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Michael K. Brame

The Cycle in Phonology: Stress in Palestinian, Maltese, and Spanish*

In this article I will adduce evidence supporting the hypothesis that stress rules apply cyclically in natural languages. A survey of some phonological alternations in Palestinian Arabic, Maltese, and Spanish leads to the postulation of an ordered set of phonological rules for each language. Further examples give rise to a series of dilemmas, and the cycle proves to be an efficient technique for their solution and for the expression of a generalization that cuts across languages.

In section 1 the Palestinian data are explored, a set of rules is motivated, and an apparent contradiction is averted by appealing to the cycle. In section 2, a set of facts similar to those of Palestinian are investigated and a similar result is obtained. In section 3 some facts of Spanish are laid bare, and the program repeats itself. Section 4 poses and seeks to answer a question concerning alternatives to cyclic analyses. New hypotheses for constraining the cycle are hazarded in section 5, which concludes the paper.

1. Palestinian Arabic

The following examples can be utilized to motivate the rule that assigns stress in Palestinian Arabic.

- (1) kátab 'he wrote' ʔíbil 'he accepted' fíhim 'he understood'
 kátabit 'she wrote' ʔíblit 'she accepted' fíhmit 'she understood'
 katábna 'we wrote' ʔbílna 'we accepted' fíhmna 'we understood'

* Some of the material included in this article can be found in Brame (1973). For additional material on Palestinian Arabic, see Brame (1971) and Abdo (1969), the latter treating a different dialect. For additional material on Maltese, see Brame (1972b). A detailed treatment of Spanish can be found in Harris (1969) and a somewhat different approach to Spanish is given in Brame and Bordelois (1973, in press). I have assumed throughout this paper a principle of stress subordination explicit in Chomsky and Halle (1968, 64): "The rules that determine stress contours are, for the most part, rules that assign primary stress in certain positions, at the same time weakening the stresses in all other positions by one." Since writing this article, I have had the opportunity of seeing Halle (1973), in which this principle is restricted. Adopting Halle's new proposal for stress subordination does not alter the results obtained here. It would be a simple and routine matter to translate the rules and derivations of this paper into the new system.

I am indebted to Joan Bresnan for important criticism of this paper, which led to significant revisions. I also wish to thank Noam Chomsky and Morris Halle for helpful comments. C. L. Baker and Joe Emonds read an earlier abbreviated version of this article and I benefited from their remarks. None of the aforementioned linguists necessarily agrees with my analyses or conclusions.

The stem underlying the verb 'to write' in the above paradigm is *katab*, with suffixes *-φ* 'he', *-it* 'she', and *-na* 'we'. The CVCVC shape of the underlying stem of 'to write' can be generalized to the verbs 'to accept' and 'to understand'. Assume underlying *ʔibil* and *fihim* and further assume that the vowel bears stress in every case as it does in (1). We thus obtain the following more abstract representations.

- (2) *kátab* *ʔíbil* *fíhim*
 kátabit *ʔíbilit* *fíhimit*
 katábna *ʔíbílna* *fíhímna*

The phonetic representations of (1) may now be obtained from the more abstract representations of (2) by applying the following rule of Syncope.

- (3) *Syncope*
 $i \rightarrow \phi / \text{ — CV}$

This rule drops unstressed *i* before consonant-vowel sequences. It can be generalized to apply to all high vowels, but only *i* will be of immediate concern. Syncope will derive *ʔiblit* and *fíhmit* from *ʔíbilit* and *fíhimit*, *ʔílna* and *fíhímna* from *ʔíbílna* and *fíhímna*; but it will not affect *ʔibil* and *fíhim*, due to the condition that *i* be unstressed.

Given the foregoing analysis, it is easy to see that stress can be assigned in a straightforward manner by the following rule.

- (4) *Stress Assignment*
 $V \rightarrow [1 \text{ stress}] / \text{ — } C_0((VC)VC_0^1)$

This rule abbreviates three disjunctively ordered subcases, which are displayed in (5).

- (5) (i) $V \rightarrow [1 \text{ stress}] / \text{ — } C_0VCVC_0^1$
 (ii) $V \rightarrow [1 \text{ stress}] / \text{ — } C_0VC_0^1$
 (iii) $V \rightarrow [1 \text{ stress}] / \text{ — } C_0$

The rule of Stress Assignment, along with Syncope, provides for the following representative derivations of the examples listed in (1).

- (6) *fíhim* *katab* *fíhim + it* *katab + it*
 — — *fíhim + it* *kátab + it* Stress Assignment (i)
 fíhim *kátab* — — Stress Assignment (ii)
 — — *fíhm + it* — Syncope
 fíhim *kátab* *fíhmit* *kátabit*

 fíhim + na *katab + na*
 — — Stress Assignment (i)
 fíhím + na *katáb + na* Stress Assignment (ii)
 fíhm + na — Syncope
 fíhímna *katábna*

Case (iii) of Stress Assignment applies to a large class of monosyllables in Palestinian,

e.g. *sádd* 'dam', *ḥúbb* 'love', *sítt* 'lady', and many others. Case (iii) applies to an even larger class of inflected verb forms, which has purposely been omitted in (1). This class will be introduced directly.

Stress Assignment predicts the correct stress for a large majority of the forms of Palestinian. There are several classes of forms, however, that appear to be counter-examples to the rule postulated above. Consider the contrast in stress that exists between the examples presented below in column I and those recorded under column II.

(7)	I	II
a.	kátabit 'she wrote'	katábit 'I wrote'
	ṭálabit 'she ordered'	ṭalábit 'I ordered'
b.	ʔbílna 'we accepted'	ʔábilna 'before us'
	šríbna 'we drank'	ḥíbirna 'our ink'
	malíkna 'our king'	mflíḥna 'our salt'
c.	ʔíbil 'he accepted'	ʔábil 'before'
	šríb 'he drank'	ḥíbir 'ink'
	málik 'king'	mflíḥ 'salt'

How can the two classes be reconciled? In particular, how can the stress difference between *kátabit* and *katábit* be predicted? Or that between *ʔbílna* versus *ʔábilna*? Since *ʔbílna* derives from underlying *ʔibil + na*, which is of the same *CVCVC + na* canonical shape as *ʔábilna*, there seems to be no basis for predicting the stress difference. Nevertheless, there is a satisfying resolution of this dilemma, a phonological solution which salvages the above analysis in toto. This solution becomes more transparent upon the observation that with the exception of geminates, there are no word-final consonant clusters in Palestinian. This suggests a general rule that serves to break up underlying word-final clusters. Also absent from Palestinian are triconsonantal clusters, again suggesting a phonological rule that serves to ensure their nonoccurrence. The two processes can be viewed as a single rule, which is stated as (8).

