JPS 3

PRELIMINARY DRAFT (1978)

PHARYNGEAL EFFECTS IN* RENGAO PHONOLOGY AND SEMANTICS

Kenneth Gregerson
Summer Institute of Linguistics

Although specialists from a variety of linguistic areas have described the effects of pharyngealization or velarization in certain languages, recent renewed interest in the topic has been particularly aroused by the proposal by Ladefoged (1964) and Stewart (1967) that West African vowel harmony is based on pharynx width distinctions produced by tongue-root movement (see also Pike, 1967). Efforts to incorporate tongue-root articulation into phonetic feature theory has generated further discussion (see Chomsky and Halle, 1968; Halle and Stevens, 1969; Perkell, 1974; Lindau, Jacobson and Ladefoged, 197). The ultimate testing ground for phonetic theory, however, is as always in the actual description of a range of languages (cf. Colarusso, 1974 on Northwest Caucasian languages and Kiparsky, 1974, on English).

In this paper I will describe some pharyngeal effects I have explored in Mon-Khmer languages of Southeast Asia. I will first summarize some phonological aspects, then spend more time on semantic (sound symbolism) aspects, and finally conclude with some remarks on broader implications beyond Mon-Khmer. The categories of pharynx-related phenomena that I have in mind may be summarized as follows:

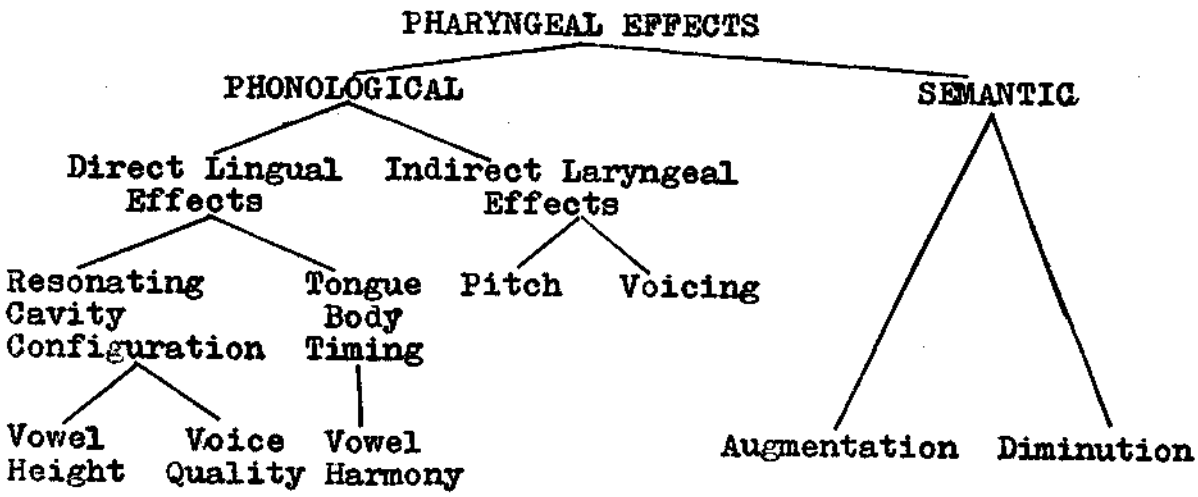

FIGURE 1

* Mon-Khmer language of Vietnam

1. Pharyngeal effects in the phonology of register.

Rengao, like many other Mon-Khmer languages of Southeast Asia, is characterized by a certain constellation of phonological features which specialists in that linguistic area have customarily referred to as '<u>voice register</u>' or simply '<u>register</u>'. Henderson (1952) described the pronunciation of Cambodian (Khmer) syllables in terms of a major dichotomy between <u>First</u> and <u>Second Register</u>. The relevant features of Khmer register may be summarized as follows:

	<u>Written Initial Consonants</u>	<u>Voice Quality</u>	<u>Vowel Quality</u>	<u>Pitch</u>
First Register	surds	'normal' 'head' 'clear' 'tense'	more open, onglided	relatively higher
Second Register	sonants	'deep' 'breathy' 'sepulchral' 'chest' 'relaxed'	close centering diphthongs	relatively lower (larynx also low)

