The Treatment of Exceptions

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The data for this paper is provided by Piro, an Arawakan language spoken in Peru which has been described by Esther Matteson.[1] I shall be concerned with the operation of a single rule in this language, which I refer to as VOWEL DROP. This rule has a number of interesting properties which will not be dealt with in the present paper. My concern here is restricted entirely to the implications of VOWEL DROP for the development of an adequate theory of exceptions. Our understanding of the exceptional behavior of linguistic elements is still limited, and much remains to be learned before a fully general theory of exceptions can be established. VOWEL DROP in Piro provides some rather interesting evidence with respect to one very critical aspect of the treatment of exceptions.

Let us begin by establishing the essential nature of the rule of VOWEL DROP. As our first illustration of the operation of this rule, we might examine instances of the nominalization of verbs by the addition of the nominalizing suffix lu. There is, for example, a verb yimaka 'to teach' which combines with lu as yimaklu 'teaching.' Similarly, the verb kakonu 'to build

a shelter for a hide-out in hunting' has the nominalized form kakonru (l is converted to r by a general rule which does not concern us here), meaning 'a shelter in which a hunter hides.' Finally, kama 'to make, form' occurs in the nominalized form kamlu 'handicraft.'

In each of the above examples, the final vowel of the verb stem deletes when suffixed by lu. This vowel dropping is not, however, an idiosyncratic property of verb stems when followed by lu, but rather a wide-spread phenomenon that occurs repeatedly throughout Piro phonology. For example, there is a possessive suffix ne which is used in conjunction with a possessive pronominal prefix. Thus a noun root such as xipalu 'sweet potato' has as one of its "possessed" forms nxipalne 'my sweet potato,' where n- is the surface realization of the first person singular pronominal prefix and ne is the possessive suffix. Similarly, čalu 'fish net' has a possessed form nčalne 'my fish net.' In these examples, we see that the final vowel of a noun root also drops.

VOWEL DROP is not, however, restricted to just the final vowel of the verb or noun root. There is, for instance, a suffix kaka, causative, which appears in its full form when word final, as in čokoruhkaka 'to cause to harpoon' (čokoruha 'to harpoon'), but in reduced form when followed by a suffix, as in salwakaklu 'cause him to visit' (salwa is a verb meaning 'to visit' and the lu which follows kaka is the third person singular pronominal

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suffix). We see in this example that kaka loses its final vowel when followed by a suffix. From this we can conclude that, generally, VOWEL DROP operates upon morpheme-final vowels, irrespective of whether the morpheme is a root or an affix.[2]

The dropping of morpheme-final vowels is not, however, unrestricted, as a form such as salwakaklu demonstrates. Notice that in this example the final vowel of the verb root salwa does not drop before kaka. Failure of VOWEL DROP to apply here cannot be attributed to any peculiarity of kaka, for in čokoruhkaka (from /čokoruha+kaka/) the morpheme-final vowel before kaka drops. The failure of VOWEL DROP to apply in the case of salwakaklu is not an isolated phenomenon. Other examples are readily available. We have, for example, already seen cases where vowels drop before the possessive suffix ne; but there are other examples where a preceding vowel is retained. For example, kahli 'clay' has the possessed form nkahline, VOWEL DROP not applying. Similarly, xinri, a palm species, has the possessed form nxinrine. To cite just one more example, the suffix lewa 'habitually, characteristically' permits the deletion of a preceding vowel, as in yohimlewa 'to hide habituall (cf. yohima 'to hide'); but in hiwlalewa 'to cook habitually' (cf. hiwla 'to cook') the final vowel of the verb root is retained.

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All of the above examples can be accounted for if we assume that VOWEL DROP affects only morpheme-final vowels in the context VC___+ -- that is, a vowel may not drop if preceded by a consonant cluster. This is not quite correct. There are, for example, cases where a morpheme-final vowel is followed by a consonant cluster and does not delete. For example, hiknokamta 'pass by without stopping' consists of the verb root hiknoka 'to pass' plus m, a suffix expressing transitoriness, and ta, verbal theme formative. The final vowel of hiknoka does not elide in this example since it is followed by a consonant cluster. The context for VOWEL DROP thus appears to be VC____+CV.