(8) *Epenthesis*

$$\phi \rightarrow i / C \text{ — } C \left\{ \begin{array}{l} \# \\ C \end{array} \right\}$$

To ensure that Epenthesis does not apply to the identical consonant sequences of *sádd*, *ḥúbb*, *sítt*, etc. mentioned above, either of two things could be done. We could associate with Epenthesis a condition excluding the possibility that the left and right consonants straddling the dash of (8) be identical. Or we could assume a general rule of gemination, a rule turning two identical consonants to a single geminate or long consonant. If this rule were made to apply before Epenthesis, there would be no need to tag Epenthesis with a special condition. The latter possibility will be adopted here, although neither choice affects the principal point of this section.

The existence of Epenthesis explains the nonoccurrence of certain clusters in phonetic representations. But there is a more cogent motivation for this rule: its existence affords us an explanation for the contrast seen in the paradigms of (7). The following forms will underlie those of (7).

(9)	I	II
a.	katab + it	katab + t
	ṭalab + it	ṭalab + t
b.	ʔibil + na	ʔabl + na
	širib + na	ḥibr + na
	malik + na	milḥ + na
c.	ʔibil	ʔabl
	širib	ḥibr
	malik	milḥ

Epenthesis will be ordered after Stress Assignment, and all the correct phonetic representations will fall out as a natural consequence of our analysis. Representative derivations are displayed in (10).

(10)	katab + it	katab + t	ʔibil + na	ʔabl + na	ʔabl	
	kátab + it	katáb + t	ʔibíl + na	ʔábl + na	ʔábl	Stress Assignment
	_____	_____	ʔbíl + na	_____	_____	Syncope
	_____	katáb + it	_____	ʔábil + na	ʔábil	Epenthesis
	kátabit	katábit	ʔbílna	ʔábilna	ʔábil	

Forms such as underlying *katab + t* and *ṭalab + t* are assigned stress by case (iii) of Stress Assignment. We should also expect to find underlying *ʔibil + t* and *fihim + t* for the first person singular of the stems *ʔibil* and *fihim*. The correct phonetic representations are *ʔbílít* 'I accepted' and *fḥímit* 'I understood'. This is correctly predicted by the set of rules at our disposal.

(11)	ʔibil + t	fihim + t	
	ʔibíl + t	fihím + t	Stress Assignment
	ʔbíl + t	fḥím + t	Syncope
	ʔbíl + it	fḥím + it	Epenthesis
	ʔbílít	fḥímit	

Yet another problem arises in connection with the following examples.

(12)	I	II
a.	ṭalábna 'we ordered'	ṭalábna 'he ordered us'
	ṭalábtu 'you (pl) ordered'	ṭalábkum 'he ordered you (pl)'
	ʔaṭáʕna 'we cut'	ʔaṭáʕna 'he cut us'
	ʔaṭáʕtu 'you (pl) cut'	ʔaṭáʕkum 'he cut you (pl)'

b. fhímna 'we understood'	fhímna 'he understood us'
fhímtu 'you (pl) understood'	fhímkum 'he understood you (pl)'
smířna 'we heard'	simířna 'he heard us'
smířtu 'you (pl) heard'	simířkum 'he heard you (pl)'

Verbs having low stem vowels exhibit no contrast in syllabic structure when the subject markers *-na* and *-tu* and the object markers *-na* and *-kum* are suffixed. The (b) verbs, however, do exhibit such a contrast. The problem is that *fhímna* and *smířna* derive from the more abstract *fhim + na* and *simiř + na*, which appear to be identical to the underlying representations of the column (b)II forms. Why is it that the underlying initial *i* of *fhim + na* and *simiř + na* drops to give rise to the column (a)I examples, but the initial *i* does not elide from the underlying *fhim + na* and *simiř + na* representing the column (b)II examples? Before answering this question, another class of non-eliding forms will be recorded under column II of the following display.

(13)	I	II
	fhim 'he understood'	ma fhímiř 'he did not understand'
	řibil 'he accepted'	ma řibíliř 'he did not accept'
	símiř 'he heard'	ma simířiř 'he did not hear'
	řirib 'he drank'	ma řiribiř 'he did not drink'

Here we see that when the negative particle *-ř* is suffixed, the initial *i* does not drop, just as with the column (b)II examples of (12).

The explanation for the facts adduced in (12) and (13) becomes clear once we reflect on the nature of the suffixes involved. All verbs in Palestinian require the presence of a subject pronoun (although *-ř* in the third person masculine singular), but not all verbs require the presence of object pronouns or the negative particle *-ř*. Thus, the subject pronouns are much more intrinsically bound to the stem. On the other hand, the encliticization of object pronouns and the incorporation of negative particles are the kinds of operations we frequently encounter in the syntax of natural languages. Thus, there seems to be a legitimate basis for assuming a difference in hierarchical structure between *řařářna* 'we cut', with a subject pronoun, and *řařářna* 'he cut us', with an object pronoun. This distinction can be made explicit by positing a labeled bracketing of the form [*řařař + na*] for the former example, and a labeled bracketing of the form [[*řařař*]na] for the latter. Analogous to the latter will be [[*řařař*]ř] with the negative particle *-ř*. Translating this distinction to stems such as *fhim*, we get [fhim + na] with subject pronoun suffix versus [[fhim]na] with object pronoun suffix and [[fhim]ř] with the negative particle. This distinction, together with one further assumption, yields an explanation for why the initial vowel drops from the column I examples of (12b), but not from the column II examples of (12b) and of (13b). The further assumption is that Stress Assignment applies in a cyclic fashion. Sample derivations follow.

This rule has the effect of dropping all unstressed vowels appearing before a consonant-vowel sequence. The forms listed in (15) can be derived by means of Syncope from the more abstract *ħataf*, *ħataf + et*, *ħataf + t*, *beza²*, *beza² + et*, and *beza² + t*. But now, as with Palestinian, stress is predictable according to the following rule of Stress Assignment.

- (17) *Stress Assignment*
 $V \rightarrow [1 \text{ stress}] / \text{--- } C_0((VC)VC_0^1)]$

Stress Assignment in Maltese is stated in a format identical to that of Palestinian, cf. (4). It also abbreviates three disjunctively ordered subcases, which are given for convenience as (18).