TABLE 1

In Gregerson 1976 I have suggested that the explanation for this correlation of features is to be found in a more thorough understanding of tongue-root articulation. Register effects are, in this view, created by expanding or contracting the pharynx by the movement of the tongue mass (as distinct from the upper portions of the tongue, i.e. tongue blade). Looked at in this fashion, the First Register is a retracted tongue-root (RTR) phonation type in which the auditory <u>voice quality</u> impression 'clear' or 'normal' (see chart above) is produced by resonances in a reduced pharynx. The Second Register on the other hand involves an advanced tongue-root (ATR) gesture, which expands the pharynx and yields a more 'cavernous' or 'deep' auditory sensation. The same tongue-root movements, however, simultaneously produce the <u>vowel quality</u> (see above chart) effects of 'more open' for First

Register (RTR) and 'close' for Second Register (ATR), for, in general, the forward movement of the entire tongue mass tends to raise the tongue height producing a closer vowel, while retracting the tongue mass (RTR) lowers the tongue height, resulting in a more open vowel.

The Rengao vowel system, is as follows:

Second (ATR) Register		First (RTR) Register	
i	u	ei	ou
e	o	ɛ	ɔ
ə		a	

TABLE 2.

This very symmetrical vowel system opposes a set of vowel articulations possible within phonological words of an ATR prosody versus those within words of an RTR prosody. It is readily noticed that the ATR vowels are all higher in tongue height than their RTR counterparts. The ATR front vowels are also generally more fronted than their RTR counterparts. These effects are directly relatable to tongue-root positioning, for ATR movement tends both to advance and raise the tongue, while RTR movement tends to retract and lower the tongue. In addition to these vowel quality features, Rengao vowels like those of Khmer exhibit the voice quality impressions of 'breathy, relaxed' for the ATR vowels and 'clear, normal' for the RTR vowels.

If 'register' or 'phonation type' is viewed phonologically as a prosodic or suprasegmental feature of the phonological word, then the vowels above are simply variants determined by that word prosody. This is by the way an attractive way of viewing these phenomena for the further reason that consonants as well as vowels are often simultaneously conditioned (in varying ways in different Mon-Khmer languages) by one and the same tongue-root prosody. From this perspective, the vowels of Rengao are simply:

I	U
E	O
A	

TABLE 3

These vowels occur in either an ATR or an RTR phonological word,

(1) $CVCVC_{ATR}$

$CVCVC_{RTR}$

For example, a tonic syllable high front vowel /I/ would occur in $CVCVC_{ATR}$ as $/CVCIC/_{ATR}$ or phonetically CVCiC , while /I/ in a $CVCVC_{RTR}$ word occurs as $/CVCIC/_{RTR}$ or phonetically CVCeiC , etc.

Having described a prosodic phonological approach, let me now say that for purposes of more transparent phonetic exposition, I will throughout this paper cite Rengao forms with vowels in their allophonic shapes as in e, ɔ, o, u vs. ei, ɛ, a, ɔ, ou, since it makes perhaps for more immediate recognition of certain facts about vowel relationships that come up in the sound symbolism discussed below. The following forms illustrate these vowel contrasts:

(2)	ATR vowels	RTR vowels
	kɔdri 'wife'	kadrei 'thunder'
	nhen 'we (excl.)'	nhɛn 'to see'
	tɔŋ 'to ponder'	tang 'to substitute'
	brok 'go'	brɔk 'stringed instrument'
	tuh 'to water'	touh 'to hit'

Pharyngeal effects on vowels involve not only matters of vowel quality, but also vowel harmony. That is, 'vowels are constrained so that all the vowels in a single word have some property or properties in common (Ladefoged, 1975:202).

Vowel harmony in such Mon-Khmer languages as Khmer (Huffman, 1967:) and Rengao appears to be fundamentally the same as that reported in certain West African languages for which tongue-root articulation provides the most satisfying physiological explanation (Ladefoged, 1964; Stewart, 1967, Pike, 1967). Thus in Mon-Khmer, phonological words are controlled by a prosody whose physiological basis is tongue-root articulation (either ATR or RTR). All phonological words are thereby constrained to allow only a

certain sub-set of vowels both within and across syllables. These seem to be explained by the fact that the tongue-body is positioned by the slow-moving extrinsic musculature (see Perkell,) in either an ATR or RTR configuration while at the same time the tongue-blade is performing more intricate gestures through the faster moving intrinsic musculature. Since tongue-root adjustments are made more slowly than tongue-blade adjustments, the former tend to persist across syllable boundaries within the word and may thereby provide the physiological common denominator which 'harmonizes' the vowels of a word. The main observation seems to be that the set of configurations which the tongue top assumes in the oral cavity while the tongue body is in a RTR position. That is, if one tongue root posture is maintained through two syllables, both syllables will be constrained to select their vowels only from that subset which can be produced in that tongue root position and can never select from those vowels possible in another tongue root position. This creates vowel harmony.

