raise the question whether the rules of the phonology themselves may modify [rule features]; for example, should we permit rules of the form (127):

(127) A => [- rule n] / Z___W

Such rules add greatly to the power of phonology. Suppose, for example, that [a rule (125) of the form A=>B/X__Y] applies as indicated except in the context Z___W. By ordering (127) before rule (125), we achieve exactly this effect. Therefore rules of the form (127) permit us to formalize the notion "except"; in other words, they permit us to refer to contexts in which a rule does not apply, as well as those in which it does apply. This is true even if we permit a rule such as (127) only when it is rule n-1 in the ordering, so that it can be reformulated as (128):

(128) A => [- next rule] / Z___W

If we permit rules such as (127) to appear more freely, we add still greater power to the phonology. At various stages of our work we have experimented with rules of the form (128), and of the more powerful type (127), but we have not found any convincing example to demonstrate the need for such rules. Therefore we propose, tentatively, that rules such as (127), (128), with the great increase in descriptive power that they provide, not be permitted in the phonology: the feature [- rule n] must either be introduced by readjustment rules or appear as a diacritic feature in the lexical representation of an item.

In the passage quoted in (28), then, Lakoff seems to assume some stage of SPE where Chomsky and Halle "experimented" with the sort of rule he proposes: they have been rejected eventually for the reasons given in (29).[7] As indicated in (29), Lakoff's exceptional cases of type (1) are accounted for in SPE by a

readjustment rule if h is lexically present; otherwise, h should be excluded by the proper formulation of the rule itself, i.e. by excluding h from the environment of the rule through the appropriate selection of phonological features.[8] Furthermore, his type (2) case, the alternation between goose/geese, foot/feet, etc., is as pointed out above accounted for by readjustment rule (25) ("UMLAUT").

In the meantime, although Lakoff assumes that Chomsky and Halle's theory of exceptions as he interprets it will work in syntax as well "if we are concerned only with characterizing the completely grammatical sentences of the language" (21), he goes on to propose an extension of the system, under Postal's view "that grammars be constructed so that they generate directly not only the fully grammatical sentences of the language, but also the partially grammatical ones, marking them automatically as to the degree and nature of their deviance" (21). Again, in arguing for the extension, Lakoff uses examples from phonology as illustrations, but before we come to them it will be useful especially for later comparison to give a brief survey of Lakoff's proposals for syntax. Those unfamiliar with the notions introduced are referred to Lakoff (1970: sections 1.4. and 1.5.), and references cited there.

The survey of Lakoff's syntactic proposals runs as follows. In syntactic deep structure, each occurrence of a lexical category will dominate a pair of feature matrices. The, say, lefthand member of the pair, the so-called grammatical member, will contain all of the syntactic features introduced by the subcategorization rules of the base. Among the features in the grammatical member will be negatively specified rule features and negatively specified structural description features, one of each for each rule of the grammar. The righthand member of the pair of feature matrices, the so-called lexical member, will be empty, but will become filled via lexical substitution by a lexical item chosen at random from the lexicon. In the lexicon, the syntactic features of formatives are represented in terms of m and u, for 'marked'

(exceptional) and 'unmarked' (regular), respectively. Special rules, say "syntactic marking conventions", will convert these m's and u's into pluses and minuses. Structural description features and rule features are represented in terms of m's and u's as well, but no marking conventions apply to them in the lexicon: they will be converted into pluses and minuses at a later stage. The evaluation measure will count only lexical m's as contributing to the complexity of the grammar.

Given this information at the input level of syntax, we can turn to what happens in derivations. Firstly, given the fact that a lexical item meets the structural description of some rule in the course of derivation, the sign of the corresponding structural description feature for that particular item in the grammatical member will be converted from the minus it started out with into plus, by convention. Similarly, if the structural change of a given rule has been carried out (if, not when, since in Lakoff's view all transformational rules are freely applicable), the sign of the appropriate rule feature in the grammatical member will also be converted from the original minus into plus. Secondly, in the situation that the structural description of a particular rule is not met, the corresponding structural description feature will remain negatively signed, which implies that the corresponding rule feature will remain negative, too: there can be no form that does not meet the structural description of some rule, and yet undergoes the structural change of that same rule. Finally, at the end of the derivation a set of marking conventions converts the m's and u's of the lexical members into pluses and minuses, and the signs of the structural description features and rule features in the grammatical and lexical members are checked against each other. When at this point "the lexical member of a pair is incompatible with the grammatical member of the pair, we will say that the pair defines a violation. Any sentence generated by the grammar with one or more

violations we will define as being 'ungrammatical'"(9).

Based on this general framework, Lakoff distinguishes four types of irregularity:

(30) (i) so-called "simple exceptions";
(ii) items which exceptionally undergo a rule;
(iii) so-called "positive absolute exceptions";
(iv) so-called "negative absolute exceptions".

I shall discuss these four separate types in this order.

To begin with, little space will be necessary to discuss Lakoff's "simple exceptions". As pointed out above, this type is also recognized in SPE, and like Chomsky and Halle Lakoff uses the derived noun obesity, with tense rather than expected lax e, as an example (14, 19).

In order to handle exceptions of type (30ii), Lakoff introduces the notion minor rule (30ff.). A minor rule is a rule of grammar which applies only to a handful of items out of those which meet its structural description, viz. it applies only to exceptions (consequently, a rule which has only a few "simple exceptions" or no exceptions at all will be a major rule). As a phonological illustration of this type of irregularity, Lakoff gives the irregular plurals feet and geese vis-à-vis the rule of UMLAUT in (25). UMLAUT will be a minor rule, and foot and goose will exceptionally undergo it.

For syntax, Lakoff suggests to capture the formalism for both simple exceptions and minor rules in one sweep. Simplifying to some extent, this formalism may be represented as follows (for elaborate discussion cf. Lakoff, 1970: 43ff.). Given a rule n of the grammar, whether major or minor, a regular formative that meets its structural description is characterized in the lexical member as [u SD n, u rule n], and an exceptional formative as [u SD n, m rule n] (notice that exceptional here covers both the simple exceptions, such as obesity in phonology, and the minor rule exceptions, such as

in phonology foot and goose). Then, at the end of the grammar a set of marking conventions turns these m's and u's into pluses and minuses: at the end, since for at least one such convention (given here in (31)) the plus or minus to be assigned depends on the plus or minus developed in the course of the derivation in the grammatical member in the manner described earlier (cf. Lakoff, 1970: 55).

(31) [u SD lex] => [α SD lex] / $[\overline{\alpha \text{ SD gramm}}]$

The task of convention (31) is to assign a value to a structural description feature on the basis of the value developed for that feature in the course of a derivation: if a structural description has been met, the unmarked value for the structural description feature is +, and vice versa. Clearly, such a convention makes sense only at the end of the grammar, after all relevant rules have been tried for application.

For major rules (minor rules will be discussed shortly) the second relevant marking convention is that of (32).[9]

(32) [m rule n] => [- rule n]

The task of convention (32) is to express the natural fact that it is irregular for a major rule not to apply. Given Lakoff's assumption that all grammatical rules are freely applicable, we may schematically represent derivations involving a major rule for both regular and irregular items as in (33).

(33) REGULAR LEXICAL ITEM

	lexical member	grammatical member
(i) lexicon	[u SD n]	[- SD n]
	[u rule n]	[- rule n]
(ii) major rule	-	[+ SD n] (by assumption)
		[+or- rule n] (freely)
(iii) conventions	[+ SD n] by (31)	
	[+ rule n] by (32)	

(iv) check: grammatical sentence if twice [+ rule n]
ungrammatical sentence if [- rule n] in grammatical member.

EXCEPTIONAL LEXICAL ITEM

(i) lexicon	[u SD n]	as above
	[m rule n]	
(ii) major rule	as above	as above
(iii) conventions	[+ SD n] by (31)	
	[- rule n] by (32)	

(iv) check: grammatical sentence if twice [- rule n]
ungrammatical sentence if [+ rule n] in grammatical member.

As these tables show, ungrammatical sentences result either when a major rule has not been applied (to a regular formative) although it should, or when a major rule has been applied (to an irregular formative) although it should not. This is the type of characterization we were out for.

With reference to minor rules, Lakoff adds another marking convention, prior to convention (32). It reads as in (34):

(34) $[\ \gamma$ rule n$] \Rightarrow [^{\sim}\gamma$ rule n$]$ where $\gamma = \underline{u}$ or $\underline{m}$
$\sim$ $\underline{u} = \underline{m}$
$\sim$ $\underline{m} = \underline{u}$
and $\underline{n}$ is a minor rule.

Convention (34) has the effect of converting u and m for the rule feature of a minor rule. It is triggered by the list of minor rules in the grammar, a list proposed by Lakoff to be held against the grammar in evaluation: just a few exceptions are better than many, and just a few minor rules will be better than many minor rules. Given (34) we may again establish a schema with derivations involving a minor rule for both regular and irregular lexical items, as in (35). Stages (i) and (ii), which will be identical to those in (33) except that the minor rule replaces the major rule, will not be repeated here.

(35) REGULAR LEXICAL ITEM

		lexical member	grammatical member
(iii)	conventions	[+SD n]	-
		[- rule n] by (34) and (32)	
(iv)	check:	grammatical sentence if twice [- rule n]	
		ungrammatical sentence if [+ rule n] in grammatical member.	

EXCEPTIONAL LEXICAL ITEM

(iii)	conventions	[+ SD n]	-
		[+ rule n] by (34) and (32)	
(iv)	check:	grammatical sentence if twice [+ rule n]	
		ungrammatical sentence if [- rule n] in grammatical member.	

As these tables suggest, ungrammatical sentences result either when a minor rule has been applied although it should not (to a regular formative), or when a minor rule has not been applied although it should (to an irregular formative). Again, we have obtained the results we were out for.

While the two schematic representations in (33) and (35) refer essentially to syntactic derivations, they will be very useful when we go more elaborately into the phonological use of minor rules below. In the meantime the two types of irregularity

left out of the four we started out with in (30) are the two types of absolute exceptionality, positive and negative. In the description of these types, the so-called structural description features play a major role, but I will have to simplify the discussion considerably in this respect. There are two reasons for this. Firstly, Lakoff himself states in his Preface that, in retrospect "I think that absolute exceptions were a mistake" (x). Secondly, and more interesting here, structural description features of the Lakovian type do not appear to play a role in phonology at all: unlike in his discussion of simple exceptions and minor rules, Lakoff does not illustrate his text with phonological parallels. In spite of this, something bearing a superficial (if not solely terminological) resemblance to his structural description features has been proposed in phonology, and for this reason I present a brief outline of Lakoff's proposals here: to be able to point out the differences at the proper stage below. I refrain, however, from entering into detail, and have selected those syntactic illustrations expositorily most convenient. Readers interested in greater depth are referred to the relevant sections of Lakoff (1970: 6-6.3).

Positive absolute exceptions are, for Lakoff, lexical items that must meet the structural description of some given rule. Reflexive verbs in English are a case in point, in that they must meet the structural description of the REFLEXIVE TRANSFORMATION, lest one should derive an ungrammatical sentence. Cf. the sentences in (36) and (37).

(36) (a) John behaved himself.
(b) *John behaved Harry.

(37) (a) John prided himself on being a pacifist.
(b) *John prided Harry on being a pacifist.

As seems reasonable, negative absolute exceptions are items that must not meet the structural description of some given rule. Irreflexive verbs in English are a case in point in that they must not meet the structural description of the REFLEXIVE TRANSFORMATION, lest an ungrammatical sentence should result. Cf. the sentences in (38) and (39).

(38) (a) I will meet Bill.
(b) *I will meet myself.
(c) *I will meet me.

(39) (a) You assassinated Harry.
(b) *You assassinated yourself.
(c) *You assassinated you.

Notice that if verbs such as meet and assassinate were simple exceptions to the REFLEXIVE rule, which the (a) and (b) sentences in isolation suggest, we would expect the (c)-sentences to be grammatical, which they are not.

These brief syntactic examples of absolute exceptions terminate my discussion of the theory of exceptions in generative grammar as outlined in Lakoff (1970). As shown, this theory is based partly on (prepublication versions of) SPE. As regards differences with SPE, it proposes that the distinction between major and minor rules be incorporated into the theory of grammar, mainly for syntax, but through suggestive illustrations for phonology as well. The formalism proposed towards this end is basically that expressed in (31), (32), and (34), represented schematically as in (33) and (35). In the next subsection I will discuss further proposals towards the incorporation of these suggestions by Lakoff into generative phonology. At the end of that subsection I will then compare the complete set of proposals to the survey of the SPE theory in (27). I will return to absolute exceptions in subsection 3.3.2.

3.3.1.2. FURTHER PROPOSALS ON MINOR RULES IN GENERATIVE PHONOLOGY.

As regards the distinction between major and minor rules as argued for in Lakoff (1970), the further introduction of this distinction into generative phonology should be attributed to Lightner. In a cluster of four papers, (i) "Sur l'emploi de règles mineurs dans la phonologie de russe" (1967), (ii) "On the Use of Minor Rules in Russian Phonology" (a translation of (i), (1968a)), (iii) a review of Joos (ed.): Readings in Linguistics (1968b); and (iv) "Some Remarks on Exceptions and Coexistent Systems in Phonology" (1972a), Lightner argues for the usefulness of Lakoff's distinction for phonology. I will give a brief survey of the contents of these four papers below. Furthermore, I will briefly discuss two further early proposals towards minor rules in phonology, by Harms (1968), and by Levy and Fidelholtz (1971).

In (i) and (ii) (quotes below are from the latter), Lightner's major example runs as follows. Russian has "a type of deverbal nominalization which causes the root vowel to shift to o in some roots, but which, in other roots, leaves the vowel unchanged"(69). Illustrations of these two types of nominalization are:

(40)

root vowel changes			
verb		noun	
vy-brat'	'to choose'	vy-bor	'choice'
u-bit'	'to kill'	u-boj	'slaughter'
pri-tečʼ	'to flow'	pri-tok	'flow'
root vowel unmodified			
verb		noun	
pod-kupat'	'to bribe'	pod-kup	'bribary'
obvalit	'to fall'	obval	'falling'
na-mekat	'hint'	na-mek	'to hint at'

Although (40) gives an equal amount of examples of both types of nominalization, the actual state of affairs is very different: there is a large number of roots lacking vowel change, while roots that nominalize to o are rare. As it seems odd to specify the great majority of roots as exceptional, Lightner proposes to introduce the notions major and minor rule into generative phonology:

(41) Lakoff (1965) has suggested that rules (both syntactic and phonological) are of two types - MAJOR RULES and MINOR RULES. Major rules are the type we have been discussing: all forms are automatically subject to the application of all major rules unless they are specifically marked as not undergoing a certain major rule. The convention for application of minor rules is that no form is subject to the application of a minor rule unless the form is specifically marked as undergoing a certain minor rule. (70)

If o-nominalization is a minor rule, then, we are able to specify the exceptional roots in the lefthand column of (40) as the exceptions (in the manner of (35), lower half), while the regular roots in the righthand column are also characterized as they should be: as regular ((35), upper half).

Lightner goes on to make one additional observation. Like major rules, he proposes that also the application of minor rules may be governed by lexical redundancy rules (or, more properly, readjustment rules, cf. fn. 3). Thus, roots containing a lax high vowel ('jer') followed by a sonorant generally have an o-nominal (for instance, underlying /bij, bir/, showing up in verbs such as bit', brat', have o-nominals in -boj, -bor). For other roots, however, o-nominalization is exceptional (root /tek/, with the verb-form teč, has an irregular o-nominal in -tok, cf. (40)). Lightner proposes, therefore:

(42) To make these facts explicit, we include in the grammar of Russian a redundancy rule which specifies roots in u i followed by a sonorant as specifically undergoing [the minor rule]... Thus it turns out that roots of this type are not in any way exceptional - the fact that these roots undergo the o-nominalization rule .... is predictable by application of a redundancy rule. The few roots like tek ..., which undergo the o-nominalization rule and which are not subject to the redundancy rule constitute real exceptions and must be idiosyncratically specified as undergoing [the minor rule]. (71)

Lightner's (1968b) example in the review of the Joos volume involves some English data which, as we have seen, also occupied Chomsky and Halle in SPE: alternations of the type knife/knives, house/houses, and bath/baths with voiceless fricatives in singular, and voiced ones in plural, versus the stable type chief/chiefs, mass/masses, and myth/myths. He proposes to add to the phonology of English a rule voicing final obstruents before the plural suffix which the former class of nouns, though not the latter, should undergo. He continues:

(43) ....The description does not make explicit the fact that knife is irregular, chief regular. To make this fact explicit, I follow a suggestion by George Lakoff in his monograph, On the Nature of Syntactic Irregularity.... Lakoff proposes a separate class of rules which do not apply to any forms unless the form is explicitly marked as undergoing the application of the rule. These rules (which may be either syntactic or phonological) are called minor rules. The rule which voices morpheme final obstruents before the plural affix will be a minor rule. Only the morphemes

> in leaf, house, bath etc. will be marked with the morpheme feature indicating that these forms undergo the minor rule; the regular morphemes (chief, blouse, myth etc.) will carry no morpheme feature. The fact that only irregular nouns carry a morpheme feature makes explicit the irregularity of these nouns. (59-60).