- (18) (i) $V \rightarrow [1 \text{ stress}] / \text{--- } C_0VCVC_0^1]$
 (ii) $V \rightarrow [1 \text{ stress}] / \text{--- } C_0VC_0^1]$
 (iii) $V \rightarrow [1 \text{ stress}] / \text{--- } C_0]$

The phonetic representations of (15) can now be generated from underlying stressless phonological representations. Representative derivations follow in which all three subcases of (17) are utilized.

- (19) *ħataf* *ħataf + et* *ħataf + t* *beza²*
 --- *ħátaf + et* --- --- Stress Assignment (i)
ħátaf --- --- *béza²* Stress Assignment (ii)
 --- --- *ħatáf + t* --- Stress Assignment (iii)
 --- *ħátf + et* *ħtáf + t* --- Syncope
ħátaf *ħátfet* *ħtáft* *béza²*

beza² + et *beza² + t*
béza² + et --- Stress Assignment (i)
 --- --- Stress Assignment (ii)
 --- *bezá² + t* Stress Assignment (iii)
béz² + et *bzá² + t* Syncope
béz²et *bzá²t*

Case (i) of (18) exhibits the longest environment and thus is the first subcase of (17) to be invoked. By this case, *ħataf + et* and *beza² + et* are correctly stressed, the medial vowel being dropped by Syncope. Case (ii) correctly stresses *ħataf* and *beza²*. Case (ii) does not apply to *ħátaf + et* and *béza² + et*, even though the environmental conditions are fulfilled. This follows from the principle of disjunctive ordering associated with parentheses notation (cf. Chomsky 1967 and Chomsky and Halle 1968). Case (iii) assigns stress to underlying *ħataf + t* and *beza² + t*, and Syncope follows. For the reason given above, case (iii) does not apply to the other forms. In this way, all the desired phonetic representations are generated; the stems and suffixes are generalized for all forms at the abstract phonological level.

There is a further rule involved in the derivation of *hátfet* and *béz²et*, which can be motivated on the basis of the following paradigms.

- (20) kínas 'he swept' zifin 'he danced'
 kínset 'she swept' zifnet 'she danced'
 kníst 'I swept' zfint 'I danced'

At first glance, the underlying stems for these forms appear to be *kines* and *zifen*, with *e* as the second vowel of the stem. However, this vowel alternates with *i* in *kníst* and *zfint*. If the latter were derived from underlying *kines* + *t* and *zifen* + *t*, a rule turning *e* to *i* under stress would be needed. But *e* shows up under stress elsewhere, e.g. *béza²*, *béz²et*, etc. The alternative is to assume an underlying *i*, viz. *kinis* + *t* and *zifin* + *t*, together with a rule of Vowel Reduction, stated below as (21).

- (21) *Vowel Reduction*
 i → *e* / ____ C₀##

Vowel Reduction, like Syncope, is ordered after Stress Assignment, giving rise to derivations such as the following.

- (22)

kinis + t	kinis	zifin + t	zifin	
kinís + t	kínis	zifín + t	zífín	Stress Assignment
knís + t	—	zfín + t	—	Syncope
—	kínas	—	zifen	Vowel Reduction
kníst	kínas	zfint	zifen	

The existence of Vowel Reduction suggests that the feminine ending *-et* of *hátfet*, *béz²et*, *kínset*, and *zifnet* may in fact derive from the more abstract *-it*. If so, Vowel Reduction would correctly derive *-et*, since this suffix is unstressed in the aforementioned examples. The test is to find forms in which the third person feminine singular suffix shows up with stress. If *-et* derives from *-it* via Vowel Reduction, such forms would be expected to exhibit *-it*. The requisite forms are abundant. They include *hátfitkom* 'she grabbed you (pl)', *bez²itlek* 'she spit to you (sg)', *ma hátfitkómš* 'she did not grab you (pl)', and *ma bez²itlikš* 'she did not spit to you (sg)', in which the feminine suffix shows up as *-it*. (Also note the *-ek* ~ *-ik* alternation for 'you (sg)'). The correct derivations for *hátfet* and *béz²et*, along with those required for *kínset* and *zifnet*, are given below.

- (23)

hataf + it	beza ² + it	kinis + it	zifin + it	
hátaf + it	béza ² + it	kínis + it	zifín + it	Stress Assignment
hátf + it	béz ² + it	kíns + it	zifn + it	Syncope
hátf + et	béz ² + et	kíns + et	zifn + et	Vowel Reduction
hátfet	béz ² et	kínset	zifnet	

Let us now turn to the rule that will figure crucially in the main argument of this

section. The examples that motivate this rule, some of which are displayed in (24), are drawn from the imperfective conjugation of Maltese.

(24)	I	II
	níkteb 'I write'	níktbu 'I write it'
	tíkteb 'you write'	tíktbu 'you write it'
	níkšef 'I uncover'	níkšfu 'I uncover it'
	tíkšef 'you uncover'	tíkšfu 'you uncover it'
	nízbor 'I prune'	nízbru 'I prune it'
	tízbor 'you prune'	tízbru 'you prune it'
	nízboħ 'I paint'	nízbhū 'I paint it'
	tízboħ 'you paint'	tízbhū 'you paint it'

The prefixes marking the first and second persons appear to be *ni-* and *ti-*. The object marker is clearly *-u* and the underlying stems can be taken to be of the shape CCVC. The examples listed under column I exhibit stem vowels *e* and *o*. This *e* actually derives from the more abstract *i* by Vowel Reduction, as proved by alternations such as *ma níktibš* 'I do not write' and *níktiblek* 'I write to you (sg)'. The column II examples of (24) may therefore be derived from underlying CV + CCVC + V sequences. Sample derivations follow.

(25)	ni + ktib + u	ni + zbor + u	
	ní + ktib + u	ní + zbor + u	Stress Assignment
	ní + ktb + u	ní + zbr + u	Syncope
	níktbu	nízbru	

The following examples should now be compared with those listed in (24).