Having established (approximately) the context in which vowels drop in Piro, we can now get on to the main point of this paper. I have cited just a small number of examples which support the proposition that VOWEL DROP is a fully productive rule in the grammar of Piro. Examination of Piro texts reveals repeated application of this rule. There are, however, as many cases of exceptions to VOWEL DROP as there are regular cases. It is these cases where VOWEL DROP does not apply which are of interest for the development of the theory of exceptions.

The most general type of exception to VOWEL DROP involves

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the failure of vowels to drop when they precede certain suffixes whose phonological structure is not in any way different from the phonological structure of suffixes before which vowels are deleted. That is to say, a number of Piro suffixes appear to be exceptional in that they will not tolerate the deletion of a preceding morpheme-final vowel. In addition, there are a number of morphemes which are exceptional in that they do not drop a final vowel even if followed by a suffix which generally requires deletion of the preceding vowel. Examples follow.

There is a frequently occurring verbal theme formative ta, and vowels do not drop before this suffix. Thus meyita 'to please' can be separated into a verb root meyi and the verbal theme formative ta, and we notice that the final vowel of the root does not drop. There is another suffix wa, which forms intransitive verb themes, and it does not permit a preceding vowel to drop; thus, in meyiwata 'to celebrate' (/meyi+wa+ta/) neither the final root vowel nor the vowel of wa drops, for both occur before a morpheme which does not permit vowel dropping. Observe, however, that in meyiwlu 'celebration'(/meyi+wa+lu/) the final root vowel does not drop since wa follows, but the vowel of wa drops before the nominalizing suffix lu.

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Examples of the failure of VOWEL DROP to affect a vowel which precedes ta are myriad. We can contrast hatata 'to illuminate' (/hata+ta/) with hatnu 'light, shining' (consisting of the verb root hata and nu, which forms abstract nouns). Similarly, examples of failure of VOWEL DROP before wa are numerous. For example, pokowata 'to establish a town' (poko 'town') and towuwata 'to command' (intransitive derivative of towuta 'to command').

There is another suffix wa meaning 'yet, still' which is also exceptional in that a preceding vowel does not drop. Thus, hetawa 'still see' (heta 'to see'), which can be contrasted with hetya 'see there' (consisting of heta and the indirective suffix ya). This wa, unlike the wa considered above, is also exceptional in that it does not undergo VOWEL DROP. Thus, hiʸinkawalu 'to be still thinking about it' shows wa retaining its vowel before lu, third person singular pronominal suffix. Ordinarily, a vowel drops before lu -- note, for example, hetlu 'see it' (/heta+lu/). In this case, then, the exceptionality does not have to do with a following suffix, but rather with wa itself.

We must now consider how these exceptional suffixes are to be treated. Let us review the theory of exceptions proposed in The Sound Pattern of English.[3] Chomsky and Halle propose to associate with each lexical item a diacritic

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feature of the form [@rule n] , where @ may be either + or -, for each of the rules of the phonology. In the unmarked case, @ = +; in the marked case, @ = -. By convention, the specification [@rule n] is assigned to each segment in the lexical item.

Chomsky and Halle then propose that given a rule in the grammar of the form (n),

(n) $A \longrightarrow B \;/\; X\_\_\_\_Y$

this rule applies to a string X'A'Y' (where X', A', and Y' are indistinct from X, A, and Y respectively) just in case A' contains the specification [+rule n] . If a segment has been assigned the specification [-rule n] by virtue of occurring in a lexical item marked as an exception to n, then n will not apply to that segment.

Consider wa 'yet, still.' It will be entered in the lexicon as [n VOWEL DROP]. Universal convention will specify this as [-VOWEL DROP] and assign this specification to each segment in wa. Now, given a form such as hišinkawalu, VOWEL DROP cannot apply to the vowel of wa since a vowel may undergo VOWEL DROP just in case it is specified as [+VOWEL DROP]. The proposal sketched above is thus able to account for the failure of wa to undergo VOWEL DROP; but what about the more general case in Piro, where a vowel fails to drop because it

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is followed by a suffix which does not tolerate dropping of the preceding vowel. That is, how does the proposal deal with the exceptionality of wa when it does not permit a preceding vowel to drop, as in hetawa? Obviously, we cannot say that in hetawa, the verb heta is to be marked in the lexicon as an exception to VOWEL DROP -- for in hetya 'see there' and hetlu 'see it' the final vowel of the verb does drop. The final vowel of heta fails to drop only in the case where some suffix such as wa follows.