In his 1972 contribution to The Slavic Word, Lightner elaborates somewhat upon his earlier remarks. Specifically, he introduces the pair of marking conventions in (44):

(44) [u minor rule m] => [- minor rule m]
[u major rule m] => [+ major rule m]

(where the converses are contained by convention, cf. Lightner, 1972a: 429). In effect, these conventions are very similar to Lakoff's (32) and (34) above (cf. fn.9). They are meant to interpret the lexical markedness values u and m, where only m will be held against the grammar in evaluation. One of Lightner's examples in this paper is the alternation between goose/geese, foot/feet, and mouse/mice in English which, as we have seen, was also suggested as an example of a minor rule by Lakoff. Lightner continues, moreover, to place restrictions on what constitute valid examples of minor rules in generative phonology:

(45) I believe it is the case that minor rules are characterized by the facts that (1) they always apply before all major rules and (2) their environment always contains a reference to some morphological category. If this is correct, then minor rules are in an intermediate position between syntactic rules and phonological rules; they serve a true morphological function.

Indeed, all examples given by Lightner in the four papers surveyed here are of the morphological type. As an additional example, he suggests in (iv) that the problematic alternations of Lachman's Law in Latin be handled by a minor rule (1972a: 430). For details of this particular example the reader is referred to Lightner's text.

In the wake of Lightner's earlier papers, proposals as to the introduction of Lakoff's theory of irregularity in phonology are made by Harms (1968), in his Chapter 10, section C: "Morpheme Features" (118-21). Harms' "morpheme features" comprise what we have called morphological features, rule features, and a third type of feature to be discussed in subsection 3.3.2. Morphological features are used by Harms in apparently the same situations as in SPE: "Frequently, a limited class of morphemes, generally lexical forms, will be characterized by numerous shared ... constraints. Foreign morphemes commonly participate in such morpheme classes" (119). Rule features are used by Harms in order to characterize simple exceptions, as expected, and also for the following type of phenomenon:

(46) ... certain morphemes are subject to special rules that do not affect most other morphemes. In colloquial Finnish final [i] is dropped after [s], but only for a list of ten or so morphemes, e.g. [viisi] > [viis] five, but [liesi] hearth ... These ten morphemes would be assigned a special feature which will be necessary for the application of the rule in question, say [+ Rule P6].

Rules that are general for morphemes in the language are called major rules; rules that apply only to special morphemes are called minor rules (cf. Lakoff, 1965). All morphemes are by convention considered to be 'plus' for any major rule and 'minus' for any minor rule - except those morphemes which possess specially assigned rule features to the contrary, as

> in the above Finnish examples. Thus the Finnish rule for [i] deletion will be listed as a minor rule, and only those few morphemes which are marked 'plus' for that rule can undergo the change, provided that they otherwise satisfy the structural description of the rule. (118-9)

Clearly, Harms' proposal in (46) is essentially the same as Lightner's in his earlier papers. Notice, however, that there appears to be a major discrepancy with Lightner's 1972 constraint as to the strict morphological character of minor rules: apparently Finnish i-deletion is not morphologically constrained, at least Harms does not mention this fact. It is of some interest, therefore, to note that Karttunen (1970: 149) dismisses Harms' minor rule rather straightforwardly as in (47):

(47) [According to Harms] colloquial dropping of final i is restricted to about ten words. This might be theoretically curious if it were true, but in colloquial speech most final i's drop.

Thus, Harms' proposal resembles Lightner's in spirit, although upon reconsideration it is not supported by the Finnish data.

In the meantime, it will not have gone unnoticed that both Lightner and Harms are concerned only very superficially with the formal way in which the distinction between major and minor rules should be incorporated into generative phonology: their primary aim appears to be to make the suggestion to this effect as such. Slightly more explicit in this respect is a proposal by Levy and Fidelholtz (1971). While their paper is concerned exclusively with (simple exceptions to) major rules in Arabic and Desano, they argue that Lakoff's set of ordered marking conventions in (32) and (34), and Lightner's pair in (44), together with SPE's convention that a marking convention with u implies another one with m and the opposite feature in the

structural change (cf. fn. 9), can all be accounted for in one sweep by the following schema (op.cit.: 65):

(48) [β u rule R] => [β α rule R] if rule R is [α MAJOR]

given the assumptions that the characteristic of a rule's being MAJOR or MINOR is expressible by attaching a binary feature [MAJOR] to it, and that u = -m, and m = -u. In this way, (48) will contain as subcases the conventions of (49).

(49) (i) [u rule R] => [+ rule R] if rule R is [+ MAJOR]
(ii) [m rule R] => [- rule R] if rule R is [+ MAJOR]
(iii) [u rule R] => [- rule R] if rule R is [- MAJOR]
(iv) [m rule R] => [+ rule R] if rule R is [- MAJOR]

Notice that [- MAJOR] is in fact "minor". Given the usefulness of this approach, there is still one further point to be considered. In particular, Levy and Fidelholtz's (48) (their (13); op.cit.: 65) is qualified by a footnote, saying:

(50) We disregard the question of how formally to state the restriction in convention (13). It is obvious, however, that the specification [α MAJOR] must somehow qualify the convention.

Although hidden in a footnote, Levy and Fidelholtz raise an interesting point here in which they seem to echo the anticipation of a formal difficulty in the informal Lightner-Harms theory of minor rules in generative phonology by Wurzel (1970: 52):

(51) The proposed uniform treatment of both types of exceptionality by [m rule (x)] in the lexicon has one flaw. It results in an innovation the consequences of which are not completely surveyable. The plus/minus specification of rule-features is not independent of

> the rules of the grammar, but checks their application directly. It is not immediately clear whether this proposal can be incorporated into the theory in this form.
> [Die vorgeschlagene einheitliche Behandlung der beiden unterschiedlichen Regelmerkmale im Lexikon als [m Regel (x)] hate eine Unschönheit. Sie erfordert eine Innovation, deren Konsequenzen noch nicht voll abzusehen sind. Die Plus-Minus-Spezifikazion der Regelmerkmale geschieht nicht unabhängig von den Regeln der Grammatik, sondern setzt direkt ihre Überprüfung voraus. Es muss sich erst zeigen, ob das in diesen Form in die Theorie einbezogen werden kann.]

More precisely, this difficulty may be paraphrased as follows. If the set of marking conventions for major and minor rules is part of the lexicon, as are all marking conventions in phonology (cf. SPE, Chapter Nine), one will have to know beforehand, at the level of the lexicon which rule of phonology is major and which is minor. But this requires looking ahead into a derivation which at that moment will still have to be executed. The cause of this difficulty appears to lie in the fact that the usefulness of the distinction between major and minor rules, as proposed for syntax and suggested for phonology by Lakoff, has been adopted for the latter by initially Lightner and Harms, with little concern for the formal consequences of this step. In this respect, recall that within Lakoff's syntactic theory the marking conventions appear at the end of each derivation, by way of check, in order to mark ungrammatical output-sentences "automatically as to the degree and nature of their deviance" (21). In this check, the marking conventions take as their input, inter alia, the list of major and minor rules of the grammar which is not independent but is obtainable

in the derivations themselves: one can, in a manner of speaking, add a major or minor rule to the list each time one occurs in the course of a derivation.

In phonology, on the other hand, one is as a rule not interested in characterizing the deviance of irregularly derived forms by rules freely applicable. Rather, as far as the exceptionality mechanisms are concerned, phonologists are interested in blocking the rules in the appropriate manner at the appropriate stages rather than checking derivations afterwards.

As far as I can see, then, given the distinction between major and minor rules and the concomitant formalism, the progressive blocking function of the exception mechanisms can be saved only by allowing the necessary marking conventions to escape the lexicon, and be rather of the anywhere-type: it is only at the stage of application of a rule that one will know whether it is major or minor, and it is at this stage therefore that the marking conventions will apply, i.e. immediately prior to the application of each rule of the phonology. As an illustration to this point, let us consider an assumed derivation of the plural geese from underlying goose, as regards the rules of (i) regular plural formation (to which it is a "simple exception"); (ii) UMLAUT (a minor rule, cf. (25)); and (iii) DIPHTHONGIZATION of tense vowels (a major rule of English phonology, cf. SPE: 183, 209-10).

(52)	goose	modification by marking convention	modification by phonological rule
(i)	m REG PL	- REG PL	-
	m UML		
	u DIPHTH		
(ii)	- REG PL		
	m UML	+ UML	geese
	u DIPHTH		

(52)	geese	modification by marking convention	modification by phonological rule
(cont.)			
(iii)	- REG PL		
	+ UML		
	u DIPHTH	+ DIPHTH	gee[y]se

From gee[y]se, further rules of English phonology will derive the final output [gīys]. Notice that in (52) each application of a phonological rule in the rightmost column is preceded by the application of a marking convention in the middlemost.

Having explored elaborately the initial motivation and some of the formal consequences of the introduction of the distinction between major and minor rules to generative phonology, we are now in the position firstly to take stock, and secondly, as promised, to compare the results with the relevant parts of the theory of exceptions in SPE, as set out in (27).

In sum, the introduction of the distinction between major and minor rules in generative phonology motivates to this theory the following additions:

(53) (i) phonological rules can be either MAJOR or MINOR, expressible perhaps by a binary feature [MAJOR] (as proposed by Levy and Fidelholtz (1971));

(ii) marking conventions (cf. versions (32)-(34) by Lakoff, (44) by Lightner, and (48)-(49) by Levy and Fidelholtz) convert lexical m's and u's into +'s and -'s on the basis of the status of the rule as regards the major-minor distinction;

(iii) the marking conventions of (ii) apply in the course of derivations, prior to each phonological rule (rather than in the lexicon).

When compared to the SPE-theory of exceptions as surveyed in (27), one observes that minor rules in the above sense correspond to two of its subcases:

(54) (i) minor rules correspond to readjustment rules of type (c), those that "describe irregular changes not otherwise specified in the grammar". Thus, both Lakoff (1970) and Lightner (1972a) propose that UMLAUT, SPE's example of such a readjustment rule, be a minor rule;

(ii) minor rules correspond to rules with alphabet features of type (a), those for "exceptional forms which undergo a change highly similar to that specified in an independently required general rule" (where the alphabet feature is introduced by a readjustment rule of type (b)). Thus, Lightner (1968b) proposes that the rule voicing the fricative in the plurals of knife: knives, house: houses, and so on (which SPE handles the other way about by an alphabetically conditioned subrule of a more general fricative devoicing rule) be a minor rule. Similarly, the alphabetically triggered rules of irregular Vowel Shift and irregular Stress Retraction could well be viewed as minor rules, in the Lightner-Lakoff framework.[10]

In effect, then, the proposals to introduce into generative phonology the distinction between major and minor rules amount to the replacement of (54) immediately above by (53).

3.3.2. STRUCTURAL DESCRIPTION FEATURES.

3.3.2.1. HARMS (1968)

As pointed out above, Harms (1968) distinguishes between three different types of "morpheme features" (SPE's "diacritic features"). One type corresponds to SPE's "morphological features". The second type corresponds to SPE's "rule features",

which are used in a framework with major and minor rules: an example of a minor rule in Harms' sense was given in (46) (although found incorrect in (47)). A third type of feature, and its motivation, will be discussed in the present subsection. These are the so-called structural description features, which are introduced by Harms as follows (1968: 119):

(55) Consider also the situation where a major rule applies to certain morphemes that do not otherwise satisfy the structural description of the rule. In Finnish, intervocalic [t] is normally dropped after an unstressed (i.e., noninitial syllable) vowel, but retained elsewhere; thus /talo+ta/ > [taloa], but /si+ta/ > [sitä]. The colloquial first and second pronoun forms, which are monosyllabic, also undergo the rule, e.g. [mu+ta] > [mua]. Here the morphemes /mu/ I and /su/ you will be assigned a feature that indicates that they satisfy the environment required for the t-deletion rule regardless of their segmental qualification; e.g. [+ SD of P15].

With regard to this passage, two things are worth pointing out. Firstly, to the best of my knowledge this is the only text within generative phonology where mention is made of structural description features.[11] But, as the reader will notice, this passage contains no reference to Lakoff (1970), as does Harms' passage (46) on minor rules. This omission appears to be well motivated, for in spite of a superficial typographical and terminological resemblance, Harms' structural description features are quite different from Lakoff's. In order to make this clear, let me briefly reconsider the phenomena for which Lakoff suggested that structural description features be introduced to syntax: his so-called positive and negative absolute exceptions. Examples of the positive sort were reflexive verbs

such as behave oneself vis-à-vis the REFLEXIVE transformation, while examples of the negative kind were irreflexive verbs such as meet in relation to the same rule. Suppose we try to say informally what the characteristics of these two types of verbs come down to, as in (56).

(56) (i) in case of positive absolute exceptions (reflexive verbs), a derivation is correct only if the item has met the structural description of the particular rule (REFLEXIVE), and has undergone its structural change;

(ii) in case of negative absolute exceptions (irreflexive verbs), a derivation is correct only if the item has not met the structural description of the particular rule (REFLEXIVE) (and hence its structural change has not been carried out).

It is clear that Harms' features satisfy neither description. He proposes, to put it informally again, to call some derivation correct (although exceptionally so) when an item does not meet the structural description of the rule in question, and yet has undergone its structural change. As pointed out above, such cases are explicitly excluded by Lakoff, who assumes that (22-3)

(57) by the definition of a rule, the structural change of a rule can take place only if the structural description is met ....

In Lakoff's terms, then, Harms proposes implicitly a modification of the definition of the notion 'phonological rule'.

Secondly, it should be pointed out that, just as for Harms' example of a minor rule in Finnish, Karttunen (1970: 150) calls into question Harms' example of 'overapplication' in Finnish. She points out that the underlying pronominal stems involved are bisyllabic, as seen in for instance minulla and minuum, and that therefore t-deletion will apply completely regularly to

minuta > minua, which will become mua by later rules (and similarly for the second person pronoun).

Naturally, this brief rejection by Karttunen would serve to take the heart out of Harms' proposals as regards the present discussion, if not for the fact that suggestions essentially similar to those by Harms have been made by various other phonologists since 1968. In the next subsection I will discuss in particular detail two papers by Kenstowicz (1970), and by Schane (1973c). These papers will also serve to clarify the position of Harms' structural description features in relation to the theory of exceptions contained in SPE.

3.3.2.2. FURTHER PROPOSALS ON OVERAPPLICATION IN GENERATIVE PHONOLOGY.

In the previous subsection I tentatively introduced the term 'overapplication' for Harms' case from Finnish where a rule of t-deletion was assumed to apply to forms which "satisfy the environment required for the t-deletion rule regardless of their segmental qualification" (cf. (55)), i.e. the rule applied even though its structural description was not (entirely) met by the input form. Under the assumption that 'overapplication' is indeed a useful term for such a situation, further examples of the same phenomenon are contained in Kenstowicz (1970), Schane (1973b, 1973c), Postal (1968), and Wurzel (1970). The first two of these will be discussed in detail in the next two subsections, the latter two somewhat more informally in the third.

3.3.2.2.1. KENSTOWICZ (1970)

In Lithuanian long non-high stem-vowels change their (underlying) acute accent to circumflex in third person future. Examples are given in (58) (cf. Kenstowicz, 1970: 95):

(58)	infinitive	2 fut.	3 fut.	gloss
	dė́eti	dė́esi	dė̃es	'to do'
	klóoti	klóosi	klõos	'to unfold'
	vė́esti	vė́esi	vė̃es	'to grow cold'
	žinóoti	žinóosi	žinõos	'to know'
but:	dí̀gti	dí̀gsi	dìgs	'to sprout'
	lí̀ti	lí̀si	lìs	'to rain'
	pū́uti	pū́usi	pùs	'to rot'
	rū́ugti	rū́ugsi	rùgs	'to ferment'

and the rule may be formulated as in (59) (op.cit.: 101):

(59) $\begin{bmatrix} \acute{V} & V \\ -\text{high} & \\ 3\ \text{FUT.} & \end{bmatrix} \Rightarrow \tilde{V}\ V$

As shown by the bottom four examples in (58), long high vowels shorten before word-final (C)s by a general rule of Lithuanian as in (60):

(60) $V \Rightarrow \emptyset\ /\ \acute{V}\ \_\_\_\ (C)\ s\ \#$

While this is the regular situation, there are five verbs which are exceptional in, that they contain long high vowels which change accent to circumflex rather than that they shorten in 3 fut. These are the five verbs in (61).