(26)	I	II
	nítlef 'I lose'	nitílfu 'I lose it'
		nitílfek 'I lose you (sg)'
	títlef 'you lose'	titílfu 'you lose it'
		titílfek 'you lose it'
	níšrob 'I drink'	nišórbu 'I drink it'
	tíšrob 'you drink'	tišórbu 'you drink it'

The forms listed under column I are analogous to those of (24I) and present no problem. The forms listed under column II, however, differ considerably from those of (24II). Given the (26I) forms and the underlying suffixes *-u* 'it' and *-ik* 'you (sg)', we conclude that the column II examples of (26) should derive from underlying *ni + tlif + u*, *ni + tlif + ik*, *ti + tlif + u*, *ti + tlif + ik*, *ni + šrob + u*, and *ti + šrob + u*, with canonical shapes completely analogous to the underlying representations of the (24II)

examples. Stress should be assigned to the initial syllable of these underlying representations by case (i) of Stress Assignment. But then Syncope should follow, dropping the stem vowel, which cannot be recovered due to the fact that some stem vowels are *i* and others *o*. The fact that the stem vowel actually shows up in phonetic representations after the initial stem consonant suggests that a rule of metathesis has applied before Syncope has the opportunity to eliminate the stem vowel. What distinguishes the class of metathesizing stems of (26) from the nonmetathesizing stems of (24) is the appearance of the liquids *r* and *l* as the medial root consonant of the stem. The nasals *m* and *n* and the laryngeal *ʕ* also participate in the metathesizing process (cf. Brame 1972b). If the class *r*, *l*, *m*, *n*, and *ʕ* is informally denoted by *R*, the rule of metathesis can be formulated as follows.

(27) *Metathesis*

CRVCV → CVRCV

Above, it was noted that Metathesis must precede Syncope, for otherwise the stem vowel would be forever lost. Note that Metathesis must also precede Stress Assignment, since stress falls on the strong cluster created by Metathesis. Let us now consider the fruit these hypotheses bear.

(28)	ni + tlif + ik	ni + šrob + u	
	ni + tilf + ik	ni + šorb + u	Metathesis
	ni + tɪlf + ik	ni + šórb + u	Stress Assignment
	n + tɪlf + ik	n + šórb + u	Syncope
	n + tɪlf + ek	—————	Vowel Reduction
	*ntɪlfek	*nšórbu	

We see that Metathesis creates an environment for the subsequent application of Syncope. Thus, Syncope drops the prefixal vowel, which yields incorrect results. It would appear, then, that Syncope must precede Metathesis so that the prefixal *i* will not elide. Yet if Syncope precedes Metathesis, the stem vowel will drop, giving *nɪtɪlfu, *nɪtɪlfek, *tɪtɪlfu, *tɪtɪlfek, *nɪšrbu, *nɪšrbek, *tɪšrbu, and *tɪšrbek. To solve the latter problem we want Metathesis to precede Syncope, thus bleeding it; but this in turn creates a new problem, since it gives rise to a new environment for Syncope, thereby feeding it and resulting in the loss of the prefixal vowel. But consider the following important fact: the prefixal vowel is just that vowel that would be stressed if Stress Assignment preceded Metathesis, and if the prefixal vowel were stressed, it would never be susceptible to elision by Syncope; further, it is the object pronoun suffix which in a sense triggers Metathesis, which in turn accounts for the rightward placement of stress due to the creation of a strong cluster. From here it is easily seen that the ordering paradox finds a natural solution in terms of a cyclic analysis of the stress assigning process. This analysis is summarized in the following derivations.

(29) [[ni +tlif] +ik] [[ni +šrob] +u]

		<i>First Cycle</i>
¹ ni + tlif	¹ ni + šrob	Stress Assignment
		<i>Second Cycle</i>
¹ ni + tlif + ik	¹ ni + šrob + u	Metathesis
² ¹ ni + tlif + ik	² ¹ ni + šrob + u	Stress Assignment
<hr/>	<hr/>	Syncope
² ¹ ni + tlif + ek	<hr/>	Vowel Reduction
² ¹ nitilfek	² ¹ nišorbu	

By assuming that Metathesis precedes Stress Assignment (and hence Syncope), but that only Stress Assignment is a cyclic rule, the correct phonetic representations can be generated. As in Palestinian, subject pronouns must cooccur with the verb stem and are consequently more intimately correlated with the stem. On the other hand, object pronouns are less closely associated with verbal stems, and it therefore seems natural to capture this difference by means of a difference in bracketing. This is precisely the kind of bracketing we need to effect a reapplication of Stress Assignment. First cycle stress thereby inhibits Syncope from later affecting the prefixal vowel. Maltese is therefore a second example illustrating the explanatory value of the transformational cycle.

3. Spanish

There are three classes of verbs in Spanish. These classes are represented by the following present tense forms.

- (30) amár 'to love'
 ámo 'I love' amámos 'we love'
 ámas 'you love'
 áma 'he, she loves' áman 'they love'
 comér 'to eat'
 cómo 'I eat' comémos 'we eat'
 cómes 'you eat'
 cóme 'he, she eat' cómen 'they eat'
 vivír 'to live'
 vívó 'I live' vivímos 'we live'
 vívés 'you live'
 víve 'he, she lives' vívén 'they live'

The various forms of *amar*, *comer*, and *vivir* represent the first, second, and third conjugations, marked respectively by the theme vowels *a*, *e*, and *i*, which show up

under stress preceding the infinitive marker *-r*. The person markers include *-o* 'I', *-s* 'you', *-φ* 'he, she', *-mos* 'we', and *-n* 'they'. The theme vowel follows the stem and precedes the person markers of all the finite forms of (30), with the exception of the first person singular, which bears no theme vowel. We can generalize the paradigms by assuming an underlying theme vowel in the case of the first person singular and by postulating a rule of truncation, which will derive the phonetic representations from underlying *am + a + o*, *com + e + o*, and *viv + i + o*. In the third conjugation, the theme vowel *i* shows up as *i* under stress, but as *e* elsewhere. This alternation can be handled by the following rule, which is identical to that needed for Maltese.

- (31) *Vowel Reduction*
 $\text{ĩ} \rightarrow \text{e} / \text{ — } \text{C}_0\#$

Rule (31) can be generalized to apply to all high vowels. With the exception of the infinitives, all the forms displayed in (30) bear stress on the penultimate syllable. Harris (1969) argues for an underlying word-final *e* for infinitives and other words ending in a phonetic consonant. If Harris is correct, all the forms of (30) receive stress on their penultimate syllable at some point in phonological derivations. If Harris's word-final *e* is incorrect, the stress rule will have to be complicated. For the argument of this section, the choice is unimportant. For simplicity of exposition, it is sufficient to assume a single rule which assigns stress to the penultimate syllable of verbs and forms closely related to verbs, such as past participles, gerunds, and adverbs, along with a rule of *e*-elision. Many nouns bear their stress on the antepenultimate syllable, but nouns will not be considered in the following, nor are they relevant. The stress rule will therefore be given as follows:

- (32) *Stress Assignment*
 $\text{V} \rightarrow [\text{I stress}] / \text{ — } \text{C}_0\text{VC}_0]$

Of primary concern for this section is a rule of Spanish I shall term Raising. This rule is related to other processes of Spanish, but these are of no concern here. The process of interest is one whose effect is to raise *e* to *i* under stress, as illustrated in the following present tense paradigm.