Rengao vowel harmony can be described as follows:

Second (ATR) Register ('deep, breathy')

pretonic syllable vowel	tonic syllable vowel
ə	i,e,ə,o,u

First (RTR) Register ('tense', 'clear')

pretonic syllable vowel	tonic syllable vowel
a ~ ə	ei, ou
a (ɛ,ɔ)	a, ɛ, ɔ

TABLE 4

That is, in disyllabic forms ATR cooccurs as the pretonic syllable vowel with ATR [i,e,ə,o,u] as tonic syllable vowels. But RTR [a~ə] occurs in the pretonic syllable preceding tonic syllable RTR high vowels ei and ou , while a appears before RTR low vowels a, ɛ, ɔ often with perfect harmony variants [ɛ] or [ɔ] preceding tonic syllables with [ɛ] or [ɔ] respectively. The following Rengao forms illustrate these harmony restrictions:

(3) ATR Register words

hədri	'pestle'
bəseh	'wizard'
bərəm	'to exterminate'
həjoh	'to be wet'
mənuŋ	'chisel'

RTR Register words

balei/bəlei	'species of bamboo'
tadrou/tədrou	'six'
basat	'knife'
manɛŋ /mɛnɛŋ	'crossbow'
cakhɔq/cɔkhɔq	'shoe'

In addition to what appear to be more <u>direct effects</u> of tongue-root articulation, Mon-Khmer languages also reflect possible <u>indirect effects</u> on laryngeal action. The chart of Khmer features (2) notes that contrasts in <u>pitch</u> correlate with contrast of register. Recall that Henderson characterized Khmer First (RTR) Register as 'relatively higher' and the Second (ATR) Register as 'relatively lower.' While it is true, of course, that pitch features need not necessarily be effects of the movements of the tongue mass, the question, for Mon-Khmer at least, is whether such movements could under appropriate conditions constitute a significant causal or cooperating mechanism in the historical development of pitch phenomena (tonogenesis) in certain Asian languages. In connection with these considerations, it was suggested (Gregerson, 1976) that tongue-root articulation has the potential for affecting the larynx either because of the neuro-muscular linkage of the tongue with the larynx or because the positioning of the tongue body in the pharynx can exert an airstream managing effect on vocal fold action.

While pitch plays no role (not even sub-phonemic so far as I have noticed) in Rengao register generally, there is one interesting example involving pitch in a phrasal intonation contour that does correlate with register. Notice

the following examples (where 1 is low and 3 is high pitch):

(4)

a. cha̤m (1) 'below'

b. cha̤m (2) cha̤m (1) 'down below'

c. cha̤m (3) cha̤m (2) 'way down below'

The curious thing here is that the normal word cha̤m 'below', a second register (ATR) word, when reduplicated with a high plus low pitch intonation tune maintains its ATR vowel ə̆ in the lower contour 2-1 (b.), but in the most emphatic and highest pitch contour 3-2 (c.), it changes to the corresponding First Register (RTR) vowel ă, thus higher pitch correlates with narrow pharynx (retracted tongue root) vocalism.

The voicing status of initial consonants was correlated with register in (2) above for Khmer with voicing associated with ATR (wide pharynx) and voicelessness with RTR (narrow pharynx). The fact that wide pharynx should correlate with voicing and a narrow pharynx with voicelessness is not merely an idiosyncrasy of Mon-Khmer is clear from cineradiographic tracing for English, wherefor example [s] has a narrower pharynx than [z] and [t] than [d] (Perkell, 1969: 78-83). As with pitch, it is not clear, however, whether it is the neuromuscular events involved in positioning the tongue-body which affects larynx adjustments for voicing or whether it is the degree of constriction in the pharynx occasioned by tongue-body placement that influences air flow patterns past the glottis (see Gregerson, 1976).