(61)	infinitive	3 fut.	gloss
	lĺisti	l͡íis	'to grow lean'
	lĺišti	l͡íiš	'to loosen'
	matĺiti	mat͡íis	'to see'
	s'úuti	s'͡úus	'to sew'
	vĺiti	v͡íis	'to chase'

According to Kenstowicz, within the SPE-framework this situation would be handled as follows:"what would be done would be to abstract out the [-high] condition and formulate it as a readjustment rule M on the now modified accent change rule N':

[(62)] M $\begin{bmatrix} \acute{V} & V \\ +high \end{bmatrix}$ => [- rule N']

N' $\begin{bmatrix} \acute{V} & V \\ 3 & FUT. \end{bmatrix}$ => $\overset{\frown}{V}$ V " (101-2)

Under this assumption, regular derivations will proceed as in (63i), and irregular ones as in (63ii):

(63) (i)	dées	púus	(ii)	lĺiš [-readj.]
readj.	-	[-accent]		-
accent	d͡ées	-		l͡íiš
short	-	pùs		-

Kenstowicz has several objections to this approach for Lithuanian, however, in fact three in sum. Firstly, he observes that the readjustment rule introducing a minus rule feature in (62), although allowed within an SPE framework, does not resemble in spirit the typical use of these rules in SPE. There, readjustment rule (11) is used so as to avoid a highly complex environment of the LAXING rule before consonant clusters. In the Lithuanian case, on the other hand, no dramatic complication arises by the presence of [+high] in the ACCENT rule itself. Secondly, Kenstowicz observes that a regularization of the exceptional l͡íis-class by phonological change would

have to be described as the awkward coincidence of the loss of the readjustment rule, plus the simultaneous reformulation of the ACCENT rule from (62: N') into (59). Finally, and this is perhaps his most important objection, Kenstowicz makes the point that within the SPE-theory of exceptions readjustment rules of type (62: M) apply at the level of the lexicon, and it is predicted therefore that all lexical long high vowels will fail to undergo accent change. However, when formulated in its complete form (i.e., with a slight expansion of (59)), accent change has a subrule which applies regularly to vowel-sonorant combinations, such as gérti/gẽrs 'to drink', and gínti/gĩns 'to defend'. If such a sequence happens to derive, by rule of Lithuanian phonology, from an underlying long high vowel, accent change still occurs, as in (mínti>) mínti/mĩns 'to trample'. Since readjustment rules do not apply to derived but to underlying representations, these data show that the readjustment approach fails, and that the restriction against long high vowels "is to be stated as part of the structural description of accent change itself" (104). Given these observations, Kenstowicz continues (104-5):

(64) If these observations are correct then it would seem that the theory of exceptions may have to be expanded to allow for the marking of morphemes as exceptional in undergoing rules they aren't supposed to. If this could be accomplished then the accent change rule could be stated as [(59)] and the lìs and mĩns class of forms could now be characterized as perfectly regular and effectively distinguished from the vĩ:s class, which would be idiosyncratically marked lexically. Regularization of this form to vìs could then be described as a simple case of lexical change like the monophthongization of trauma so that it rhymes with drama.

Such an innovation means allowing rules to apply to strings of segments which strictly speaking do not meet the structural description of the rule if these strings are specifically marked as such. Whether or not this is the correct move to make depends upon at least two things. First, whether it is characteristic of language to have exceptionally behaving elements which are exceptional in that they undergo or condition rules they aren't supposed to. In a more abstract sense, it would involve the question of whether it is typical to find a rule referring to a class A to the exclusion of a class B, and also find that there are a small minority of elements belonging to B which do condition or undergo the rule.

Secondly, such an innovation of allowing rules to apply to forms not meeting the structural description would obviously have to be severely restricted, since otherwise it would in effect claim that any segment could potentially condition or undergo any rule.

In fact, Kenstowicz (106-7) then goes on to suggest that

(65) (some?) phonological rules have a basic skeletal structure and that a given language can embellish it by placing further conditions on the application of the rule. It might be conjectured that the variability of language lies in these ancillary conditions and that they should be formally distinguished from the basic process.

If this is correct one might imagine that the structural description of the skeletal part of the rule establishes a constraint which all items must meet in undergoing or conditioning the rule, but that they may exceptionally undergo or condition the

rule if they violate one of these ancillary conditions. Thus, in the Lithuanian accent change rule the basic condition (one might say the point of the rule in the first place) is the specification for acute accent on the final syllable of the third person future, while the vowel quality of the syllable is a condition which would be subject to modification and variation.

As one may have noticed, Kenstowicz's suggestion is an enlarged version of Harms' proposal towards the incorporation of structural description features within generative phonology. In effect, then, Kenstowicz in (64) and (65) proposes constraints on the use of these features. One may also recall the description of Smith's account of the unexpected laai and booiem cases in Dutch in section 2.5. above, where it was suggested that these forms undergo a rule of J-INSERTION before a suffix-boundary, in spite of the absence of the boundary in these forms themselves. However, I will return elaborately to these forms in section 3.5. More important here is the observation that Kenstowicz's description of the possible readjustment account of the Lithuanian 3rd person future phenomena within an SPE-framework, although correct in itself, does not exhaust the possibilities offered by this theory. In particular, one will recall the description of irregular VOWEL SHIFT in English in subsection 3.2.3. above, where some lax vowels were forced to undergo a rule otherwise applicable only to tense ones. Therefore, the second possibility within the SPE-framework, one which is apparently overlooked by Kenstowicz, is the two-step approach of (66) where a readjustment rule introduces an alphabet feature, say [+L] onto the irregular verbs, and where this feature is collapsed with the conditioning feature [-high] in the rule of accent change.

(66) rule: $\left[\begin{array}{c} \acute{V} \quad V \\ 3 \text{ FUT.} \\ \left\{\begin{array}{c}[-\text{high}] \\ [+L]\end{array}\right\} \end{array}\right] \Rightarrow \tilde{V} \; V$

derivations:	dées	púus	líis	míns
readj.			+L	
accent	d$\tilde{e}$es	-	l$\tilde{i}$is	m$\tilde{i}$ns
short.	-	pùs	-	-

As regards this alternative, several things are worth commenting on. Firstly, notice that (66) meets Kenstowicz's objections to his own readjustment approach in (62): (i) it does not involve a readjustment rule introducing a rule feature; (ii) phonological change can be described plausibly as the loss of a readjustment rule, and (iii) input to the rule derived by earlier phonological rules can be described as regular, as it should: míns from míins will undergo accent change to m$\tilde{i}$ns just because it meets the structural description of the rule at its stage of application. Secondly, notice that if Kenstowicz's suggestions on "skeletal parts" and "ancillary conditions" in (65) make sense, the ancillary condition in (66) will be identifiable by virtue of being collapsed with the alphabet feature [+L]. Finally, it appears from Kenstowicz's description of Lithuanian that Harms' so-called description features, and his own proposals, correspond to the following two subcases of the theory of exceptions in SPE as schematized in (27):

(67) (i) a phonological rule conditioned by a readjustment rule of type (a) introducing a rule feature (as in English CLUSTER SHORTENING, cf. subsection 3.2.1.);

(ii) a phonological rule collapsed with an alphabetically conditioned rule, where the alphabet feature is introduced by a readjustment rule of type (b) (as in English VOWEL SHIFT, cf. subsection 3.2.3.).

Notice also that the data from Lithuanian as described in (66) do not at all constitute a violation of the definition of the notion phonological rule, since the rule of accent change always applies just in case its structural description is met (cf. (57) and surrounding discussion).

The observation that structural description features correspond to the two SPE-subcases in (67) receives additional confirmation from further illustrations, one of which I will discuss in some detail in the following subsection.

3.3.2.2.2. SCHANE (1973b-c).

Schane's line of argumentation in his two 1973 papers (b being contained in c) on French resembles to a high degree that by Kenstowicz (1970), although his conclusions differ. Like Kenstowicz, Schane is concerned with the description of forms which appear to undergo rules they should not undergo on the face of it, but unlike Kenstowicz Schane reaches the conclusion that the appropriate way to handle these irregular forms is to postulate very general phonological rules, limited in application by readjustment-like constraints introducing minus rule features. Schane discusses three examples of this type of overapplication in French: CONSONANT DELETION, VOWEL NASALIZATION, and VOWEL DELETION. The former two of these will be discussed below, while the third, which reflects accurately Schane's line of argumentation for all three cases, will be dealt with here. It runs as follows.

French has a rule of schwa deletion before vowels, which Schane formulates as in (68):

(68) $$\begin{bmatrix} V \\ -\text{tense} \\ -\text{stress} \end{bmatrix} \Rightarrow \emptyset \; / \; \_\_\_ \; ([-\text{segm}]) \; V$$

Thus: roug(e)+âtre 'pink'; princ(e)+esse 'princess'; petit+(e) amie 'little friend'; quatr(e) ans 'four years'; and so on. While this is the regular situation, there are some exceptions. These exceptions, according to Schane (831)

(69) all involve unstressed tense vowels that become deleted before other vowels. These exceptions include the [a] of la, both the feminine definite article and object pronoun -- e.g. l(a) école, ils l(a) ont vue; morpheme final [a] in a few place names -- e.g. Canad(a)+ien, Cub(a)+ain; the [i] of si but only when followed by the subject pronouns il and ils -- e.g. s(i) il, s(i) ils, but si elle; and the [y] of tu in certain colloquial styles, e.g. t(u) aimes, but not in formal style -- e.g. tu aimes. Because these deletions are marginal and cannot be accommodated by the schwa deletion rule, the standard treatment requires a minor rule. As different vowels are involved, the minor rule need only state that an unstressed vowel is deleted before another vowel,

$$[^{V}_{-\text{stress}}] \Rightarrow \emptyset \;/\; \_\_\_ \;([-\text{segm}])\; V$$

For the minor rule we still need to state that the vowel must be unstressed. The final vowel of Canada, Cuba, etc., is not deleted whenever it bears the word stress -- e.g. le Canada est grand, -- nor is the vowel of la when it is stressed as a post-verbal clitic -- e.g. Donnez-la à Jean.

However, in actual fact Schane finds the account sketched in (69) unsatisfactory (826):

(70) In most phonological descriptions, one finds the constraints built directly into the rules. This approach is wrong...[I]t leads not only to rules where similar

> environmental restrictions are repeated so that generalizations are constantly missed but, still worse, to rules that are highly unnatural. In fact, one has only to look at extant synchronic analyses done within the generative framework to appreciate the unnaturalness of many of the purported rules.
>
> To remedy this undesirable situation, we propose that in the set of rules there may likely be only 'natural' rules. Deviations are not to be built into the rules themselves, since this leads to a proliferation of complicated rules, but rather should be separately stated as a set of constraints on how the rules are to be applied.

In this system, the 'natural' rule of VOWEL DELETION will be the rule contained in (69). Furthermore, French will have a single condition on this rule, expressed as in (71), Schane's constraint (8) (831):

(71) $[^{V}_{+\text{tense}}] \Rightarrow$ [- VOWEL DELETION]

Although (71) looks like a readjustment rule of the SPE-type, it had in fact better not referred to as such, since its application is not limited to the lexical level: it is understood to apply immediately before the rule of VOWEL DELETION, to all forms that meet its structural description, whether derived or underlying. In order to characterize in this system the exceptional forms mentioned in (69), in the lexicon "the vowels of la, Canada, Cuba, etc., and tu for those styles where the vowel can be deleted, will be marked [- constraint 8]. The vowel of si will be marked [- constraint 8] / __ # {il, ils}. Because these forms are not subject to the constraint, their vowels will be deleted by the elision rule" (831-2).

Notice furthermore that Schane's system of 'natural rule' plus language-particular constraints resembles closely Kenstowicz's system of 'basic skeletal rule' plus 'ancillary conditions' (and in fact, Kenstowicz argues in the first half of his 1970 paper that ACCENT CHANGE is a very 'natural' rule within the context of Lithuanian verb morphology). They differ crucially, however, in their attitude towards devices introducing minus rule features ('readjustment rules', or 'constraints'), and it is curious to note in this respect that Kenstowicz offers an argument from phonological change against these devices, while Schane offers an argument from phonological change in favour of them (832-3):

(72) One interesting consequence of this system is that there is a closer rapprochement between synchronic and diachronic processes. The synchronic rules, freed from their idiosyncratic constraints, mirror more faithfully the actual diachronic changes, while the constraints reflect how the original rules have been modified through the course of time.... This system, intended to account for synchronic regularities, subregularities, and exceptions, may perhaps also contribute in some way to our understanding of phonological change.

Finally, observe that Schane, in arguing that the exceptions to VOWEL DELETION "cannot be accompanied by the schwa deletion rule" (cf. (69)), like Kenstowicz overlooks the possibility offered by the SPE-framework to use an alphabet feature braced into the phonological rule, as in (66) for Lithuanian. Thus, the VOWEL DELETION rule of French may be formulated as in (73), where the irregular tense vowels are marked lexically as [+M].

(73) $$\left[\begin{array}{c} V \\ -\text{stress} \\ \left\{\begin{array}{c}[-\text{tense}] \\ [+M]\end{array}\right\} \end{array}\right] \Rightarrow \emptyset \;/\; \_\_\_ \;([-\text{segment}])\; V$$

As in the Lithuanian case, the 'natural' or 'basic' phonological rule is the rule minus the braced features. I will have occasion to return to this point, and a more proper evaluation of Schane's proposals below. In the last subsection of this overview on overapplication in phonology I will very briefly discuss two final examples of the phenomenon from Mohawk (Postal (1968)), and German (Wurzel (1970)), respectively.

3.3.2.2.3. POSTAL (1968) and WURZEL (1970).

According to Postal (1968: 130-1) Mohawk has a rule sending š > dz except after h. He proposes to state the rule maximally general as š > dz, and to formulate the except-environment as a readjustment rule of the type h > [- rule š > dz]. Those cases where the voicing rule applies irregularly after h (such as ohša':na? > ohdza':na? 'hand, palm') may then be regarded as exceptions to the readjustment rule. Notice that the original rule might have been formulated with a phonological environment excluding h, with the exceptional forms described as cases of overapplication via a structural description feature à la Harms. Alternatively, the environment of the rule might have contained the phonological feature(s) excluding h, collapsed in some appropriate manner with an alphabet feature introduced onto the exceptional forms via a readjustment rule.

Wurzel (1970: 50ff.) describes a theory of exceptions which includes the notion "minor rule", where minor rules are characterized by inclusion of their associated rule feature in their structural description, schematically as in (74).

(74) $A \Rightarrow B \;/\; X \;[\overline{}_{+\text{ rule n}}]\; Y$

Under this assumption, simple exceptions and forms which exceptionally undergo a minor rule are differentiated lexically by the following set of marking conventions:

(75) [u rule n] => { (a) [- rule n] when n contains the mark [+ rule n]; (b) [+ rule n] }

Clearly, these conventions are Wurzel's version of the conventions by Lakoff, Lightner, and Levy and Fidelholtz (cf. (53ii)).

Under Wurzel's view, major and minor rules can also be collapsed in order to cope with a situation where a lexical item is exceptional in that A is replaced with B not in the regular context X__Y, but in the context P__Q, while normally A is retained in the latter. Schematically, such a situation may be represented as in (76).

(76) $A \Rightarrow B \;/\; \left\{ \begin{array}{l} X \;\underline{}\; Y \\ P\;[\overline{}_{+\text{ rule n}}]\;Q \end{array} \right\}$

As a concrete example of the latter sort of situation, Wurzel cites a case from German "Substantiv-Stammbildung" (53-4). Here a rule adds -n to noun stems of weak declension in two cases: (i) generally in plural; and (ii) when the stem is morphologically masculine, again in two cases: (iia) when the stem takes a stem-building element, and/or is animate; and (iib) either in genitive, dative, or accusative singular. For the full expansion into morphological features of this environment the reader is referred to Wurzel (1970: 47). In the meantime, I will formulate the rule here as in (77), where M stands for the intended environment.

(77) $\emptyset \Rightarrow n \;/\; M \_\_]_N$

The German noun Herz 'heart' is the relevant piece of data here. Generally, it behaves as if neutral, and within Wurzel's analysis its expected genitive and dative ("Oblique") cases are *Herzes and *Herze, respectively. Instead, one finds Herzens and Herzen. In order to account for these exceptional forms, Wurzel proposes to add a minor rule branch to (77), which applies uniquely to the noun Herz, in genitive and dative only. Rule (77) is therefore modified to (78) (op.cit.: 54):

(78) $\emptyset \Rightarrow n \;/ \left\{ \begin{matrix} M \\ \left[\begin{matrix} +\text{rule 78b} \\ +\text{Oblique} \end{matrix} \right] \end{matrix} \right\} \_\_]_N$ (a) (b)

The noun Herz will be marked in the lexicon as if for a minor rule, viz. as [m rule 78b], to be interpreted via convention (75a) as [+ rule 78b], since (78b) contains a rule feature. So as to support our suggestion that Harms' structural description features refer to cases (67) of the SPE-theory, notice firstly that within the SPE-framework, where rule-features are not allowed to figure in structural descriptions, [+ rule 78b] would have been replaced by an alphabet feature, introduced on Herz by a readjustment rule. Secondly, this case could have been described by a structural description feature forcing Herz to undergo the original rule (77) even though it does not meet its structural description. And finally, M might have contained neutral oblique cases from the outset, where a readjustment rule would exempt just these neutral oblique cases from the rule, with Herz specified as an exception to this readjustment rule.

3.3.3. RULE ENVIRONMENT FEATURES.

The third and final subsection of the additions to and modifications of the inital theory of exceptions in SPE will be concerned with so-called rule environment features. These features were proposed apparently independently in two papers in the same 1970 issue of Papers in Linguistics: Kisseberth's "On the Treatment of Exceptions", and Coats' "Rule Environment Features in Phonology". I will discuss these two papers in the subsection immediately below. One of Coats' examples given there will serve to clarify the relation between environment features and the SPE-theory in (27). In a second subsection I will discuss further support for rule environment features as provided by Coats (1974), and Coats and Lightner (1975).