- (33)
- | | | |
|---------------------|------------------|------------------|
| | pedír 'to ask' | |
| pído 'I ask' | | pedímos 'we ask' |
| pídes 'you ask' | | |
| píde 'he, she asks' | píden 'they ask' | |

The underlying stem vowel is *e* and becomes *i* under stress. It is not possible to assume an underlying *i* that becomes *e* because there are third conjugation forms with an underlying *i* that does not change. Raising of *e* applies in two morphological environments: first, when *e* serves as the stem vowel of the third conjugation as in (33), and second, when *e* serves as the theme vowel (that is, the *e* of the second conjugation theme). Past participles can be cited as motivation for the latter environment. Past

participles are formed by suffixing $-d + o$ or $-d + a$ to the stem followed by the theme vowel, where $-d-$ serves as the past participial marker and the following vowel marks the masculine or feminine gender. Examples of first and third conjugation past participles include *amádo* 'loved' and *vivido* 'lived', which are segmented $am + a + d + o$ and $viv + i + d + o$. By analogy to these forms we would expect to find underlying second conjugation past particles with the e theme vowel. Taking the verb *comer* as a specific example, we expect to find underlying $com + e + d + o$. This form surfaces phonetically as *comido*, with i in place of e , precisely because the theme vowel e , like the stem vowel e of (32), bears stress. Thus, the rule of Raising must mention the two morphological environments $[+3 \text{ conj}]$ and $[+ \text{theme}]$. Proof that Raising does not apply to first and second conjugation stem vowels resides in examples such as *quémo* 'I burn', *quémas* 'you burn', *quéma* 'he, she burns', etc. and *bébo* 'I drink', *bébes* 'you drink', *bébe* 'he, she drinks', etc. The rule of Raising can now be stated as (34).

(34) *Raising*

$$e \rightarrow i / \left[\begin{array}{c} \overline{} \\ + \text{stress} \\ \left\{ \begin{array}{l} +3 \text{ conj} \\ + \text{theme} \end{array} \right\} \end{array} \right] C_0 V$$

The consonant-vowel sequence in the environment of this rule is needed to prevent Raising from applying to *comér*, where the theme vowel e is stressed. (An additional constraint on the environment of (34) inhibits the application of Raising to *comémos* in (30); cf. Brame and Bordelois 1973.)

Adverbs in Spanish are commonly formed by suffixing the adverbial marker *-mente* to the feminine past particle. The first and third conjugations are represented in (35).

(35)

<i>Adverbs</i>	<i>Infinitives</i>
resignadaménte 'resignedly'	resignar 'to resign'
desconcertadaménte 'disconcertedly'	desconcertar 'to disconcert'
deliberadaménte 'deliberately'	deliberar 'to deliberate'
cumplídaménte 'completely'	cumplir 'to suffice'
desmedídaménte 'disproportionately'	desmedir 'to exceed'
interrumpídaménte 'interruptedly'	interrumpir 'to interrupt'

Stress falls on the penultimate syllable of the adverbs as predicted by Stress Assignment. The segmentation of the adverbs is straightforward: *resign* + $a + d + a + mente$, *cumpl* + $i + d + a + mente$, etc. By analogy to these forms, one expects to encounter adverbs corresponding to second conjugation infinitives. Thus, given verbs such as *conocer*, *extender*, and *deber*, one expects to find corresponding adverbs *conocedamente*, *extendidamente*, and *debedamente*. The actual occurring forms are listed below.

(36)	<i>Adverbs</i>	<i>Infinitives</i>
	conocidaménte 'knowingly'	conocer 'to know'
	extendidaménte 'extendedly'	extender 'to extend'
	debidaménte 'justly'	deber 'to owe'

Where we expect to encounter the *e* theme vowel of the second conjugation in the adverbs, *i* actually occurs. This *i*, however, bears no primary stress, and unstressed *e* does not change to *i* in any analogous environment.

The explanation for the phonetic *i* of these adverbs follows the pattern of that given for the Palestinian and Maltese data. It is no coincidence that *conocida*, *extendida*, and *debida* actually appear in Spanish as phonetic representations and that as such stress falls on the theme vowel *i*, which is raised from *e* precisely because it is stressed. Thus, there is a natural bracketing that can be associated with the adverbs of (35) and (36). Moreover, this bracketing can be utilized to explain the occurrence of *i* in (36), provided of course that Stress Assignment is a cyclic rule of Spanish. Representative derivations follow.

(37)	[[conoc + e + d + a] + mente]	
		<i>First Cycle</i>
	conoc + ¹ e + d + a	Stress Assignment
		<i>Second Cycle</i>
	conoc + ² e + d + a + ¹ mente	Stress Assignment
	conoc + ² i + d + a + ¹ mente	Raising

The rule of Raising, like the rule of Syncope in Palestinian, could be assumed to apply cyclically. We have no evidence that Raising must apply cyclically, so we assume that Raising is a word-level rule. Stress Assignment in Spanish, however, must apply cyclically. Spanish is therefore yet a third language supporting the principle of the transformational cycle.

4. An Alternative to Cyclic Stress Assignment?

As an alternative to the cyclic analysis of the Spanish data, we might formulate a rule of secondary (or tertiary) stress placement and require this new rule to follow the main stress rule of Spanish.

(38)	<i>Stress Adjustment</i>
	$V \rightarrow \overset{2}{V} / \text{ — } C_0 V C_0 \overset{1}{V}$

If Stress Adjustment is ordered before Raising in Spanish, there would apparently be no need for a cyclic analysis of stress, since the correct phonetic representations would be generated from the correct underlying representations.

- (39) $\text{conoc} + e + d + a + \overset{1}{\text{mente}}$
 $\text{conoc} + e + d + a + \overset{1}{\text{mente}}$ Stress Assignment
 $\text{conoc} + \overset{2}{e} + d + a + \overset{1}{\text{mente}}$ Stress Adjustment
 $\text{conoc} + \overset{2}{i} + d + a + \overset{1}{\text{mente}}$ Raising
 $\text{conocidam}\overset{2}{e}\overset{1}{nte}$

As an alternative to the cyclic analysis of the Maltese data, we might also attempt to formulate a rule assigning a subordinate stress.