In The Sound Pattern of English, Chomsky and Halle discuss the possibility that given a rule of the form of (n) above, we might require that not only must A' be specified as [+rule n], but also that X' and Y' be [+rule n]. If this proposal were adopted, then we could account for a form such as hetawa. Recall that VOWEL DROP has the approximate form,

(VOWEL DROP) V----→ Ø / VC____+CV

If VOWEL DROP is not permitted to apply to a string where the segments after the morpheme-final vowel contain the specification [-VOWEL DROP], then hetawa would be immune from VOWEL DROP by virtue of the fact that wa is entered in the lexicon as [m VOWEL DROP].

Chomsky and Halle comment on this possible extension

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of the theory of exceptions as follows: "The issue is whether the context in which a segment appears should be permitted to block the application of a rule to this segment, even if the segment itself is not specified as an exception to this rule. It is easy to invent examples that militate against this assumption, but we have no clear cases in a real language." (p. 375)

The issue, it turns out, is somewhat more complicated than the above remarks might suggest. The first point to be made is that Piro does provide a real-language example showing rather clearly that the analysis of the exceptionality of hetawa outlined immediately above will not generalize to the full range of data. That is, we cannot simply enter morphemes such as wa or ta in the lexicon as [m VOWEL DROP], and then permit that specification to prevent VOWEL DROP from affecting a preceding vowel. The incorrectness of such an analysis is readily apparent if we reconsider an example such as meyiwlu 'celebration' (/meyi+wa+lu/). In this example, we see that the final vowel of the verb root meyi does not drop before the intransitive verb theme suffix wa. Under the above analysis, this would have to be explained by entering wa in the lexicon as [m VOWEL DROP], thus preventing wa from serving as the environment for VOWEL DROP. But this obviously cannot work, for the vowel in wa is deleted before

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lu, the nominalizing suffix. If wa is entered in the lexicon as an exception to VOWEL DROP in order to block application of VOWEL DROP to the preceding vowel, then clearly VOWEL DROP will also be inapplicable to wa itself. But this is incorrect, for wa undergoes VOWEL DROP.

Examples of the above sort are abundant. I will cite just two more examples. We have already seen that ta does not permit a preceding vowel to drop, but it loses its own vowel in yonatnawa 'to paint oneself' (consisting of yona 'to paint' and the reflexive elements na....wa). Here we see that yona does not lose its vowel before ta, but ta drops its vowel before na...wa. Finally, the anticipatory suffix nu does not tolerate the dropping of a preceding vowel, as hetanu 'going to see' demonstrates. (Recall that the homophonous abstract noun suffix nu does delete a preceding vowel.) In hetanru 'going to see him' (/heta+nu+lu/), however, nu loses its vowel before lu. We can compare this form with hetawalu 'to see him yet,' where wa 'yet, still' both fails to condition VOWEL DROP and also fails to undergo it.

The above examples demonstrate that those suffixes which do not permit a preceding vowel to delete may delete themselves (except for wa 'yet, still'). We cannot, then, simply mark such suffixes as being [- VOWEL DROP] and permit this specification to characterize both failure to undergo a rule and failure to condition a rule. Somehow, in an adequate theory of

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exceptions, a morpheme must be able to undergo a rule even if it fails to condition the application of that same rule (and, presumably, condition a rule that it fails to undergo).