3.3.3.1. KISSEBERTH (1970) AND COATS (1970) ON RULE ENVIRONMENT FEATURES.

Kisseberth (1970) deals with one rule of the phonology of Piro, an Arawakan language spoken in Peru. The rule is VOWEL DROP, formulated as in (79).

(79) $V \Rightarrow \emptyset \; / \; V \; C \; \_\_ \; + \; C \; V$

Examples of the operation of this rule include those of (80).

(80)	yimaka	+ lu	'nomin.'	:	yimaklu	'teaching'
	heta	+ lu	'3 obj.'	:	hetlu	'see it'
	heta	+ ya	'there'	:	hetya	'see there'
	hata	+ nu	'abstr.'	:	hatnu	'light'
	čokoruha	+ kaka	'cause'	:	čokoruhkaka	'cause to harpoon'
	salwa	+ kaka + lu		:	salwakaklu	'cause him to visit'

The rule of VOWEL DROP happens to have an interesting range of exceptions. In particular, there is a class of suffixes which never cause the final vowel of a preceding morpheme to drop. This class includes the verbal theme suffix -ta, the anticipatory suffix -nu, intransitive -wa, and its homophone -wa meaning 'still, yet'. Examples are displayed in (81).

(81)

meyi-ta	'to please'	hata-ta	'to illuminate'
meyi-wa-ta	'to celebrate'	poko-wa-ta	'to establish a town'
heta-wa	'still see'	heta-nu	'going to see'

Curiously enough, the class of exceptional suffixes itself is split up into two subclasses: one includes -ta, -nu, and intransitive -wa, and allows deletion of the suffixal vowel itself when followed by a suffix triggering deletion; the other includes -wa 'still, yet', which neither triggers deletion, nor allows deletion of its own vowel. Examples are given in (82), (i) and (ii), respectively.

(82)

(i)	meyi - w - lu	'celebration'
	yona - t - nawa	'to paint oneself'
	heta - n - ru	'going to see him'[12]
(ii)	hišinka - wa - lu	'to be still thinking about it'
	heta - wa - lu	'to see him yet'

Kisseberth's concern, then, is how to account for these curious phenomena. His main concern in this, we may observe beforehand, will not be with those cases where vowels consistently fail to disappear, as from the suffix -wa 'still, yet' in (82ii). To account for this case, the suffix may simply be lexically marked as [- rule VOWEL DROP]. More problematic, however, will be the failure of some suffixes to trigger deletion, and the interaction of this characteristic with the readiness, or respective lack of it, to lose their own vowel.

In order to account for the data in (80)-(82), Kisseberth considers three possible analyses, two of which are rejected. Let me briefly discuss the two rejected analyses first. As pointed out in subsection 3.2.1., Chomsky and Halle limit the power of their theory of exceptions by allowing only the focus of a rule to contain the rule feature [+ rule n] by convention. Consequently, a rule can be prevented from applying to a segment if the segment itself contains a negatively signed rule feature, but the context in which the segment appears cannot block the application of the rule. Having proposed this constraint, Chomsky and Halle add that it "is easy to invent examples that militate against this assumption but we have no clear cases in a real language" (SPE: 375). The Piro VOWEL DROP data, however, look suspiciously like an example of the required format. Thus, one could relax the SPE constraint, and assume that each segment of the structural description of a given rule contain the specification [+ rule n]; furthermore, we would add [- rule n] to our exceptional Piro suffixes in their lexical representations. While on very first glance this seems a feasible proposal, there is, however, a very serious disadvantage to this procedure: on the one hand it accounts nicely for the behaviour of -wa 'still, yet', which fails both to undergo and trigger deletion. On the other, we lose the opportunity to segregate this suffix from the remaining three, since for these the lexical specification [- rule n] will incorrectly prevent them from dropping their own vowel, too. Rule feature markings on environments of rules are apparently incapable of describing both types of interaction at the same time: they are able to describe one, to the exclusion of the other.

Kisseberth's second alternative (eventually also rejected) resides in SPE's notion of 'readjustment rule', by means of which the failure of some suffixes to trigger deletion can be described as in (83).

(83) V => [- rule VOWEL DROP] / __ + ta, wa, nu, wa ...

Each vowel immediately preceding the suffixes mentioned in (83) would thus be marked as an exception to VOWEL DROP, which will have precisely the desired effect when the rule itself comes along. Unfortunately, this analysis has two drawbacks. Firstly, "the environment for this 'rule' is in fact a list, and the information it contains would appear to be more appropriately contained in the lexicon itself" (Kisseberth, 1970: 55). Secondly, Kisseberth advances an argument against the power of readjustment rules of type (83) (Kisseberth, 1970: 57) of the following structure:

(84) ... this approach would permit certain kinds of "exceptional contexts" which is not at all clear should be permitted. For example, a given morpheme could block the application of a phonological rule even though that morpheme is not part of the context of the rule. For example, consider a language which has a rule shortening vowels before two consonants. This language could have a readjustment rule of the form,

V => [- SHORTENING] / pa + ___

(where pa is some arbitrary morpheme). Indeed it would not have to be the case that the exceptional morpheme be adjacent to the segment being assigned the rule feature. Thus the above rule might be formulated slightly differently:

V => [- SHORTENING] / pa + C V C_0 + ___

It remains to be demonstrated that exceptions of this sort exist (where a particular morpheme limits the application of a rule but is itself not part of the context for the rule), and thus less powerful apparatus should be preferred until proven insufficient. (55)[13]

Given the failure of the 'rule feature' and the 'readjustment rule' approaches, the correct account of the Piro facts is, according to Kisseberth, as follows. Each formative will in principle be lexically specified for two sets of exception features, [α rule n] and [α context n]. Furthermore

(85) A rule n applying to the A in the context X__Y will block if either A' is specified as [- rule n] (but not neceesarily [- context n]), or if X' and Y' is specified as being [- context n] (though not necessarily [- rule n]). (57)

This approach results in the following tripartite division of Piro suffixes, as regards the rule of VOWEL DROP:

(86)

kaka et al.	*ta* et al.	*wa* 'still, yet'
+ rule VD	+ rule VD	- rule VD
+ context VD	- context VD	- context VD

Kisseberth adds (57):

(87) Not only is this analysis adequate to the Piro facts, it is significantly less powerful than the readjustment analysis. To cite one key difference, under the latter analysis a morpheme may block application of a phonological rule only by virtue of having one or more of its segments in the context governing application of the rule. The readjustment approach is not so constrained.

In its set-up, Coats (1970) bears a striking resemblance to Kisseberth (1970). In order to show this, I will briefly discuss two of Coats' examples here. Firstly, in Russian there is a small set of suffixes (loc. and dat. sg. -*e*, imp. -*i*, and possessive -*in*) which block an otherwise general rule turning *k* into *č*, before front vowels. Examples are given under (88).

(88)	ruk	'hand'	: ruč,ka	'little hand'	(<ruk+ik+a)
			ruk,e	'hand'	(<ruk+e)
	suk	'bitch'	: suč,ka	'small bitch'	
			suk,in	'bitch's'	
	pek	'to bake'	: p,eč,et	'bakes'	
			p,ek,i	'bake!'	

Coats observes that one "can, however, say that the suffixes mentioned above are marked -A, and then restrict (k>č,) to apply to a velar only if the vowel following the velar is marked +A. In this analysis (k>č,) would be formulated as follows.

[(89)] (k>č,) [-ant] => [-back] / ___ $\begin{bmatrix} -\text{cons} \\ -\text{back} \\ +A \end{bmatrix}$ " (121)

Notice that the suffixes blocking k > č, cannot themselves be marked by rule features since they are not represented by the focus of the rule, but by its environment.

Coats' second example is a reanalysis of the SPE description of the circumstances under which the vowel of the Russian suffix -isk drops or fails to drop. The SPE-analysis, which was given more elaborately in subsection 3.2.3., may be represented schematically as in (90) (cf. (24)),

(90)

	/sibír+isk+əy/	/gréč+isk+əy/ -D	/muš+isk+óy/ +D
READJ RULE	-	[- rule DEL]	-
DELETION	ø	-	ø
LOWERING	-	e	-

where (i) the readjustment rule specifies the i of isk as [- rule DEL] after [-D] non-anterior consonants, (ii) deletion occurs in the environment __CCV, and (iii) lowering occurs "elsewhere".

Coats reanalyses this case in essence by reversing the order of the lowering and deletion rules, to the effect that i will be lowered in between [-ant]___CC, and deleted elsewhere. This correctly predicts sibirskəy (since r is anterior), and greč-eskəy (since č is non-anterior). The exceptionality of mušskoy can now be accounted for by adding, again, [+D] to muš in the lexicon, and to add, this time, [-D] to the non-anterior consonant of the lowering rule. Under this assumption the lowering rule will be that of (91).

(91) $\begin{bmatrix}+\text{syll}\\-\text{tense}\end{bmatrix} \Rightarrow [-\text{high}] \;/\; \begin{bmatrix}+\text{cons}\\-\text{ant}\\-\text{D}\end{bmatrix} \_\_\_ \; C_2$

Notice that this obviates the need for a readjustment rule introducing a minus rule feature, and that therefore derivations will run as in (92).

(92)

	/sibir+isk+əy/	/greč+isk+əy/ −D	/muš+isk+oy/ +D
LOWERING	-	e	-
DELETION	ø	-	ø

However, although this analysis works, i.e. it accounts for the data, this is not according to Coats something to be proud of. Rather, he would like to replace it by an analysis following from the addition of the following conventions to the theory of exceptions in generative phonology:

(93) (i) Each lexical item will be marked either [+ env. rule n] if it may serve as the environment of rule n, or [- env. rule n] if it may not serve as the environment of rule n;

(ii) A segment specified [- env. rule n] may not function as part of the environment of rule n.

Markers of the form [α env. rule n] will be called "rule environment features". Under this approach, the suffixes -e, -i, and -in will be lexically marked as [- env. rule k>č,]. Similarly, a stem such as muš will be marked [- env. lowering]. These markings will be sufficient for the rule to block before these suffixes.

Coats has in fact several reasons to prefer the analysis with his "environment features" to one with an "alphabet feature". A first drawback of the latter is described as follows:

(94) In the theory that utilizes only rule features and rule environment features a particular segment may block application of a rule that otherwise would apply only if the segment occupies a position specified in the structural description of that rule - either the position of the segment to which the rule would normally apply, or a position in the environment of the rule. In the theory that utilizes alphabet features, however, there are no restrictions of this kind. A particular segment may block application of a rule even if the segment does not occupy a position in the structural description of the rule. (133)

Clearly, this is Kisseberth's concern with power revisited. Coats calls exceptions of this unlikely type "detached exceptions", and provides a hypothetical example where a Russian prefix ba- is supposed to block palatalization of k to č, in a form /ba+p,ek+e+t/. The readjustment rule needed to handle this situation would be (95) (slightly revised, cf. Coats, 1970: 134).

(95) $k \Rightarrow [-\text{ rule PAL}] \;/\; ba + C_0\, V \;\_\_\; +$

Coats adds (with more justification than Kisseberth, because of his reanalysis of Russian jer-deletion, cf. fn.13):

(96) I suspect that detached exceptions ... do not occur in any language. If they do not occur, then the theory utilizing rule environment features must be preferred to the one utilizing alphabet features, because only the former accounts in a straightforward way for the fact that detached exceptions do not occur. (134-5)

It will be clear from the above survey that Kisseberth (1970) and Coats (1970) make, in effect, the same proposals as to the incorporation of rule environment features (Kisseberth's "context"-features) into the theory of exceptions in generative phonology. Furthermore, Coats' second example from Russian clarifies the position of this proposal in relation to the SPE-theory as sketched in (27): environment features are proposed to replace cases where an 'alphabet feature' occurs in the environment of a rule. Thus, even under the original SPE-analysis,[14] the stem muš might have been described as [- env. readj. rule (23)], after which deletion of i would follow (cf. fn. 5). It will also be clear that the introduction of environment features will have to be accompanied by a set of marking conventions à la those introduced for minor rules, given above in various versions. For instance, the Piro suffixes blocking deletion, and the Russian suffixes blocking palatalization would have to be marked with m for the respective environment features in the lexicon, so as to indicate their irregular status versus the suffixes triggering deletion and palatalization, respectively. In the next subsection, I will briefly summarize some further evidence for rule environment features in generative phonology, as forwarded after 1970.

3.3.3.2. FURTHER EVIDENCE FOR RULE ENVIRONMENT FEATURES IN GENERATIVE PHONOLOGY.

Additional evidence for the above approach towards environmental exceptions in generative phonology is provided by Coats (1974), and Coats and Lightner (1975). I will discuss these papers in this order below.

The example of an environmental exception in Coats (1974) runs as follows. In Russian, imperfective verbs contain a stem and a verbal suffix, plus tense marker and person suffix. From these imperfective verbs one can derive perfective verbs by prefixations of several types. And from perfective verbs one can again build secondary imperfective verbs by addition of the suffix -aj. Thus, the following verbs may be derived from the verb-stem pek 'to bake' (which happens to take a 'zero' verbal suffix):

(97)	pek + Ø + e + t	'bakes'		imperfective
	na + pek + Ø + e + t	'will bake'		perfective
	na + pek + Ø + aj + e + t	'bakes'		2ndary imperfective

A curious characteristic of the secondary imperfective suffix -aj is that it brings about a change to w in an immediately preceding j, as shown by j-final verb-stems with 'zero' verbal suffixation, or by verb-stems followed by one of the verbal suffixes aj and ej.

(98) (i)	na + duj + Ø + aj + e + t	'blows'	: naduvajet
	do + pij + Ø + aj + e + t	'drinks up'	: dopivajet
(ii)	za + bol + ej + aj + e + t	'becomes ill'	: zabolevajet
	vy + dum + aj + aj + e + t[15]	'invents'	: vydumyvajet

The rule required for this alternation may be stated as "j > w / __ + aj", where aj is further specified as the derived imperfective suffix, not the verbal suffix of the same phonological shape, which does not trigger the rule. Although this analysis clearly works, it is again not, according to Coats, an analysis to be proud of. Specifically, he argues:

(99) .... the analysis fails, because it makes the explicit claim that j is backed to w before a certain suffix because this suffix has certain phonological and morphological properties, and yet there is no reason to expect, on general principles, that these morphological properties should have any effect on the preceding glide. Certainly it is not a characteristic of derived imperfective suffixes, in languages which have such suffixes, that they typically cause preceding segments to be backed. This is not a plausible or natural phonological process in the way that palatalization of consonants before front vowels, for example, is plausible and natural. (38)

Rather, Coats replaces the above tentative rule with the assimilation rule (100),

(100) $\begin{bmatrix}-\text{syll}\\-\text{cons}\end{bmatrix} \Rightarrow [+\text{back}] \;/\; \_\_\_ \; \begin{bmatrix}+\text{syll}\\+\text{back}\end{bmatrix}$

and dams the overgeneralization by means of the appropriate lexical specifications. In particular, the derived imperfective suffix -ja will be lexically marked as [+ env. BACK], the verbal suffix of the same phonological shape will be marked as [- env. BACK].

In a footnote to Coats (1974: 35, fn.8), the author points out a curious characteristic of some verbs allegedly taking the verbal suffix -a, such as pisát' 'to write'. This verb has the basic imperfective pišet, the perfective zapišet, and the

derived imperfective zapisyvajet. Since the latter form has all characteristics of a derived imperfective of an aj-verb (/za+pis+aj+aj+e+t/, cf. (98ii)), Coats proposes to handle this verb by assuming that it has the verbal suffix -aj throughout its paradigm, and that -a is dropped from its basic imperfective and perfective by some special rule: /pis+aj+e+t/ > pišet, and /za+pis+aj+e+t/ > zapišet. This proposed rule of a-drop is the subject of Coats and Lightner (1975). They point out that if pišet is derived from /pis+aj+e+t/ by VOWEL DROP, that there must be some way to prevent deletion of a in the large class of aj-verbs such as čitát''to read', which has the imperfective čitajet, and so forth (in the derivations of pisát' and čitát' j will be dropped before a consonant, which is regular for Russian, cf. below). They propose that VOWEL DROP is the rule in (101),

(101) $V \Rightarrow \emptyset \; / \; \_\_\_ \; j \; V$

and that "the roots in verbs like pisat' must be specially marked as undergoing the morphological rule V-drop" (339). They find some independent purpose for (101) in an alternation between two comparative suffixes: productive -eje, as in gordeje 'prouder', and non-productive -e, as in moleže 'younger'. They propose to derive the irregular forms by deletion of the leftmost e from -eje by VOWEL DROP:

(102) V-drop is what Lakoff 1970 calls a minor rule, one that never applies except to forms specifically marked as undergoing the rule. Thus roots like molod- .... will be marked as irregular in that they undergo V-drop in the comparative. (339)

An almost unforgiveable informality is then corrected in a footnote:

(103) Actually, V-drop is a special type of minor rule in that it applies to [morphemes] marked to undergo the rule (the comparative suffix -ẹje [and the verbal suffix -aj]) only if the latter [occur] after a morpheme marked to trigger the rule, such as the [root molod-]. Rules of this type are discussed briefly in Coats 1974.

In footnote 17 to Coats (1974: 40), the author in fact proposes the following terminological classification among phonological rules:

(104) major-maxi rules, which apply to regular morphemes in regular environments;
major-mini rules, which apply to regular morphemes in exceptional environments;
minor-maxi rules, which apply to exceptional morphemes in regular environments;
minor-mini rules, which apply to exceptional morphemes in exceptional environments.