- (40) *Stress Adjustment*

$$V \rightarrow \overset{2}{V} / \text{---} \overset{1}{C}VRCV$$

If Stress Adjustment (40) were ordered before Syncope (16) in Maltese, the following derivation would account for forms such as those listed in (26II).

- (41) $\text{ni} + \text{šrob} + u$
 $\text{ni} + \text{šorb} + u$ Metathesis (27)
 $\text{ni} + \overset{1}{\text{šorb}} + u$ Stress Assignment (17)
 $\text{ni} + \overset{2}{\text{š}} + \overset{1}{\text{orb}} + u$ Stress Adjustment (40)

 $\text{ni}\overset{2}{\text{š}}\overset{1}{\text{orbu}}$ Syncope (16)

Since the appearance of *The Sound Pattern of English* (Chomsky and Halle 1968), some linguists have reacted against the cycle in phonology. For example, Ross (forthcoming) argues for a noncyclic approach to English word stress, and, though largely an oral tradition, others have voiced objections to the phonological cycle (cf. Hoard 1971). Apparently the dissatisfaction with the cycle is due in part to a feeling that the bracketings adopted in *The Sound Pattern of English* are to some extent artificial and contrived. If this claim is granted, it would not seem to follow that cyclic stress assignment should be abandoned. Consider the implications for the examples discussed above. By eliminating the cycle in favor of auxiliary rules of stress adjustment, we must postulate two unrelated stress adjustment rules for Spanish and Maltese. Thus, under a noncyclic approach to stress assignment, the fact that the *i* of Maltese *nišorbu* does not elide by Syncope (16) and the fact that the *i* of *conocidaménte* is raised from *e* in Spanish become two unrelated facts. It is precisely this ill consequence that cyclic stress avoids, since the problems that arise in connection with Raising in Spanish and Syncope in Maltese can be reduced to a single universal explanation embodied in the cyclic hypothesis. This hypothesis explains the troublesome facts of Maltese, Spanish, and Palestinian Arabic. The same facts are not explained, but described within a noncyclic framework of the type illustrated above.

A noncyclic approach to stress in Maltese and Spanish reduces other facts to the status of accidents. For example, it is accidental that Maltese Stress Adjustment should precede Syncope in derivation (41) and that Spanish Stress Adjustment should precede Raising in (39). This accidental property of the noncyclic approaches is not found in the cyclic approach. Cyclic stress relates what is dismissed as accidental in (39) and (41), since Stress Adjustment is not needed in the cyclic approaches and Stress Assignment is required to precede Syncope in Maltese and Raising in Spanish in both the cyclic and noncyclic approaches.

The argument for the cycle in Palestinian Arabic is even more powerful, for, due to the identity of the subject pronoun suffix *-na* 'we', with the object pronoun suffix *-na* 'us', recourse to a purely phonological rule of stress adjustment is not possible.

In conclusion, it seems to me that there are two factors that influence recent tendencies to abandon the cycle in phonology. First, there appears to be the mistaken and perverse idea that the theory would be more general without this one extra device. This reasoning is questionable and otiose; whereas abandoning the cycle in a single language may appear to yield a more general theory with less theoretical machinery, whatever appeal may have existed completely evaporates when the elimination of the cycle is viewed in the context of several languages or of language in general, as Chomsky and Halle intended. In other words, the principle of the cycle is a universal, which reduces what may appear to be disparate facts from differing languages to a single fact and thereby offers an explanation for these facts. In this view, the child acquiring Maltese or Spanish need not consider the noncyclic language specific analyses embodied in (39) and (41). Rather, the universal cyclic principle forms the basis which facilitates the acquisition of Maltese and Spanish, thereby significantly limiting the hypotheses that need be made in the acquisition process. Similar arguments can be made in support of deep structure, ordering, and other devices of generative grammar that have come under attack on vague grounds of simplicity and generality.

A second, and more serious, factor responsible for the intellectual discomfort with the phonological cycle derives from a justified concern for the unmotivated use of labeled brackets. It is this issue to which attention is directed in the following section. With regard to this point, it appears that there is a fundamental confusion over what is at issue, the status of the cycle or the status of natural bracketings. I agree there is need for constraining the use of labeled brackets, but I fail to see how it follows from this that the phonological cycle should be abandoned.

5. Constraints on Natural Bracketings and Constraints on the Cycle in Phonology

The question of whether other than stress-assigning rules can apply in a cyclic fashion is still very much open. Some speculative evidence for non-stress-assigning cyclic rules

is given in Brame (1972c). In spite of the examples presented in that paper, the most convincing of cyclic phonological rules appear to me to be those involved in assigning primary stress. This fact is itself in need of explanation, and I venture a conjecture below. However, I will be primarily concerned in this section with advancing a proposal for constraining natural bracketings. Since the phonological cycle is dependent on bracketings, a consequence of my constraint will be a delimitation of where rules can be expected to cycle. In other words, my proposal will serve as an indirect means of constraining the cycle in phonology.

The constraint I intend to offer is grounded in the examples presented in sections 1, 2, and 3 above but may in the long run prove to be too strong. What stands out about each of the earlier examples of cyclic application of stress is the fact that the string constituting the first cycle itself shows up elsewhere as an independent phonetic word sequence. Thus, the string of the inner cycle of [[fihim] + na] of Palestinian Arabic has an independent status as the word *fihim* 'he understood'; the string constituting the inner cycle of Maltese [[ni + šrob] + u] shows up as the independent word sequence *níšrob* 'I drink'; and finally, the string constituting the inner cycle of Spanish [[conoc + e + d + a] + mente] shows up as an independent word of Spanish, viz. *conocida* 'known'. There are additional examples illustrating this point for Spanish.

(42)	<i>Adverbs</i>	<i>Infinitives</i>
	abhorreciblemente 'hatefully'	abhorrecer 'to hate'
	creíblemente 'credibly'	creer 'to believe'
	invenciblemente 'invincibly'	vencer 'to conquer'
	placiblemente 'agreeably'	placer 'to please'

The fact that the infinitives are second conjugation forms, i.e. they bear the theme vowel *e*, proves that the *i* of the adverbs derives from *e* by Raising. Again a cyclic approach to stress in Spanish will correctly predict this outcome in terms of derivations analogous to (37). A representative derivation is given as (43).

(43)	[[abhorrec + e + ble] + mente]	
		<i>First Cycle</i>
	abhorrec + ¹ e + ble	Stress Assignment
		<i>Second Cycle</i>
	abhorrec + ² e + ble + ¹ mente	Stress Assignment
	abhorrec + ² i + ble + ¹ mente	Raising

Of significance for this section is the fact that, like the other examples cited above in Palestinian, Maltese, and Spanish, the strings of the innermost cycles of the adverbs of (42) have an independent status as word sequences of Spanish.