How are we to account, then, for the failure of VOWEL DROP to apply to a vowel which precedes ta, nu (anticipatory), wa, etc.? One possibility is to draw upon a piece of apparatus which Chomsky and Halle propose in The Sound Pattern of English: namely, "readjustment" rules which assign the feature [-rule n] to segments in particular environments. Thus, we might propose the following readjustment rule:

$$V \longrightarrow [\text{-VOWEL DROP}] \; / \; \_\_\_\_\_ + \begin{Bmatrix} ta \\ wa \\ nu \\ \vdots \end{Bmatrix}$$

(The phonological shape of these suffixes is irrelevant, of course, since nu, anticipatory, would be one, but nu, abstract noun suffix, would not be in the list. Thus using the phonological labels of these suffixes is misleading, but convenient.) This rule would assign the feature [-VOWEL DROP] to any vowel in the underlying representation which precedes one of the listed suffixes. VOWEL DROP will then be able to apply only to vowels which have not been assigned the exception feature, i.e. those vowels which precede the remaining suffixes. The suffixes like ta, wa, etc., will now be entered in the lexicon as completely normal with respect

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to VOWEL DROP, and will undergo the rule when in the correct context.

There are some dubious aspects to this approach. First of all, the environment for this "rule" is in fact a list, and the information it contains would appear to be more properly included in the lexicon itself. More importantly, this approach would permit certain kinds of "exceptional contexts" which it 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,

$$V \longrightarrow [\text{-SHORTENING}] \;/\; pa+ \_\_\_\_$$

(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:

$$V \longrightarrow [\text{-SHORTENING}] \;/\; pa + CVC_0 + \_\_\_\_$$

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.

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Before sketching an alternative analysis, it should be observed that the "readjustment rule" approach would handle Piro only if all of the vowels which must not delete before suffixes like ta, nu, and wa immediately precede these suffixes in the underlying form. If any of these vowels were epenthetic, or came to be next to the relevant suffixes as the consequence of a rule, then their deletion could not be prevented by the above analysis. If it happens that Piro has no derived vowels preceding these suffixes, I see no reason not to suppose that this is purely accidental. That is, there is, as far as I can see, no inherent reason why the non-dropping vowels should always have been immediately before the relevant suffixes in the underlying form. Thus, even if the readjustment rule is able to account for the facts of Piro, it seems only accidentally able to do so. Of course, there would be no problem if the rule assigning the exception feature were permitted to apply after the application of phonological rules, but that would only add to the power of the apparatus. It would, for example, permit environments derived by the application of phonological rules to block the application of some other rule. Again, the need for such power remains to be demonstrated.

Let us now consider the alternative. We might define two sets of features, [@rule n] and [@context n]. According

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to this analysis, each lexical item would have to be categorized as either undergoing a rule or not, and as either serving as the context for a rule or not. (In the unmarked case, a lexical item would be specified as + for both features.) A rule n applying to the A in the context X___Y will block if either A' is specified as [-rule n] (but not necessarily [-context n]) or if X' or Y' is specified as being [-context n] (though not necessarily [-rule n]). Thus, in hetawa, the final vowel of the verb root may not drop because wa is [-context VOWEL DROP] ; in hetawalu, the vowel of wa does not drop because it is specified in the lexicon as being [-rule VOWEL DROP].

This second analysis accounts for the Piro data in a straightforward fashion. It handles the data whether or not all of the vowels which precede the relevant suffixes at the point VOWEL DROP applies also preceded them in the underlying form. 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 similarly constrained.

From the above discussion, I conclude that it is correct to view certain morphemes as being exceptional in that they prevent application of phonological rules to neighboring segments. I have suggested one fairly restricted device

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for characterizing this exceptionality in the theory of grammar. Whether the device proposed is sufficient to deal with the full range of exceptional morphemes can only be determined by further research.

Footnotes

1. Esther Matteson, The Piro (Arawakan) Language. University of California Publications in Linguistics, Vol. 42. Berkeley and Los Angeles, 1965. For additional references on Piro, see the bibliography in the above-cited volume.

2. The rule is, in fact, both more restricted and also more general than indicated. It is more restricted in that it does not affect prefixal vowels, nor the final vowels of monosyllabic stems. It is more general in that it applies not only within the word, but also across word boundaries in the event the words are syntactically or semantically linked.

3. Noam Chomsky and Morris Halle, The Sound Pattern of English. New York, 1968.

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