Within this classification, VOWEL DROP in Russian is a minor-mini rule, with lexical markings as in (105):

(105)

	stems	suffixes
regular	čit, gord	
	- env. VOWEL DROP	- rule VOWEL DROP
irregular	pis, molod	ẹje, aj
	+ env. VOWEL DROP	+ rule VOWEL DROP

3.4. THE FAILURE OF RULE ENVIRONMENT FEATURES.

In the above three subsections of section 3.3. I have been concerned with three (sets of) proposals towards modifications of and additions to the theory of exceptions in generative phonology as presented by Chomsky and Halle in The Sound Pattern of English. These modifications and additions amount to the introduction of (i) the distinction between major and minor rules; (ii) so-called structural description features, or more generally: the possibility for phonological rules to apply to forms which do not meet their structural description; and (iii) so-called rule environment features. Plus, of course, in each case an amount of accompanying formalism, such as marking conventions, rule markings, appropriate restrictions, and so forth. In the present section it will be my purpose to present arguments to the effect that these modifications and additions are in fact superfluous. The presentation of these arguments will run as follows. First, it will be shown that rule environment features as introduced by Kisseberth and Coats, and further supported by Coats and Lightner, fall short of the specific task assigned to them in a rather obvious way. This argument will proceed in two steps. Firstly, I will show that the argument against rule environment features as presented in Iverson and Ringen (1977) is based on a mistake. Secondly, I will present a group of new arguments towards the same aim: rule environment features should be banned from the exception theory of generative phonology. Since there appears to be no obvious way to correct their failure with retention of the features themselves, we will have to fall back on the only alternative presently available: SPE's alphabet features, albeit with severe constraints on the situations where they may be invoked. Since we have shown in the previous section that alphabet features are capable of handling minor-rule phenomena and cases of 'overapplication', it will follow that to maintain the

theoretical distinction between major and minor rules, and structural description features (or some similar device à la Kenstowicz) by the side of alphabet features, would be to create an unnecessary and therefore undesirable duplication within the theory. A summary of the theory of exceptions within generative phonology emerging from these observations will be presented at the end of the section.

3.4.1. THE FAILURE OF IVERSON AND RINGEN (1977) ON RULE ENVIRONMENT FEATURES.

The most elaborate recent article on the subject of environmental exceptions in generative phonology is Iverson and Ringen's "On Constraining the Theory of Exceptions". In this paper, the authors compare three ways of accounting for environmental exceptions, with reference to the two initial papers by Kisseberth and Coats discussed here in subsection 3.3.3.1. These three alternatives are:

(106) (i) rule features introduced by diacritically and contextually restricted readjustment rules;
(ii) context rule features;
(iii) diacritically triggered phonological rules.

By a very simple line of argument, Iverson and Ringen claim to show that (i) and (ii) are <u>unnecessary</u> for a description of the data from Piro and Russian advanced by Kisseberth and Coats, and furthermore that (i) and (ii) are <u>insufficient</u> for a description of some exceptional facts of Turkish Vowel Harmony. I intend to show in this subsection that, although simple, Iverson and Ringen's line of reasoning is, unfortunately, also incorrect.

Taking Kisseberth's Piro case as an example, the three alternatives above may be represented by the three analyses in (107).

(107) Analysis (i)

(a) V => [- VOWEL DROP] / ___ + $\begin{bmatrix} C \\ +D \end{bmatrix}$ V

where ta, nu, wa, wa.... are [+D]

(b) VOWEL DROP: V => ∅ / V C ___ + C V

Analysis (ii)

VOWEL DROP as in (ib), where ta, nu, wa, wa ... are [- env. VOWEL DROP]; no (ia).

Analysis (iii)

VOWEL DROP: V => ∅ / V C ___ + $\begin{bmatrix} C \\ +D \end{bmatrix}$ V

where ta, nu, wa, wa ... are [-D]; no (ia).

Analysis (i) may be compared to Kisseberth's pair (79)/(83) above, an analysis rejected since it allows for the possibility that so-called "detached" exceptions are described by the same formalism; (ii) is the analysis eventually chosen by Kisseberth; and (iii) is rejected for the same reason as (i) (cf. in this respect also Coats' rule (91) above, and accompanying discussion).

Commenting on these three alternatives, Iverson and Ringen propose to acquire the rationale behind (ii), a ban on detached exceptions, not through environment features and their associated formalism, but by following a consequence of Kiparsky's so-called Alternation Condition to the effect that "all readjustment rules which introduce rule features be context free" (Iverson and Ringen, 1977: 7) or, in Kiparsky's original words:

(108) [The Alternation Condition] probably should exclude the assignment of rule features to particular morphemes or segments by means of readjustment rules. Although Chomsky and Halle (1969: 379) allow for this operation, it is not certain that it is ever necessary. (1973a: 18)

Kiparsky then goes on to reanalyses of vowel harmony phenomena as in Nez Perce (cf. (13i) of this Chapter), and of jer-deletion in Russian (cf.14). In effect, this consequence of the Alternation Condition serves, of course, to destroy the detached exceptions argument as one exclusively in favour of analysis (ii): only (i) will be rejected by the Alternation Condition, while even under (iii) it will be impossible to describe detached exceptions, given the Alternation Condition. Therefore, like environment features, alphabet features are able to describe the facts from Piro adequately, and analogously those from Russian advanced by Coats.[16]

Having provided a reasonable alternative to environment features in analyses of type (iii), Iverson and Ringen in the second part of their paper adduce some exceptional data from Turkish Vowel Harmony which, they claim, select (107iii) over both (i) and (ii) in that they can be described by the former, but not the latter two. It is on this point, however, that they fail to make their case, and in order to see this consider the following brief summary of their exposition.

Turkish has a rule of BACKNESS HARMONY as in (109),[17]

(109) $V \Rightarrow [\alpha back] \; / \; \left[\begin{matrix} V \\ \alpha back \end{matrix}\right] \; C_0 + C_0 \; \_\_\_$

which accounts for instance for the harmonic vowels of the forms in (110).

(110)	somun	'loaf'	öküz	'ox'
	somun-um	'my loaf'	öküz-üm	'my ox'
	somun-lar	'loaves'	öküz-ler	'oxen'
	somun-lar-ım	'my loaves'	öküz-ler-im	'my oxen'

While (109) correctly predicts harmonic backness for an enormous amount of forms, there is nevertheless a handful of exceptions to deny it. These exceptions are of two types: in some cases a suffix vowel is front after a back vowel stem, in others it is back after a front vowel stem. Examples are displayed in (111).

(111) (i) front suffix after back vowel stem

hazf	'suppression'	- hazf-i	'the suppression'
dikkat	'attention'	- dikkat-im-iz	'your (pl.) attention'
saat	'watch'	- saat-im	'my watch'[18]
imsak	'fasting'	- imsak-ten	'because of the fasting'

(ii) back suffix after front vowel stem

fevk	'top'	- fevk-ı	'the top'
sevk	'dispatch'	- sevk-ı	'the dispatch'
tasdik	'confirmation'	- tasdik-ı	'the confirmation'
Utarid	'Mercury'	- Utarid-a	'to Mercury'

Given these exceptional data, Iverson and Ringen's aim is to show that they cannot be reasonably accounted for under theories (i) and (ii) of (107), while (iii) accounts for them comparatively straightforwardly. Their demonstration towards this end runs as follows.

Within an analysis of type (i), the readjustment approach, one would postulate rule (112), prior to the rule of VOWEL HARMONY in (109).

(112) $V \Rightarrow [-VH] \; / \; [+D] + C_0 \; \_\_$

However, given (112), always one class of (111) will be left unaccounted for: assuming underlying suffixal front vowels the forms in (111i) will be correctly derived, since for these forms (if marked [+D]) (112) will block VOWEL HARMONY. But at the same time, there will be no way to obtain the data of (111ii). Exactly the reverse situation holds when one assumes underlying back vowel suffixes: one obtains (ii), at the expense of (i).

According to Iverson and Ringen analyses of type (ii) fare hardly any better. Given front vowel suffixes, the stems of (111i) may be marked [- env. VH], but (111ii) is then left unaccounted for; the reverse again holds when one postulates back vowel suffixes.

As Iverson and Ringen point out, there is a variant of theory (ii) which with some force will account for all facts of (111).[19] The groups of forms left unaccounted for under this theory could be marked with an alphabet feature, say [+D], which would then also occur in an additional rule of the form (113), under the assumption of front vowel suffixes (or a comparable fronting rule under the assumption of back vowel suffixes):

(113) $V \Rightarrow [+back] \;/\; [+D]\ C_0 + C_0 \_\_\_$

However, in this situation the "two sets of exceptions are treated differently when they are totally parallel; in both cases the exceptional item requires the "wrong" suffix harmony. Accounting for one set of exceptions with a rule feature and the other set with a diacritically triggered rule misses this entirely" (12) (NB: for "rule feature" read: "environment feature", and for "diacritically triggered" read: "alphabetically triggered").

Eventually, then, theory (iii) remains. Within this theory Iverson and Ringen postulate a second rule of VOWEL HARMONY, or rather a rule of VOWEL DISHARMONY as in (114), which will account for the exceptional forms under (111) given the assumption that their stems will be lexically marked as [+D].

(114) $$V \Rightarrow [-\alpha back] \; / \; \begin{bmatrix} V \\ \alpha back \\ +D \end{bmatrix} \; C_0 + C_0 \; \_\_$$

They conclude: "we have shown that both the context rule feature and the readjustment rule approach to environmental exceptions are either insufficient (Turkish) or unnecessary (Russian and Piro)" (13)

Unfortunately, while Iverson and Ringen may have achieved the latter, they have certainly not succeeded in showing the former. For notice carefully the following methodological error. In their discussion of rule environment features, the authors claim that these features fail to account for the two cooccurring types of exceptions to VH (109). However, at the same time they show in their discussion of alphabet features that these features <u>can</u> account for the two types of exceptionality, not with regard to the rule of VH <u>sec</u>, but rather given an <u>additional</u> rule of VOWEL DISHARMONY. But of course the licence to add an extra rule should also be allowed to the environment feature theory, and in fact if allowed brings about a complete rehabilitation of these features: without the alphabet feature (114) may be considered a "mini rule" in the sense of Coats (1974) (cf. (104)-(105)), a type of rule for which all stems in (111) can be marked as [+ env. VOWEL DISHARMONY], without invoking alphabet features at any stage of the analysis, and without running the risk of diverging treatments as under the second variety of theory (ii). No decision is reached therefore in Iverson and Ringen's paper as to the adequacy of rule environment features versus alphabet features in Turkish Vowel Harmony, <u>pace</u> their claims to the contrary.

3.4.2. RULE ENVIRONMENT FEATURES RECONSIDERED.

In the previous subsection it was shown that a ban on so-called "detached" exceptions by Kiparsky's Alternation Condition, as proposed by Iverson and Ringen (1977), causes a tie as to two proposals of describing environmental exceptions in phonology, i.e. between rule environment features, or SPE's alphabet features. In the present subsection I will show that this tie exists only by virtue of good will or, perhaps more accurately, by virtue of oversight, and that in fact only alphabet features are capable of accounting adequately for environmental exceptions in phonology. In particular, it will be shown that the Kisseberth-Coats proposals (henceforth KC) are far less coherent then they appear to be at first glance, that they make predictions which are both initially implausible and empirically false, and that they introduce a good deal of theoretical arbitrariness in lexical exception markings. These objections to KC can be spelled out in four separate arguments, which I will present below.

As an introduction to the first two arguments, consider (115).

(115)

	V C V + C V	
(i)	m e y i + t a	(> meyita)
(ii)	y o n a + t a + n a w a	(> yonatnawa)
(iii)	b o + t a + c e + d i	

(115) contains three Piro forms, the upper two of which are actually occurring forms (cf. (81)-(82)), while the lower is, for the time being, hypothetical. Each form is matched with the structural description of VOWEL DROP, where the focus is emphasized. With each form, the suffix ta, a blocking suffix, proceeds one step to the left in a string of suffixes.

Within KC, -ta, since it blocks deletion of the final stem vowels in (i) and (ii), will be [- env. VOWEL DROP]. At the same time, however, it is [+ rule VOWEL DROP] since it loses its own vowel before non-blocking -nawa in (ii). This lands one with the following difficulty. Since exception features are features of entire formatives rather than of segments (cf. subsection 3.2.1., both Kisseberth (1970: 50, 56-7), and Coats (1970: 114, 129) subscribe to this constraint), both segments of -ta will be separately but identically marked [+ rule VOWEL DROP, - env. VOWEL DROP]. But the presence of the latter feature on the segment t will block, counterfactually, the deletion of the second a of (115ii). In other words, KC fails when a [+ rule n, - env. n] item is simultaneously partly focus, partly environment of the same structural description.[20] It will be recalled that precisely the failure to cover these cases led Kisseberth to reject an extended SPE-like rule feature account of them (cf. subsection 3.3.3.1.), and it is curious to observe therefore that his own proposals do not improve upon this account in any way. Those who should wish to claim that this example shows that segments (in this case only the vowel of -ta) rather than whole formatives should be marked for exception features will run into difficulties when we turn to the second argument.

From KC it follows that -ta ([- env. VOWEL DROP]) will block the rule also when it is part of the left-hand environment, as in (115iii) rather than the righthand environment. In other words, the theory makes no difference as regards the direction of the blocking. This is a highly implausible consequence, since one does not expect -ta to block VOWEL DROP in the position of (115iii). That this prediction is empirically false to boot can be shown with the help of a form from Kisseberth's source for the Piro data, Matteson's 1965 grammar of the language. Before I provide this crucial form, however, let me make two brief remarks. Firstly, Matteson's grammar is

naturally not set up so as to provide crucial evidence pro or con any (sub)theory of generative phonology. Rather, as stated in its introduction, it is written within the framework of Pike's "tagmemic" theory. Secondly, it should be noted that the form meeting the crucial requirements of (115iii) will be of an extremely restricted type: in order not to spoil our set-up, the suffix represented by -ce in (iii) must be of the non-deleting type, and the suffix represented by -di must be non-blocking. These observations may explain why I have been able to surface only one crucial form. It does exist, however, and its description runs as follows (Matteson, 1965: 78).

The stem čokoruha 'to harpoon' (cf. (80)) may be prefixed with w- meaning, oddly enough, 'we'. Furthermore, the following string of suffixes may be added: -ha, the 'sinister hortatory', a blocking suffix; -nu, the anticipatory suffix, a blocking suffix which may itself undergo deletion (cf. (81)-(82)); and finally -lu 'it', a non-blocking suffix (cf. (80)). The resulting string is that of (116), where again the structural description of VOWEL DROP is matched (I ignore further possible leftward matchings, which are irrelevant since both -ha and -nu are blocking suffixes).

(116) V C V + C V

w + č o k o r u h a + h a + n u + l u 'let's harpoon it'

The prediction made within KC is that the vowel of -nu will stay since -ha is a blocking suffix, i.e. [- env. VOWEL DROP], and part of the environment of the rule. One's expectation is that the vowel will drop. In actual fact, the vowel does drop, the correct output form being wčokoruhahanru (cf. fn. 12). Those who should wish to claim that this argument, together with the first, shows that environment features should be separated into left-hand and right-hand environment features, should consider answers to the following two arguments.[21]

The third argument is one against the very essence of KC. Recall that the theory was set up so as to exclude so-called "detached exceptions". It is unfortunate, in this light, that one of the examples provided by the proponents of the theory themselves, the case of Russian VOWEL DROP forwarded by Coats and Lightner (1975), is apparently by oversight a flesh-and-blood case of this phenomenon. The rule of VOWEL DROP itself, (101) above, lacks a left-hand environment, and yet some stems immediately to the left of the focal vowel are understood to trigger the rule. Naturally, this particular defect may be remedied by adding "C+" as a left-hand environment to the rule, but the vacuity of this suggestion is immediately clear when we become aware that we might as well add "[+segm]+", or "$[+segm]_0+$", or X.

The fourth and final argument presented here owes its structure to a very similar one advanced by Tranel (1974: 116) which has, however, a slightly different aim. In the relevant passage, Tranel argues against an analysis of French (specifically that of Schane, 1973b-c) where surface nasalized vowels are derived from underlying sequences of oral vowels-cum-nasal consonants. Such an analysis forces one to give up the universal claim that exception features are morphemic rather than segmental in the face of forms such as those displayed in (117), which contain both a nasalized vowel and a sequence of oral vowel-cum-consonant within one morpheme.