- (44) *Adjectives*
 aborrecíble ‘hateful’
 creíble ‘credible’
 invencíble ‘invincible’
 placíble ‘agreeable’

To clarify the point being made, the data may be summarized in the following table.

<i>Cycles</i>	<i>Word Sequences</i>
Palestinian: [[fíhim] + na]	fíhim ‘he understood’ fíhímnā ‘he understood us’ fíhímnā ‘we understood’ fíhim ‘he understood’ fíhímíš ‘he did not understand’
Maltese: [[ni + šrob] + u]	níšrob ‘I drink’ níšróbu ‘I drink it’
Spanish: [[conoc + e + d + a] + mente]	conocída ‘known’ conocidaménte ‘knowingly’
[[aborrec + e + ble] + mente]	aborrecíble ‘hateful’ aborrecibleménte ‘hatefully’

The following definition will serve to express the relation alluded to in the preceding discussion.

Definition

Two strings in phonological representations are said to be *equipotent* if they are identical and at least one of the two is not represented as a proper substrings in phonetic representations.

On the basis of the foregoing examples, I propose the following constraints on natural bracketings.

Natural Bracketing Hypothesis

For a substring ψ to be bracketed, it must be equipotent to a string σ .

All of the cyclic arguments given earlier are alike in that stress is utilized to crucially affect a later rule which mentions stress. Thus, stress is utilized in Palestinian and Maltese to inhibit Syncope, which applies only to unstressed vowels. In Spanish, stress is utilized to bring about a later application of Raising, which requires stress to be present. In any language, a potential situation exists in which a stress-assigning rule can be proved to be cyclic provided the language possesses a second rule mentioning stress. In English there is a rule of *h*-elision or psilosis, which mentions stress. This rule drops *h* when *h* is followed by a stressless vowel. In English we therefore have a

situation in which the English stress-assigning rule can potentially be proved to be cyclic. In my dialect, a crucial distinction is made between *Prohibition*, pronounced [proəbɪʃən] without *h*, as in *the days of Prohibition*, and *prohibition* with verbal force, pronounced [prohibɪʃən] with *h*, as in *the prohibition of X by Y*. Although the latter is not particularly elegant English, most speakers agree that *prohibition* with verbal force admits the presence of *h*, while *Prohibition* as in *the days of Prohibition* does not admit the presence of *h*. The explanation for this difference is again cyclic stress assignment. What could be more natural than the assumption that *prohibition* with verbal force requires a bracketing labeled *V*, viz. [[prohibit]_V + ion]_N as opposed to the totally nounlike *Prohibition* with no inner cycle? Such an assumption, along with cyclic stress assignment in English, explains why *h* does not elide. The innermost cycle will be stressed *prohibit*, just like the true verb, and the traces of this stress will inhibit psilosis from dropping the *h*. A similar explanation is given by Chomsky and Halle for why the *a* of *elasticity* does not reduce to *ə* by Vowel Reduction, a rule which mentions stress, as opposed to the *e* of *compensation* which does reduce. Because *elastic* is cycled, with the effect that stress is placed on *a*, reduction is prevented. No inner cycle exists in the case of *compensation*, however. Hence the *e* never bears stress and consequently reduces. Examples such as *prohibition* and *elasticity* in English, which require inner cycles, satisfy the Natural Bracketing Hypothesis, since *prohibit* and *elastic* are independent word sequences of English. The Natural Bracketing Hypothesis, however, rules out analyses such as [[ortho[dox]]y] and [[aristo[crat]]y], which are proposed in *The Sound Pattern of English*, while allowing for much else in that work. If correct, the Natural Bracketing Hypothesis suggests that *-dox-* and *-crat-* bear lexical [1 stress]. Halle and Keyser (1971) have made use of lexical stress with respect to other classes of English vocabulary. The Natural Bracketing Hypothesis thus forces more material into the lexicon and thereby makes a claim as to what are true generalizations and what idiosyncratic facts.

The domain of cyclic rules is determined by the bracketing that particular phonological representations exhibit. Thus, it is a necessary condition that substrings be equipotent to identical strings in order to qualify for cyclehood, but this condition is not sufficient. In other words, if a substring is equipotent to an identical string, this does not imply that the substring must be bracketed. For example, although *fihim* shows up as an independent word, this does not imply that *fihim* 'he understood' constitutes a cycle for the deep representations of both *fhimna* 'we understood' and *fihimna* 'he understood us'. A strengthening of our hypothesis so as to rule out *fihim* as a potential cycle for *fhimna*, as opposed to *fihimna*, which requires an inner cycle, is desirable. The latter form is equipotent to *fihim* 'he understood', and the meaning of *fihimna* is a compositional function of the meaning of *fihim* 'he understood' and *-na* 'us'. Not so with *fhimna* 'we understood', which does not include 'he understood' as a component of its meaning. These observations suggest the following revised constraint on natural bracketings.

Strong Natural Bracketing Hypothesis

For a substring ψ of a string ϕ to be bracketed, ψ must be equipotent to a string σ , and the meaning of ϕ must be a compositional function of the meaning of σ and $\phi - \psi$ (ϕ minus ψ).

It is clear that the Strong Natural Bracketing Hypothesis takes us into the realm of semantics and, for one thing, requires the meaning of the adverbs of Spanish to include the meaning of the past participles or adjectives. Such questions have not been investigated, but I suspect there may be adverbs in Spanish with idiosyncratic meanings, unrelated to the corresponding adverbs or adjectives. We must ask if such examples, should they be brought forward, refute the Strong Natural Bracketing Hypothesis or whether such forms are in fact to be considered underived, i.e. to be represented without an inner cycle. Still another question concerning the Strong Natural Bracketing Hypothesis arises in conjunction with certain plural verb forms in Maltese. Although *-u* serves as an object pronoun in Maltese, it is homophonous with the plural subject marker *-u*. When the latter is suffixed to imperfective stems, we get metathesis and nonelision of the prefixal vowel, cf. *nišorbu* 'we drink', *titilfu* 'you (pl) lose'. Clearly we should welcome an explanation for the latter forms analogous to that of section 2. But if we opt for $[[ni + \text{šrob}] + u]$ and $[[ti + \text{tlif}] + u]$, to what extent can we claim that 'we drink' and 'you (pl) lose' are compositional functions of 'I drink' plus 'plural' and 'you (sg) lose' and 'plural'? For these reasons, the Strong Natural Bracketing Hypothesis may be too strong; yet the principle is of sufficient interest to bear in mind.