(117)		
	Agamemnon	agamɛmnɔ̃
	intérim	ɛ̃terim
	Kremlin	krɛmlɛ̃
	tandem	tɑ̃dɛm

But, as Tranel points out, even if we relax the constraint on the morphemic-ness of exception features, the problem remains of how to account for the exceptionality. Specifically, is the vowel exceptional because it fails to nasalize, or is the

consonant exceptional because it fails to trigger nasalization? "The decisions are all arbitrary" (116). Tranel then goes on to conclude that deriving the surface forms in (117) from identical underlying forms both avoids this arbitrariness, and allows one to maintain the universal claim to the effect that exception features are morphemic.[22]

For our purpose, notice that if we turn Tranel's argument upside down, it may be used against a theory which defines both rule features and rule environment features as valid exception mechanisms. Specifically, and by way of illustration, consider the situation where a Piro stem does exceptionally never lose its final vowel, before any suffix. It is irrelevant within KC whether this stem is marked [- rule VOWEL DROP] or [- env. VOWEL DROP] (or both, although this will be excessively costly). As long as the exceptional morpheme contains both the focus and the environment of the rule, any of these markings will be sufficient to block the rule. While I have not been able to find a stem of this type in Matteson's grammar, real examples from other languages are not hard to come by. Thus, to return to the standard example of a simple exception in generative phonology, one of the subrules of the rule of TRISYLLABIC LAXING in English (cf. subsection 3.2.1.) will have the structural description of (118i). Notice that this is also the structural description of Piro VOWEL DROP, with only the plus-boundary one step to the left, and a different focus. If we match with this structural description the irregular noun obesity, as in (118ii) it turns out that it is completely arbitrary whether we mark the stem obese either as [- rule LAXING] (as in all 'standard' accounts) or as [- env. LAXING], since e will be the focus of the laxing rule, and s will be part of its environment.

(118) $\underline{V}$ C + V C V

(ii) o b e s i t y

In precisely the same way, it will be arbitrary whether French monomorphematic forms such as those in (119)

(119)

album	albym
harem	arem
hymne	imn

where unexpectedly the vowels are not nasalized, are either [- rule NASAL] or [- env. NASAL], since the non-nasal vowel is the focus of the rule, and the nasal consonant itself will be (part of) the environment. It does not strike one as an exaggeration to require that no adequate theory of exceptionality in generative phonology allow for this kind of arbitrariness.

3.4.3. A THEORY OF EXCEPTIONS IN GENERATIVE PHONOLOGY.

It will be clear, as a result of the above considerations, that the treatment of environmental exceptions in KC, although perhaps superficially a plausible set of proposals, fails on many accounts on closer scrutiny. As shown, it is inherently contradictory, implausible, empirically false, and arbitrary. This leaves one, then, with the urgent question of the alternative. If KC fails, what will replace it? In answering this question, we might take a second look at Iverson and Ringen's alphabetically triggered phonological rules, the validity of which has, after all, not been called into question here. With respect to this proposal, it is clear that the first two arguments of the previous subsection are invalid. For instance, when the right-hand environment of Piro VOWEL DROP contains an

alphabet feature as in (107iii), no claims follow as to the characteristics of either the focus or the left-hand environment. Moreover, the fourth argument appears to be invalid as well in relation to alphabetically triggered rules. While at a cursory glance it is arbitrary whether we mark forms such as those in (119) as either [- rule NASAL], or with some diacritic alphabet feature, say [+Q], under the latter analysis the nasalization rule itself will have to be complicated with [-Q], just as those forms which undergo the rule regularly. Surely any adequate evaluation measure will prefer the former account to the latter. This leaves us with the third argument, the case of detached exceptions vis-à-vis Russian VOWEL DROP. While it is easy enough to explain away this argument by proposing to add an alphabet feature, say [+G], as the left-hand environment of the rule, by doing so we immediately introduce the possibility for more highly detached exceptions, since nothing would prevent us in principle from writing a rule of VOWEL DROP after $[+G]+C_0VC_0+\_\_\_\ldots$, and so forth, the very thing we are trying to avoid. It is significant, therefore, that at least for part of Coats and Lightner's analysis an alternative explanation is offered in Thomas (1974). Specifically she argues that pisát' is not an aj-verb like čitát' as in Coats and Lightner (1975), but rather an uj-verb. Furthermore, the derived imperfective verb suffix is vaj rather than aj. Under these assumptions, correct outputs follow by independently required rules of Russian phonology, as in (120) (for further details, cf. Thomas (1974)).

(120)	/pis + uj + t/	/pis + uj + e + t/
u>a / __ [+son] C	a	-
JER DEL	-	ø
PALATALIZATION	-	š ø
j > ø / ___ C	ø	-
output:	pisat	pišet

	/za + pis + uj + vaj + e + t/
(cf. fn. 15)	y
u>a / __ [+son] C	-
JER DEL	-
PALATALIZATION	-
j > ø / ___ C	ø
output:	zapisyvajet

As far as I am aware, Thomas' analysis as represented in (120) explains everything Coats and Lightner intend to explain, and it avoids the difficulties they run into with stems as detached exceptions.[23] Furthermore, while Thomas does not discuss the additional motivation for VOWEL DROP, it appears that the alternation between the two comparative suffixes -eje and -e might be explained along similar lines, that is, by postulating different suffixes rather than one suffix treated differently in an ad hoc manner depending on the preceding stem. This appears to be a perfectly feasible proposal, and if it is accepted no arguments remain, as far as I can see, against the use of phonological rules triggered by alphabet features as the appropriate means of accounting for environmental exceptions in generative phonology.

From these observations, the following picture of the over-all theory of exceptions in generative phonology emerges. In section 3.3. above I have taken pains to point out how each modification of and addition to the theory of SPE in (27) refers to a specific task of SPE's alphabet features. Thus, within the

SPE-framework "minor rules" are represented by alphabetically conditioned rules, in particular in those cases where these rules are collapsed with "major rules", as in English VOWEL SHIFT. Similarly, collapsed major and minor rules represent cases of "overapplication" of the Harms-Kenstowicz type (including "structural description features"). And finally, "rule environment features" are represented by alphabet features specified in the environmental conditions of a rule, as for instance in SPE's account of Russian JER LOWERING and DELETION. Therefore, under the assumption that rule environment features fail, as shown in this thesis, and that furthermore SPE's alphabet features are the only alternative presently available, it would clearly be to allow two unnecessary cases of theoretical duplication if one would maintain both alphabet features and structural description features (or some similar device in the sense of Kenstowicz (1970)) on the one hand, and both alphabet features and the distinction between major and minor rules on the other. Put differently, if alphabet features are required anyway in the description of environmental exceptions, they can be used both for cases of "minor rules", and cases of "overapplication" as well, with the additional advantages that (i) the elaborate formal machinery for minor rules in (53) can be dispensed with; and (ii) we will be able at least to make a start with constraints on the notion "overapplication", by limiting the way in which alphabet features may be collapsed with other features in phonological rules (as pointed out in subsection 3.3.2.2.). In fact, a very tight constraint of the required sort will be forwarded below. If this line of reasoning is accepted (and I see no reason why it should not), a description of the resulting theory of exceptions in generative phonology will run as below. The theory will contain the following features, with tasks and constraints as indicated.

(1) Rule Features.

Rule features will be used precisely as in SPE, for simple exceptions of the type obesity. The only addition to the SPE-theory resides in the condition on possible readjustment rules to the effect that readjustment rules introducing rule features should be context-free, so as to disallow "detached exceptions", in conformity with Kiparsky's Alternation Condition. This condition is therefore both independently motivated, and a tightening of the theory. By this constraint, readjustment rules of type (10) will be allowed since non-derived formatives are specified as exceptions to the English rule of VELAR SOFTENING in a context-free manner, while (11) will be disallowed since it specifies vowels as exceptions to the English laxing rule in the context of dental clusters. It is shown in Iverson (1977) that in the latter case a complication of the laxing rule does not necessarily follow, since (11) is superfluous and the laxing rule can be maintained in its general and elegant form under the modified form of the Alternation Condition as proposed in Kiparsky (1973b). For the precise structure of this argument the reader is referred to Iverson's paper. Notice finally that to replace also rule features by alphabet features, although technically feasible, would be a reductio ad absurdum. This is shown, for instance, by the standard example obesity, where under this suggestion TRISYLLABIC LAXING and all regular forms would have to contain an alphabet feature, say, [+T], where obesity would be [-T]. This would be a complete misrepresentation of the exceptionality of obesity versus regular forms such as profanity, and so on.

(2) Morphological Features.

Morphological features will be used, again precisely as in SPE, for cases of exceptionality vis-à-vis various rules of the grammar at the same time. It has been pointed out by Lightner

(1972a: 430ff.) that these features are excluded by Kiparsky's Alternation Condition just as alphabet features (Kiparsky, 1973a: 19-20), but that Kiparsky's alternative (rule features also for these cases) does not always work. In brief, Lightner's observations run as follows. He points out that in general Kiparsky's alternative is inadequate in three different situations:

(i) various components may have a different underlying segmental inventory. Thus, in Russian the non-native component contains both plain n and palatalized n', while for the native component n' is a contextual variant of n. It is not easy to see how rule features could describe such a situation;

(ii) various components may differ in the sequences of segments allowed. Thus, the non-native component of English will allow pt, mn, and so forth, but not so the native component. Again, rule features cannot handle such a situation;

(iii) different sets of rules may apply in different systems. Thus, in Russian native underlying t/d alternate with č/ž, while in the non-native system they alternate with šč/žd.

Finally, there is a fourth situation where rule features are inadequate as an alternative to morphological features, which Lightner describes as follows (op.cit.: 434):

(121) Consider, for example, a language in which the vocabulary is subdivided into groups I and II in such a way that morphemes belonging to group I fail to undergo rules A, B, E, F, K, L, M, and S. Kiparsky's analysis requires the rules

(cont.)

(cont.)

[- rule A] => [- rule B]
[- rule B] => [- rule E]
•
•
•
[- rule M] => [- rule S]

But in this system it is not possible to state that one particular morpheme in group II is an idiosyncratic exception to rule A (and only rule A).

Within the approach with morphological features, such an exception would be marked [+II], but [- rule A]. For these reasons the theory of exceptions should contain both rule features and morphological features.

(3) Alphabet Features.

As pointed out above (cf. fn. 14), Kiparsky's Alternation Condition excludes alphabet features, where he refers to Kisseberth (1970) and Coats (1970) for the alternative: rule environment features. However, as shown in this thesis, rule environment features are inadequate, and alphabet features are the only alternative available at present. In fact, it is proposed here that alphabet features are used in precisely the same manner as in SPE (minor rules collapsed with major rules as cases of 'overapplication', and environmental exceptions), with one modification pertaining to the operation of readjustment rules. Reconsider in this respect the derivations of past tense sat (derived in a two-step analysis of readjustment rule plus independently motivated phonological rule) and of the plural geese (derived in one step by a readjustment rule since an independent phonological rule with the required effect is lacking), as summarized in (122).

(122)

	[[s i t] <u>past</u>]	[[g o o s e] <u>pl</u>]
READJ	s i t +F	READJ [g e e s e]
VOWEL SHIFT +F	s a t	

In particular, in this <u>SPE</u> analysis it is not clear how the relevant readjustment rules themselves are triggered. It appears to be reasonable, and a step towards theoretical coherence, to propose that alphabet features are part of the underlying representations of the irregular forms in these cases, and that both readjustment rules and phonological rules can be triggered by them, say as in (123):

(123)

	[[s i t] <u>past</u>] +F	[[g o o s e] <u>pl</u>] +G
READJ +F	[s i t] +F	READJ +G [g e e s e]
VOWEL SHIFT +F	s a t	

Notice that under this proposal the essential characteristics of the <u>SPE</u> account are maintained in that independently motivated phonological rules are employed as much as possible (VOWEL SHIFT versus UMLAUT), but that at the same time readjustment rules apply just in those cases where they should: to irregular forms lexically specified so as to undergo them. Finally, notice that under this proposal readjustment rules correspond to "minor rules" within the Lakoff-Lightner framework, that they are morphologically conditioned, and that they precede all phonological rules, as formulated in a universal constraint by Lightner (1972a) (cf. (45)). The fact that such constraints can still be formulated within the present framework (although the notion "minor rule" has been completely abandoned, only "major rules" exist) appears to be strong confirmation of its correctness.[24]

The above survey leaves us with two tasks. Firstly, as pointed out in subsection 3.3.2.2., given the fact that we allow for 'overapplication' of phonological rules in irregular cases, we will have to place severe restrictions on the possibilities of our theoretical mechanisms towards this phenomenon. In particular, even if "structural description features" are replaced with alphabet features braced into phonological rules, if alphabet features can be collapsed with just anything we will still have a situation where "any segment could potentially condition or undergo any rule" (Kenstowicz, 1970). Or, in the words of Halle (cf. Selkirk and Vergnaud, 1973: fn.5):

(124) In Armenia, there is a special kind of nightingale
which sings when the moon shines.
And when the moon does not shine?
It sings anyway.

However, as pointed out above, even Halle allows for some form of overapplication in SPE, in for instance English VOWEL SHIFT. It should be added immediately, of course, that this case is analysed in SPE firstly in conformity with the notion phonological rule in its obvious sense (forms can only undergo a rule if they meet its structural description, never when they do not), and secondly in conformity with the theory of exceptionality found adequate here, that is, with the aid of an alphabet feature. Furthermore, as pointed out earlier, at the present stage of research it is only within such a framework that one can at least make a start with formal restrictions on cases of overapplication in phonology.

3.5. WEAKENING IN DUTCH REVISITED.

3.5.1. THE ONE FEATURE HYPOTHESIS.

The reader will recall that in Chapter 2, section 4.1. I formulated a rule of D-WEAKENING in Dutch, repeated here for convenience.

(125)

$$\begin{bmatrix} -\text{son} \\ -\text{cont} \\ +\text{voice} \end{bmatrix} \Rightarrow \left\{ \begin{bmatrix} +\text{son} \\ -\text{cor} \\ -\text{ant} \end{bmatrix}, \emptyset \right\}_j / [-\text{cons}]_i \left\{ \begin{matrix} [+\text{back}]_i \\ [-\text{cons}] \end{matrix} \right\}_j \underline{\quad} [-\text{segm}] \begin{bmatrix} -\text{cons} \\ -\text{stress} \end{bmatrix}$$

By its upper branch, the rule accounts for j after 'long' back vowels in, for instance, the alternations of (126i), and by its lower branch for cases such as those in (126ii), where d is deleted and a homorganic glide (in fact a consonant in Dutch) follows from a rule of HOMORGANIC GLIDE INSERTION.

(126) (i)

baden	-	baaien	'to bathe'
braden	-	braaien	'to fry'
dode	-	dooie	'dead, attr.'
goede	-	goeie	'good, attr.'
kwade	-	kwaaie	'angry, attr.'
loden	-	looien	'lead, adj.'
rode	-	rooie	'red, attr.'

(ii)

breder	-	breeër	'wider'
kneden	-	kneeën	'to knead'
koude	-	kouwe	'cold, attr.'
kruiden	-	kruien	'herbs'

oude	-	ouwe	'old, attr.'
rijden	-	rijen	'to drive'
snijden	-	snijen	'to cut'

Given the fact that as a rule WEAKENING applies only before suffixal schwa, the alternations in (127), where schwa is morpheme-internal rather than suffixal, were claimed to be unexpected.

(127)	armoede	-	armoei	'poverty'
	bodem	-	booiem	'bottom'
	kade	-	kaai	'quay'
	lade	-	laai	'drawer'
	made	-	maai	'maggot'
	poeder	-	poeier	'powder'

In fact, forms of the type (127) are very rare (these six are the only ones I know of), and clearly irregular. In this spirit they were discussed in section 2.5., where it was pointed out that Smith (1973: 434) accounts for them by forcing an irregular application of WEAKENING (or rather, his rule of J-INSERTION), even though these forms do not meet the structural requirements of the rule.

In the present chapter, in a discussion of Harms' structural description features which were proposed for cases essentially similar to this one, we noted that within SPE there are two possible accounts of such a situation: by a readjustment rule and rule features, or by alphabet features. Since Smith uses readjustment rules (his 'lexical redundancy rules', cf. (104) and (105) of Chapter 2) in precisely this sense in order to explain why his rule of D-DELETION is 'productive before a boundary', it is completely inexplicable within the context of his analysis why he resorts to a theoretical innovation of a fairly drastic kind in his

description of the forms in (127). Thus, he *could* have formulated his rule of J-INSERTION (cf. (117) of Chapter 2) without a boundary, he *could* have exempted boundary-less forms by means of a 'lexical redundancy rule', and he *could* have exempted the forms in (127) by means of a rule feature from the lexical redundancy rule. He *chooses*, however, to extend the theory for the alternations in (127). **Thus, we actually** encounter another serious flaw in his analysis, since he does not explain why he chooses the former, 'standard' solution for one case, and makes a different choice, in fact an extension of the standard theory, in the other. Be this as it may, we have solved the problems connected with the forms in (127) in this thesis by showing that structural description features are superfluous, and by subscribing to the constraint following from Kiparsky's Alternation Condition that readjustment rules introducing rule features should be context-free. Clearly, this leaves alphabet features as the only device available to describe the irregular forms of (127). Therefore, if these forms are marked lexically as, say, [+D], the rule of WEAKENING will have to be modified as in (128).

(128)

$$\begin{bmatrix}-\text{son}\\-\text{cont}\\+\text{voice}\end{bmatrix} \Rightarrow \left\{\begin{matrix}\begin{bmatrix}+\text{son}\\-\text{cor}\\-\text{ant}\end{bmatrix}\\ \emptyset\end{matrix}\right\}_j / \;[-\text{cons}]_i \left\{\begin{matrix}[+\text{back}]_i\\ [-\text{cons}]_j\end{matrix}\right\} \left\{\begin{matrix}\underline{\quad}\;[-\text{segm}]\\ \begin{bmatrix}\underline{\quad}\\+\text{D}\end{bmatrix}\end{matrix}\right\} \begin{bmatrix}-\text{cons}\\-\text{stress}\end{bmatrix}$$

Crucially, rule (128) contains a subrule of the form (129):

(129)

$$\begin{bmatrix}-\text{son}\\-\text{cont}\\+\text{voice}\end{bmatrix} \Rightarrow \begin{bmatrix}+\text{son}\\-\text{cor}\\-\text{ant}\end{bmatrix} / \;[-\text{cons}]_i[+\text{back}]_i \begin{bmatrix}\underline{\quad}\\+\text{D}\end{bmatrix} \begin{bmatrix}-\text{cons}\\-\text{stress}\end{bmatrix}$$

Subrule (129) will turn d to j after 'long' back vowels and before morpheme-internal schwa in forms marked [+D], that is, in the forms of (127) - as required. Thus, pace claims to the contrary in Smith (1973), these forms can be described as in (128) within the framework of 'standard generative phonology', and they must be described in this manner within the restricted variant of this theory developed here. Taken together with the elaborate and detailed analysis of intervocalic d phenomena in Dutch developed in Chapter 2, (128) serves to falsify the obviously premature claims in Smith (1973: 434) to the effect that:

(130) Thus what might seem to be a rather straight forward phonological process or processes has turned out to involve several interesting theoretical problems, to wit the treatment of exceptions, minor rules and redundancy, analogy, derivational constraints, including peeking and transderivational constraints. This kind of situation appears to be typical in Dutch phonology. Simple rules hardly exist!

In fact, the present description of these phenomena does not lead to any extension whatsoever of the SPE standard theory. Rather, the analysis presented here follows from a theory of exceptions in generative phonology which is in several respects a restricted variant of the SPE-theory. And although I agree that the rules following from this analysis are not 'simple' in, of course, the non-theoretical sense of this notion, they do qualify, I would like to maintain, as the simplest.

Towards the second aim of this section: the formulation of optimally restricted constraints on overapplication of phonological rules, consider the following. Firstly, notice that the alphabet feature [+D] in (128) could have been collapsed with the original rule of WEAKENING in quite a

number of ways, in order to obtain the same effect. The way (128) looks, however, [+D] has been collapsed with it in, to coin a phrase, the minimal way: there is no part of WEAKENING which is smaller ("simpler", or what have you) and that could be collapsed with [+D] so as to acquire the same result. To give an example: if [+D] should be collapsed with [-cons, -stress] as well, the result would be the same for bodem and its ilk, but further claims would differ. In particular, one would predict for instance that there could be irregular cases where word-final d could change to j, say goed > *goei. This is a false prediction, since irregular cases of this type do not occur. Thus, although the prediction is apparently borne out by verb-forms such as (ik) bloei 'I bleed', where final d does turn into j, it has been shown in Chapter 2 (section 4.1.3.) that these forms derive from underlying bloed+e and so on, which are regular, and meet the structural description of the original WEAKENING rule. Thus, implicit in (128) is the following informal (and, I should emphasize, tentative) constraint on overapplication in generative phonology:[25]

(131) If alphabet features are braced into phonological rules, they may be collapsed with only one feature at a time.

Let us call (131) the ONE FEATURE HYPOTHESIS. Notice that (128) conforms to it in that [+D] is collapsed with [-segm] and only [-segm].

Of course, if the ONE FEATURE HYPOTHESIS is to prove a valid generalization about the nature of language, and not just about the nature of Dutch, we will have to trace back and see whether the previous examples of overapplication in this thesis do not constitute violations of it. In fact, an inventory may be profitably separated for this purpose into clear cases in support of the ONE FEATURE HYPOTHESIS, and a

small handful of cases which require more elaborate discussion. The clear cases in support of the ONE FEATURE HYPOTHESIS run as follows.

(i) Irregular VOWEL SHIFT in English. Since this rule over-applies to lax vowels where tense ones are regular, if the SPE analysis is worth maintaining the alphabet feature [+F] is collapsed with the single feature [+tense];[26]

(ii) ACCENT SHIFT in Lithuanian. Our formulation in (66) is in perfect harmony with the ONE FEATURE HYPOTHESIS, since [+L] is collapsed with only [-high];

(iii) VOWEL DELETION in French. Again, our formulation conforms to the ONE FEATURE HYPOTHESIS: in (73) the alphabet feature [+M] is collapsed with only [-tense];

(iv) D-WEAKENING in Dutch.

The following cases require further comments.

(i) Irregular FRICATIVE DEVOICING in English. Here, SPE collapses the feature [+] with the suffix +ive. By the looks of it this example does not appear to conform to the ONE FEATURE HYPOTHESIS but, as pointed out in fn.4 Chomsky and Halle suggest an alternative analysis of this case where fricative voicing is predicted in the complementary forms (the same route is taken by Lightner, as pointed out above, for whom fricative voicing is a "minor rule"; see also Hoard and Sloat (1971, 1973) for a similar proposal). Given this way out, this case will be irrelevant to an evaluation of the ONE FEATURE HYPOTHESIS;

(ii) Irregular STRESS RETRACTION in English. It is not immediately obvious how the analysis of the irregular cases of the mómentary and stéreoscope types can be brought in line with the ONE FEATURE HYPOTHESIS. This may be due to the informal character of the hypothesis itself, or to the specific properties of the phenomena under observation. In other words, the point is whether one should want to consider these cases as examples of overapplication, or not. At this moment, I feel intuitively inclined towards the latter position.[27]

(iii) The case of o-nominalization in Russian. Notice that in Lightner's description (subsection 3.3.1.2.) there is a "minor rule" of o-nominalization which is constrained by a "lexical redundancy rule" stating that roots in u/i followed by a sonorant regularly undergo this minor rule. Since it is argued here that lexical redundancy rules should not be allowed this power, a redescription is in order. Observe in this respect that it is not at all obvious that the miscellaneous irregular cases of o-nominalization deviate only one feature from the regular cases. This indicates that this case should not be taken as an example of overapplication in the present sense and that, as a consequence, the grammar of Russian will have to contain two separate rules of o-nominalization, one for the regular cases, and one for the miscellaneous ones. This does not strike one as an absurd move to make.

(iv) "Substantiv-Stammbildung" in German (subsection 3.3.2.2.). It is not obvious how an alphabet feature could be collapsed with only one feature of Wurzel's complicated morphological environment. However, it has been pointed out by Wus van Lessen Kloeke that the irregular forms Herzens and Herzen could be regularized by deriving

them from underlying /Herzen/, with -en deleted in the nominative, in much the same way as final j is deleted from the stem underlying the koe/koeien alternation in Dutch in singular.

(v) t-DELETION in Finnish, the initial motivation for structural description features in Harms(1968). As pointed out, this example is based on a misinterpretation. A reanalysis is proposed by Karttunen (1970).

(vi) Irregular voicing after h in Mohawk (subsection 3.3.2.2.). Postal (1968) presents too little data to be conclusive on this example. For this case to be supporting evidence for the ONE FEATURE HYPOTHESIS, the relevant alphabet feature should be collapsed with one of the features required to exclude h.

As far as I am aware, the above two lists exhaust the cases of overapplication discussed in this thesis, save for two announced in the course of the discussion of Schane's (1973c) paper on French in subsection 3.3.2.2.2. These two cases will be discussed shortly. Above all it is important to observe that the lists do not contain any clear violation of the ONE FEATURE HYPOTHESIS, and mention four examples in its support: two from Germanic languages, one from Romance, and one from Balto-Slavic. Besides there is some uncertainty on Postal's example from Mohawk because of lack of data, and some unclarity as to the relation between the ONE FEATURE HYPOTHESIS and morphological phenomena, such as English STRESS RETRACTION, Russian o-NOMINALIZATION, and German "Substantiv-Stammbildung". Notice, however, that not the ONE FEATURE HYPOTHESIS is unclear in these cases, but rather one's intuitions as to what circumstances define a valid instance of the notion "overapplication" in generative phonology. It may also be worth observing that the Turkish VOWEL HARMONY phenomena discussed

in subsection 3.4.1. in relation to Iverson and Ringen's paper on alphabet features, receive a natural interpretation within the present framework by means of the rule in (132).

(132)
$$V \Rightarrow [\alpha \text{ back}] \,/\, \left\{ \begin{matrix} V \\ [\alpha \text{ back}] \\ \left[\begin{matrix} -\alpha \text{ back} \\ +D \end{matrix} \right] \end{matrix} \right\} C_0 + C_0 \,\_\_$$

where the irregular stems triggering "vowel disharmony" will be lexically marked as [+D].[28]

In fact, the ONE FEATURE HYPOTHESIS will gain further substantive support from examples from Palauan (an Austronesian language), and from another Dutch example unrelated to the intervocalic d phenomena. Before I discuss these two cases, however, let me return briefly to the examples from French discussed in Schane (1973b-c).

3.5.2. SCHANE (1973b-c) REVISITED.

In subsection 3.3.2.2.2. I discussed briefly a system of capturing overapplication in French VOWEL DELETION phenomena as proposed in Schane (1973b-c). In this system very generally ('naturally') formulated phonological rules are limited in their application by language-particular "constraints" introducing rule features which either trigger or block the rule in specific environments. It may be worth pointing out that in such a system an example of overapplication cannot go beyond the structure specified in the natural phonological rule, that is to say, if for instance a natural rule focuses on a consonant, then a language-specific constraint will be able to state that this or that consonant will not undergo the rule, but such a constraint will never be able to say that this or that vowel will undergo the rule. In this respect,

Schane's system appears to be constrained more severely than our present system which incorporates the ONE FEATURE HYPOTHESIS. This initial impression, however, can be proven mistaken in several ways. Firstly, there are in the literature one or two cases of overapplication where in fact a vowel appears to condition a rule in some irregular cases otherwise conditioned only by C and #, and vice versa. However, these cases are not overly convincing, since for one (a case from French to be discussed below) a reanalysis is available, while the other is a morphologically conditioned case from Karok (cf. Shourup, 1974: 201, 4) where a rule of THEME VOWEL DELETION normally applicable before V and # applies before C in some exceptional compounds as well. Secondly, and more to the point it should be noted that if it is true that cases of overapplication are never of such a magnitude that a vowel undergoes a consonant-rule, or vice versa, then the addition of an appropriate branch to the ONE FEATURE HYPOTHESIS to exclude these cases must be weighed against a similar statement in Schane's system, possibly part of the definition of the notion 'natural phonological rule', to the effect that these natural rules cannot contain alphabet features. For if they can, even in his system cases of overapplication involving major class features such as consonantal and syllabic will be able to occur. Most importantly, however, and most damaging to Schane's proposals, it should be pointed out that there are at least four ways in which Schane's system is more powerful than the one proposed here. All four have been woven into the exposition above at various stages, and they may be catalogued as follows.

(i) Schane's "constraints" are not context-free and hence (unless limited by some further, special statement) will be able to describe "detached exceptions" in the sense of Kisseberth (1970) and Coats (1970);

(ii) Schane's constraints will provide an escape-route for counterexamples to any formal link between the shapes of phonological rules and the notion 'disjunctivity', as pointed out by Ringen (1975) (cf. fn. 16 of this thesis);

(iii) Schane's system is able to capture both "derived" exceptions and "underlying" ones (cf. Schane, 1973c: 834, fn. 9); the present system is, after SPE, constrained so as to allow only the latter;

(iv) in Schane's system exception features are features of segments rather than of entire morphemes; in the present system, the latter, less powerful situation holds.

In this light, it is clear that a formulation of VOWEL DELETION in French with an alphabet feature as in (73) is to be preferred to Schane's analysis as in (70)-(71), including both a 'natural' phonological rule, and a language-particular 'constraint'. Schane's two further cases may be commented upon as follows.

In Schane (1973c: 829) a rule of VOWEL NASALIZATION in French is formulated as in (133).

(133) $V \Rightarrow [+\text{nasal}] / \_\_\_\_ \left[\begin{smallmatrix} C \\ +\text{nasal} \end{smallmatrix}\right] ([-\text{segm}]) \left\{\begin{smallmatrix} C \\ \# \end{smallmatrix}\right\}$

The braced material allows nasalization in, for instance, bõn camarade 'fine comrade', and tu es bõn 'you are nice', but disallows it in bon ami 'nice friend'. A handful of irregular forms, however, deny this generalization in that they contain a nasalized vowel even when the following word begins with a vowel: mõn ami 'my friend', biẽn-aimé 'loved one', ẽn été 'in Summer', etc. In order to capture these cases, Schane proposes (i) to reformulate (133) into a natural nasalization rule which nasalizes a vowel before a nasal

consonant without further requirements; (ii) to state in a constraint that the operation of the rule is blocked before a vowel; and (iii) to specify the handful of irregular forms as exceptions to the constraint. Tranel (1974: 71ff.), however, criticizes this approach in several ways. Firstly, he questions it on general grounds in that he expresses doubt as to the validity of Schane's 'natural rules' in general, and his rule of nasalization in particular. Secondly, he observes, quite correctly of course, that the irregular words "always contain a nasal vowel on the surface: When they precede a word beginning in a consonant, or when they occur at the end of a phonological phrase, they undergo regular vowel nasalization and nasal consonant deletion; and they [escape the constraint] when they precede a word beginning with a vowel" (75-6). This is to Tranel an indication that these words should have underlying nasalized vowels to begin with, after which they will cease to be problematic. Even if this second step is not taken, however, the ONE FEATURE HYPOTHESIS can incorporate the irregular forms as in (134),

(134) $\begin{bmatrix} V \\ \langle [+N] \rangle_{\underline{b}} \end{bmatrix} \Rightarrow [+nasal] \; / \; \_\_ \; \begin{bmatrix} C \\ +nasal \end{bmatrix} ([-segm]) \left\{ \begin{matrix} C \\ \# \\ \langle V \rangle_{\underline{a}} \end{matrix} \right\}$

Condition: if a, then b.

where [+N] will be the alphabet feature added to their lexical representations. Notice that for this proposal to work, the notion "brace into" of (131) will have to be defined so as to capture also linking via angled brackets as in (134). Such a provision may be necessary independently if we follow Lass' proposals on the inappropriateness of the feature [tense] for English (for the sake of expositional clarity I have refrained from raising this point earlier in this chapter), for the VOWEL SHIFT rule of English will have to be stated as in (135) under the assumption that English 'long' ('tense') vowels are

bimoric underlyingly.

(135) $\begin{bmatrix} V \\ +\text{stress} \\ \langle +F \rangle_{\underline{a}} \end{bmatrix} \quad \langle V \rangle_{\underline{b}} \quad \Rightarrow \quad \ldots\ldots$

Condition: if not a, then b.

Similarly, if the same approach should be advisable for French (which may or may not be the case), the rule of VOWEL DELETION in (73) should be reformulated to (136).

(136) $\begin{bmatrix} V \\ -\text{stress} \\ \langle +M \rangle_{\underline{b}} \end{bmatrix} \quad \langle V \rangle_{\underline{a}} \quad \Rightarrow \quad \ldots\ldots$

Condition: if a, then b.

Schane's final example of overapplication in French comes from those cases where non-nasal consonants unexpectedly delete after a vowel, such as escro(c) 'crook', and estoma(c) 'stomac', where both final k's are motivated by related verbs: escroquer 'to swindle', and estomaquer 'to be annoyed'. These cases motivate Schane to replace an elaborate set of consonant-deletion rules by an analysis with (i) a 'natural' rule of consonant-deletion before another consonant or 'pause'; (ii) a constraint to the effect that (among other consonants) k will be exempted from the natural deletion rule; and (iii) rule features on the irregular forms to exempt them from the constraint. It is pointed out, again, by Tranel (1974: 197ff.) that, since the motivation for the underlying consonants in the irregular cases comes from related verbs, the irregularity should be accounted for in the lexicon, by a lexical (say, 'via') rule relating vowel-final nouns (escro, estoma) to verbs with consonant-final stems (escroq+uer, estomaq+uer). Even if this step is not taken, however, it may be pointed out that with the help of the ONE FEATURE HYPOTHESIS the irregular

forms may be described as exceptionally undergoing the French rule of NASAL CONSONANT DELETION, which for this purpose should be formulated as in (137),

(137) $$\begin{bmatrix} C \\ \{[+nasal] \\ [+Q]\} \end{bmatrix} \Rightarrow \emptyset \; / \; \underline{\quad} \; ([-segm]) \; \begin{Bmatrix} C \\ \# \end{Bmatrix}$$

where [+Q] will be the alphabet feature present in the lexical representations of the irregular forms.

All three cases of overapplication mentioned in Schane (1973c) have thus been shown to fall within the range of the ONE FEATURE HYPOTHESIS, although for two of them alternative analyses after Tranel (1974) may be preferable anyway. This conclusion is of some importance in view of the list of objections against Schane's approach supplied above. That is to say, while especially the last two French cases do not provide the ONE FEATURE HYPOTHESIS with spectacular support, they do not deny it either. Further, and in fact much stronger support for the ONE FEATURE HYPOTHESIS comes from two cases from Palauan and Dutch, to be discussed in the final subsection of this chapter.