The Natural Bracketing Hypothesis admits the possibility that some segmental rules may be cyclic. While it allows for the first example discussed in Brame (1972c), it disallows the second example brought forward in that work. The Natural Bracketing Hypothesis could in fact be sufficiently weakened so as to cover both examples. This could be accomplished by stating the principle as a constraint on stress-assigning rules (of the type illustrated in Palestinian, Maltese, and Spanish), rather than as a condition on bracketing.

Natural Cycle Hypothesis

For a substring ψ to be cycled by a stress rule, it must be equipotent to a string σ .

A corresponding strong version of this principle could be formulated to replace the Strong Natural Bracketing Hypothesis. Due to the almost total lack of detailed phonological analyses of more than a few languages, it is at present difficult to decide between the alternative hypotheses. However, I tend to favor the Natural Bracketing Hypothesis. Since cyclic rules are dependent on bracketing, it seems natural to constrain the cycle by placing constraints on where brackets can occur. This raises the question, mentioned at the outset, of why stress-assigning rules are typically those that can most convincingly be demonstrated to be cyclic. My answer to this question is implicit in the following universal principle which I conjecture.

Principle of Cyclicity

All and only the rules mentioning brackets apply cyclically.

This hypothesis supercedes an earlier conjecture made in Brame (1972c). Like all other hypothetical linguistic universals, it must be tested against detailed phonological analyses. Since it is typically stress-assigning rules that mention brackets in their formal statement, the Principle of Cyclicity correctly predicts that stress-assigning rules are the ones that are typically cyclic. However, the Principle of Cyclicity does not rule out the possibility that some segmental rules must be formulated with brackets. In the event of the latter, the prediction is that these segmental rules apply cyclically. In Kaye (1971) some evidence is given to show that nasalization applies cyclically in Desano. Although Kaye's formulation of this rule in the main body of his article violates the Principle of Cyclicity, he does provide an alternative formulation of his cyclic rule in footnote 15 of the article which satisfies the Principle of Cyclicity. Arguments are offered in Kisseberth (1972) in support of several cyclic segmental rules of Klamath. Unfortunately those rules, with one exception, are not explicitly stated; an explicit formulation of rules is particularly crucial to a proper evaluation of the Principle of Cyclicity. Kean (1971) accepts Kisseberth's argument that some segmental rules must apply cyclically in Klamath, while rejecting some of the details of his analysis. It is interesting to note that Kean does explicitly state the relevant segmental rules of Klamath. (Kean points out that Kisseberth's cycle violates the Principle of Strict Cyclicity, outlined in Kean (to appear), shows that this is a consequence of Kisseberth's global rule, and proceeds to reanalyze Klamath without recourse to global rules.) If Kean's analysis is correct, it is one consistent with the Principle of Cyclicity, since her relevant segmental rules are formulated with brackets. On the other hand, White (1972) has given a detailed analysis of Klamath in which the cycle is not invoked. Turning now to English phonology, it should be noted that all rules formulated with brackets by Chomsky and Halle in *The Sound Pattern of English* are cyclic rules. And all cyclic rules of *The Sound Pattern of English*, with one exception, are formulated with brackets. (The exception is a segmental rule which can conceivably be reformulated.) In the standard theory of generative phonology, as in *The Sound Pattern of English*, cyclic rules are marked ad hoc to distinguish them from non-cyclic rules. The Principle of Cyclicity obviates the necessity for such special marks and resolves the issue in what I suspect is a natural fashion.

References

- Abdo, D. (1969) *On Stress and Arabic Phonology*, Khayats, Beirut.
 Anderson, S. and P. Kiparsky, eds. (1973) *A Festschrift for Morris Halle*, Holt, Rinehart, and Winston, New York.
 Brame, M. K. (1970) *Arabic Phonology*, unpublished Doctoral dissertation, MIT, Cambridge, Mass.

- Brame, M. K. (1971) "Stress in Arabic and Generative Phonology," *Foundations of Language* 7, 556-591.
- Brame, M. K., ed. (1972a) *Contributions to Generative Phonology*, University of Texas Press, Austin.
- Brame, M. K. (1972b) "On the Abstractness of Phonology: Maltese ʔ," in M. K. Brame, ed. (1972a).
- Brame, M. K. (1972c) "The Segmental Cycle," in M. K. Brame, ed. (1972a).
- Brame, M. K. (1973) "Stress Assignment in Two Arabic Dialects," in S. Anderson and P. Kiparsky, eds. (1973).
- Brame, M. K. and I. Bordelois (1973) "Vocalic Alternations in Spanish," *Linguistic Inquiry* iv, 111-168.
- Brame, M. K. and I. Bordelois (in press) "Some Controversial Questions in Spanish Phonology," *Linguistic Inquiry* v. 2.
- Chomsky, N. (1967) "Some General Properties of Phonological Rules," *Language* 43, 102-128.
- Chomsky, N. and M. Halle (1968) *The Sound Pattern of English*, Harper and Row, New York.
- Halle, M. (1973) "Stress Rules in English: A New Version," *Linguistic Inquiry* iv, 451-464.
- Halle, M. and S. J. Keyser (1971) *English Stress: Its Form, Its Growth, and Its Role in Verse*, Harper and Row, New York.
- Harris, J. W. (1969) *Spanish Phonology*, MIT Press, Cambridge, Mass.
- Hoard, J. E. (1971) "The New Phonological Paradigm," review of *The Sound Pattern of English*, *Glossa* 5, 222-268.
- Kaye, J. D. (1971) "Nasal Harmony in Desano," *Linguistic Inquiry* ii, 37-56.
- Kean, M.-L. (1971) "A Reply to Kisseberth's 'Cyclic Rules in Klamath Phonology'," unpublished mimeograph, MIT, Cambridge, Mass.
- Kean, M.-L. (to appear) "The Strict Cycle in Phonology," *Linguistic Inquiry* v. 2.
- Kisseberth, C. W. (1972) "Cyclical Rules in Klamath Phonology," *Linguistic Inquiry* iii, 3-33.
- Ross, J. R. (forthcoming) "A Reanalysis of English Word Stress: Part II."
- White, R. B. D. (1972) *Klamath Phonology*, Doctoral dissertation, University of Washington, Seattle [reproduced as Vol. XII of *University of Washington Studies in Linguistics and Language Learning* (1973)].

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