3.5.3. PALAUAN (FLORA, 1974) AND DUTCH DIMINUTIVES.

Palauan, an Austronesian language spoken in the Western Caroline Islands, has a rule of HIGH VOWEL DELETION of the following form (Flora, 1974: 45-7):

(138) $$\begin{bmatrix} V \\ +back \\ +high \\ -stress \\ +STEM \end{bmatrix} \Rightarrow \emptyset \; / \; C \; \underline{\quad} \; C$$

Examples of the operation of this rule are displayed in (139).

(139)	stem	gloss	nomin.	my -	our -
	buŋa	'flower'	búŋ	pŋák	pŋəmám
	subad	'announcement'	súbəd	spədék	spədám
	orusu	'needle'	orús	orsúk	orsəmám

Flora notes that when "the high vowel [i] is flanked on both sides by stem consonants it behaves as the most stable of the vowels. Normally it is subject neither to deletion nor reduction rules". For example:

(140)	diŋa	'ears'	díŋ	diŋák	diŋəmám
	lild	(plant name)	líld	lildék	lildám
	?ilt	'ointment'	?ílt	?ilték	?iltám

She continues to note, however, that "there are a few examples to indicate that perhaps there is a trend toward deleting high front vowels as well as high back vowels". For example:

(141)	osibu	'pick'	osíb	ospúk	ospəmám
	?əbiŋəl	'fishtrap'	?əbíŋəl	?əpŋəlék	?əpŋəlám
				?əbiŋəlék	?əbiŋəlám
	?litakil	'song'	?əlitákl	?əlitəklék	?əlitəklám
	odiŋəl	'visit'	odíŋəl	oθŋəlék	oθŋəlám

However: "There are many more instances of high front vowels which do not delete than those which do. It seems correct then to formulate the High Vowel Deletion Rule as we have in [138], so that it will apply regularly only to high back vowels and to mark forms like those in [141] to exceptionally undergo this rule".

On this description of part of the phonology of Palauan, notice the following. Firstly, observe that Flora appears to propose that the forms in (141) undergo rule (138) in spite of

the fact that they do not meet its structural description. Secondly, recall that within the present framework this constitutes a case of overapplication, to be described via alphabet features. And finally, observe that the irregular forms deviate only minimally from the structural description of the rule, in fact only in the value of the feature [back]: they are [-back], where (138) requires [+back]. The proper way to describe this irregular behaviour, then, within the present framework, will be to collapse the feature [+back] of (138) with an alphabet feature, say [+P], where the irregular forms will be marked [+P] in the lexicon. Notice that this description is precisely that allowed by the ONE FEATURE HYPOTHESIS.

A slightly more complex, and proportionally more tentative example is constituted by a handful of forms irregular vis-à-vis the rule of DIMINUTIVE SCHWA INSERTION, referred to earlier in Chapter 2 (46iv). This rule may be formulated as in (142):

(142) $\emptyset \Rightarrow$ ə / [+cons] $\begin{bmatrix}+\text{syll}\\+\text{stress}\end{bmatrix}$ $\begin{bmatrix}+\text{cons}\\+\text{son}\end{bmatrix}$ ____ # [+DIM]

and operates in alternations such as those in (143i) to the exclusion of those in (143ii).

(143)

	stem	gloss	dimin.
(i)	bel	'bell'	belletje
	ding	'thing'	dingetje
	kar	'cart'	karretje
	man	'man'	mannetje
	mol	'mole'	molletje
(ii)	haar	'hair'	haartje
	keel	'throat'	keeltje
	maan	'moon'	maantje
	paal	'pole'	paaltje
	zoon	'son'	zoontje

stem	gloss	dimin.
bak	'basin'	bakje
hof	'court'	hofje
rek	'rack'	rekje
top	'top'	topje
vis	'fish'	visje

As was noted before (cf. Van Haeringen, 1958; Heeroma, 1959) there is a limited group of irregular forms which receive schwa in spite of the fact that they do not conform to (142). In particular, these forms can be separated into two subgroups: (i) schwa after 'long' vowels before a sonorant; and (ii) schwa after 'short' vowels before an obstruent. Examples are displayed in (144).

(144)	(i)	bloem	'flower'	bloempje/bloem<u>e</u>tje
		papier	'piece of paper'	papiertje/papier<u>e</u>tje
		piel	'penis'	piel<u>e</u>tje
		wiel	'wheel'	wieltje/wiel<u>e</u>tje
	(ii)	kip	'chicken'	kipje/kipp<u>e</u>tje
		kop	'head'	kopje/kopp<u>e</u>tje
		pop	'doll'	popje/popp<u>e</u>tje
		trap	'staircase'	trapje/trapp<u>e</u>tje

On these forms, notice the following. For the former class to fit (142) an alphabet feature, say [+B], should be collapsed with the leftmost [+cons]. Furthermore, for the latter class to fit (142), an alphabet feature, say [+C], should be collapsed with [+son]. Therefore, both classes of exceptions can be incorporated by collapsing an alphabet feature with one and <u>only one</u> feature of the original rule. Notice, furthermore, that there is no way in which one alphabet feature can be collapsed via braces or angled brackets with one feature of the rule so as to have stems with long vowels before obstruents

undergo the rule. Thus, the ONE FEATURE HYPOTHESIS predicts that irregular forms of this type will not occur, a prediction which is borne out, since there is no *taaketje from taak 'task', *kloofetje from kloof 'chasm', and so on.

While examples such as these indicate that the ONE FEATURE HYPOTHESIS has some initial plausibility, and even some predictive value as to possible and impossible classes of exceptions vis-à-vis independently established rules of phonology, it may be useful to wind up this section by pointing out some of its weaknesses. In particular, as stated in (131) the hypothesis is part of the evaluation measure rather than a strict condition on possible grammars, that is to say, it forces some types of irregularity into higher cost rather than that it excludes them. This can be shown in two separate ways. Firstly, observe that vis-à-vis DIMINUTIVE SCHWA INSERTION in Dutch, non-occurring exceptions such as *kloofetje are not literally excluded, since if kloof is both [+B] and [+C], *kloofetje follows. Therefore, if it is true that exceptionality of this type does not exist, not by virtue of high cost, but rather by principle of language, the ONE FEATURE HYPOTHESIS should be revised in some way so as to disallow alphabet features of the same rule to cooccur in one lexical representation. To a large degree this is of course a completely mechanical matter.

Secondly, notice that even if alphabet features cannot be collapsed with more than one feature, the ONE FEATURE HYPOTHESIS merely prohibits generalizations, rather than predicts the non-existence of certain types of irregularity. In particular, if for instance a non-high front vowel in Palauan should irregularly delete (a violation of two features of the rule of HIGH VOWEL DELETION), it will always be possible to state this in a separate rule, perhaps a readjustment rule. It will certainly strengthen our hypothesis if even this possibility would be disallowed. This might be accomplished, for instance,

by the following tag to (131):

(145) Furthermore, a rule is disallowed to appear in the grammar which can be collapsed with an independent rule via an alphabet feature, such that the alphabet feature is collapsed with more than one feature.

No doubt it will be possible to combine (131) and (145) more concisely and insightfully. Furthermore, it may well be that even under the tentative revisions of the already tentative ONE FEATURE HYPOTHESIS there will be ways to avoid its intentions by employing some formal trick or other, so that more drastic types of overapplication will be possible. This, however, appears to be the inevitable fate of all informal and tentative hypotheses, and the ONE FEATURE HYPOTHESIS will be no exception. However, in the absence of counterevidence to its intentions, and in view of the fact that it defines a highly necessary and in fact extremely strong restriction on the notion overapplication in generative phonology, a notion which has been implicit and sometimes fairly explicit in generative phonology for a decade, as shown in this chapter, it appears to me that the ONE FEATURE HYPOTHESIS is at least worth considering as a valid generalization about exceptions to phonological rules in natural languages.

FOOTNOTES TO CHAPTER 3.

(Page reference at the end of each note)

(1) On the borderline between 'true' and 'pseudo' exception devices will be those mechanisms proposed to explain in independent terms why and under which circumstances certain types of irregularity will exist. A case in point is, for instance, Hock's (1973) notion of 'synchronic analogy', which governs the exceptional application or non-application of rules in order to avoid surface alternations in certain morphological categories in Sanskrit. Even conditions of this type, however, will fall outside the range of this investigation. (121)

(2) I disregard here the theory of "markedness" in generative phonology, as developed in Chapter Nine of SPE. Within that theory, one value of the feature [voice] would be chosen as "marked" ("irregular") vis-à-vis the other (which would therefore be "unmarked" or "regular"). (125)

(3) Although Chomsky and Halle sometimes refer to the rules under discussion as "lexical redundancy rules", it cannot be, technically speaking, lexical redundancy rules which introduce rule features. The point is that the particular rule will modify the [+ rule n] specification assigned to each unit of a lexical matrix for every rule n by convention. True lexical redundancy rules, on the other hand, "fill in unspecified squares of phonological matrices" (SPE: 171, emphasis mine). I will therefore consistently refer to these rules as "readjustment rules". (129).

(4) However, "speculating beyond what we have worked out in detail" and while "we have not been able to arrive at a satisfactory formulation of these processes" (SPE: 213, fn. 46), Chomsky and Halle also suggest an alternative where, rather, voicing is predicted in the complementary forms by an independent rule of intervocalic fricative voicing, and relatively abstract underlying forms in -e, which is later elided. (137)

(5) The astute reader will have noticed that this particular example in fact denies Chomsky and Halle's claim that the context of a rule should not be allowed to block its application. I will return to this point below. (139)

(6) Below page references will be to the 1970 version. (143)

(7) Difficulties regarding the chronology of ideas expressed in Lakoff (1965/1970) and SPE have also been noted in Brasington (1972: 102, fn.2). Clashes on precisely the same point appear to occur in Kiparsky (1968: 191), and Postal (1968: 133). (145)

(8) In the literature two cases exist where a rule introducing a rule feature is claimed to follow crucially at least one phonological rule. The first is discussed in Postal (1968: 132), but is hard to evaluate given Postal's scant information. The second case is discussed in Sadock (1970), but it is claimed in Barkai (1972: 148, fn. 110) that "my study of Hebrew phonology has revealed no need for either the readjustment rule, as [Sadock] proposed it, or for either of the two phonological rules he claims must precede it". (146)

(9) As Henk Schultink has pointed out, it is more usual to mention in marking conventions the unmarked case rather than the marked one (cf. SPE: 403). See further below. (149)

(10) In fact, within such a framework McCawley (1974: 67) proposes that the irregular VOWEL SHIFT cases should be taken care of by an early "minor rule". See further below. (164)

(11) Apparently Bechert (1971) has missed the relevant passage from Harms (1968), since he claims: "Die Annahme von Strukturbeschreibungsmerkmale hat sich bisher in der Phonologie nicht als notwendig erwiesen" (30). (165)

(12) ru is a phonologically predictable variant of lu (Kisseberth, 1970: 45). (182)

(13) Like Chomsky and Halle in SPE, Kisseberth apparently overlooks the case of Russian JER DELETION as an analysis involving, in fact, detached context exceptions. (184)

(14) Kiparsky (1973a: 18-9), who wants to exclude readjustment rules of type (95) by means of his Alternation Condition, presents a reanalysis of this case very much like Coats'. He differs in that he complicates the environment of DELETION while he maintains the SPE order of DELETION < LOWERING. As far as I can make out, this analysis circumvents the readjustment rule, but does not obviate the need for the alphabet feature [+D]. However, in footnote 8 (which is lacking from the 1968 IULC version of "How abstract is phonology?"), Kiparsky refers to Kisseberth (1970) and Coats (1970) for the alternative: rule environment features. In particular, this reference is a rejection of Harris (1969), who argues that alphabet features will be necessary in those cases where a morpheme blocks rather than fails to undergo a rule. (It will be shown below that in retrospect Harris' intuitions are correct on this point). To recapitulate: the Alternation Condition excludes readjustment rules introducing rule features, and alphabet features, and offers rule environment features as an alternative. (As noted by Kim, 1973:

132, fn. 1, Kiparsky does not argue against readjustment rules per se, see also Kiparsky, 1973a: 56, fn. 17). (189)

(15) a will become y by rule of Russian phonology, cf. Coats (1974: 34), and below in the analysis of Thomas (1974), where u becomes y. (190)

(16) A second argument against readjustment rules introducing rule features in certain contexts is advanced by Ringen (1975: 55), who attributes it to Howard (1973). She notes that:

> ... if readjustment rules can introduce rule features, then it is necessary to abandon the claim that there are necessary and sufficient conditions for predicting disjunctive application of rules. For example, consider the following two (hypothetical) rules of Palatalization and Roundness Assimilation:

(23) Palatalization

$$\begin{bmatrix}-\text{son}\\+\text{cont}\end{bmatrix} \Rightarrow \begin{bmatrix}+\text{high}\\-\text{back}\end{bmatrix} / \_\_ \begin{bmatrix}+\text{syll}\\+\text{high}\\-\text{back}\end{bmatrix}$$

(24) Roundness Assimilation

$$[+\text{syll}] \Rightarrow [+\text{round}] / \begin{bmatrix}+\text{syll}\\+\text{round}\end{bmatrix} \ C_0 \_\_$$

> Although these rules do not meet any of the conditions proposed for determining disjunctivity, they can be made to apply disjunctively if the following readjustment rule is assumed:

(25) Readjustment Rule

$$\begin{bmatrix}+\text{syll}\\+\text{high}\\-\text{back}\end{bmatrix} \Rightarrow [-\text{ Roundness Ass.}] / \begin{bmatrix}-\text{son}\\+\text{cont}\end{bmatrix} \_\_$$

> I conclude that readjustment rules must not be permitted to introduce rule features....

(17) Slightly adjusted for expository purposes, cf. Iverson and Ringen (1977: 9). (197)

(18) Jaap van Marle has informed me that Iverson and Ringen quite correctly ignore the observation of their source on the Turkish data (Lightner, 1972b) to the effect that saat takes front vowel suffixes regularly, since it is pronounced [sa?ät] (op.cit.: 406). According to Van Marle the pronunciation cited by Lightner is 'archaic', while that with a back vowel is fairly common. (198)

(19) Iverson and Ringen attribute this variant of theory (ii) to Vago (1973). (199)

(20) After completion of this thesis, it came to my attention that Kenstowicz and Kisseberth (1977: 120) notice this first argument against rule environment features. They do not draw any particular morals from their observation, however, and do not notice the remaining three arguments presented here. (202)

(21) As Hans Gilijamse has pointed out, this second objection may, at least for the Piro case, be due to an inadequate rule writing system rather than a failure of KC. In particular, the function of the leftmost V in the rule of VOWEL DROP is to prevent the creation of triconsonantal clusters (and initial biconsonantal clusters), i.e. VC is the positive way of saying 'not more than one consonant' (and 'not initial consonants'). True though these remarks may be, they do not alter the fact that in principle KC makes the implausible prediction under discussion. (203)

(22) In spite of the absence of a reference to this effect, Tranel's analysis of French has in fact much in common with that by Posner in several articles, see for instance Posner (1971).

(23) In particular, both Coats and Lightner on the one hand, and Thomas on the other, attempt primarily to present a description of these verbal forms without an appeal to the segmental cycle, as in Lightner (1972b). Notice that by positing <u>vaj</u> rather than <u>aj</u> as the underlying form of the imperfective suffix, Thomas avoids Coats' assimilation rule (100). Hence, this is not an example of environmental exceptions in phonology either. (208)

(24) Notice that if Lightner's constraint as to the strict morphological character of "minor rules" is to prove valid also within the present framework, the rule of OPEN SYLLABLE LENGTHENING as formulated in Chapter 2 (65) is an apparent counterexample. However, it seems evident that, although the rule's statement is completely phonological for verbal inflection, a consideration of its operation in other morphological areas will reveal that the rule will be both early <u>and</u> morphologically conditioned to a considerable degree. Observe also that Russian VOWEL DROP as it stands in (101) is another counterexample. This is clearly another reason to reanalyse this case.

It may also be worth pointing out that in this chapter we have reached essentially the same conclusion as Aronoff (1976), although from the opposite angle. While Aronoff reaches the conclusion that the notion "minor rule" should be abandoned (112-3) as the result of a primarily morphology-based investigation, here the same conclusion follows from a principally phonological line of research. It should prove interesting to investigate how Aronoff's conclusions combine with the present ones in further border areas between phonology and morphology, also in the light of Harris' (1977) observations on diacritic features in combination with Aronoff's theory of morphology. (213)

(25) I owe the initial suggestion for this constraint to Hans Gilijamse, in particular to Gilijamse (1971). (219)

(26) After the completion of this manuscript, Halle (1977) appeared in which the SPE-analysis is improved upon on precisely this point. In the new system, the alphabet branch of VOWEL SHIFT is incorporated in a small group of "readjustment rules" à la UMLAUT. (220)

(27) In the most recent system of English stress rules, that by Liberman and Prince (1977: 277-8) a system of indexing is employed which may or may not provide an alternative to alphabet features for the phenomena of English STRESS RETRACTION. (221)

(28) While the opportunity given by the ONE FEATURE HYPOTHESIS to formulate the rule of Turkish VOWEL HARMONY as in (132) does certainly not damage this hypothesis, it is at the same time not clear that Turkish VOWEL HARMONY should be described under the general assumptions about such phenomena by Iverson and Ringen. Most recently, see on this point Jensen (1977). (223)