The Rengao consonant system includes a voicing contrast as reflected in the inventory below:

Labials:	p, b, m, w
Apico-alveolars:	t, d, n, s, r̆
Lamino-alveolars:	c, j, ñ, l, y
Dorso-velars:	k, g, ŋ
Laryngeals:	?, h

TABLE 5

(These elements may enter into more complex combinations to

produce aspirated, preaspirated, and preglottalized consonants as well as clusters involving /-r-, -l-, -w-, -y-/ here. As in a number of Mon-Khmer languages, the correlation of initial consonant voicing and register is no longer generally transparent in Rengao (like it was in Khmer and is in Mnong). However, in one context the correlation still seems to obtain, namely with words of the shape $PV_1?V_2(C)$, where P=labial stop. In this situation the register (tongue-root position) of V_1 and V_2 correlates with the voicing of P such that

(5)

p-: V_1, V_2 RTR

paʔaih	'swell up'
pɔʔɔ	'species of bamboo'

b- : V_1, V_2 ATR

bəʔuʔ	'to nurse'
bəʔo	'spread word'

2. PHARYNGEAL EFFECTS IN THE MAGNITUDE SYMBOLISM OF EXPRESSIVES. There exists in Rengao an extensive set of expressives (or ideophones) which have a grammatical function that is in some sense 'adverbial' and which reflect the speaker's assessment of events or referents in highly dramatic sense-oriented terms. They are roughly similar to the following English forms:

a. Clink, the coin fell to the pavement.
b. The pipe fell, clank, on the scrap pile.
c. They dropped the filing cabinet on the floor with a clunk.

It is, of course, a much observed fact that tongue fronting and raising correlates with diminution of size in the objects referred to in forms like these. Regarding the basis for this kind of ablauting (though he had other forms in mind), Sapir (1929:235) said:

> 'The reason for this unconscious symbolism...may be acoustic or kinesthetic or a combination of both. It is possible that the inherent 'volume' of certain vowels is greater than that of others and that this factor alone

is sufficient to explain the results of the experiment. On the other hand, it should be noted that one may unconsciously feel that the tongue position for one vowel is symbolically 'large' as contrasted with the tongue position for another. In the case of i the tongue is high up toward the roof of the mouth and articulates pretty well forward. In other words, the vibrating column of air is passing through a narrow resonance chamber. In the case of a the tongue is very considerably lowered in comparison, and also retracted. In other words, the vibrating column of air is now passing through a much wider resonance chamber. This kinesthetic explanation is just as simple as the acoustic one and really means no more than that a spatially extended gesture is symbolic of a larger reference than a spatially restricted gesture (emphasis mine, KG).'

Now notice the following set of expressives in Rengao:

(6) a. Aw hloq ga mut hye ragɛw. 'I saw him come in, TALL AND REAL SKINNY.

b. Aw hloq ga mut hye ragaw. 'I saw him come in, TALL AND THIN.

c. Aw hloq ga mut hye rəgəw. 'I saw him come in, TALL AND BIG.

In addition to noticing the syntactic deployment of these morphemes, observe that there is also vowel ablauting reminiscent of the English examples above. Thus ragɛw in (6)a is the most diminutive of the set and is indeed a more fronted and raised form than the semantically more augmentative form ragaw in (6)b. However, the most augmentative form rəgəw in (6)c, does not fit into a simple scheme of front to back in the oral cavity, for ə is approximately as far back as a and if anything should be more diminutive being a closer vowel than a. It is at this point that it becomes clear that a theory of sound symbolism that recognizes only oral cavity factors will be inadequate. The fact is that while ragɛw and ragaw contrast as to oral cavity closure, both of them contrast with rəgəw as to pharyngeal cavity closure, the former pair being pronounced with a relatively narrower pharynx and the latter one with a wider pharynx. Thus while ragaw has a more open oral cavity than ragɛw, rəgəw has a more open pharyngeal cavity than either of them and is therefore of the greatest magnitude from a Rengao sound symbolism point of view.

In the following sections I will continue to show how Rengao speakers use modifications of resonating cavity volume to model the magnitude of objects in their perceptual world. In this way a physically-based metaphor is created in which a reduced resonating air passage symbolizes smaller referents, i.e. diminutives, and an expanded resonating passage larger ones, i.e. augmentatives. What makes Rengao sound symbolism especially interesting as reflected above, and this is the main point of the paper, is that not only the oral cavity, but also the pharyngeal cavity may serve as the locus for this magnitude symbolism. Furthermore, though oral cavity symbolism is clearly distinct from the pharyngeal symbolism, they are seen to form an overall system which is interlocking and, noncontradictory.

The magnitude symbolism theme that will be illustrated below manifests itself in different languages variously as size, quantity, distance, gender, endearment, etc. (see e.g. Ultan, 197). The root metaphor, however, remains in general quite constant and may be summarized in what I shall here term the MAGNITUDE SYMBOLISM PRINCIPLE, according to which:

(7) $$M_f = M_c$$

That is, magnitude of (linguistic) form is symbolically equated with magnitude of concept. Reduction in form yields diminutives (DIM) in some broad semantic sense, while expansion of form yields augmentatives (AUG).

2.1 ORAL CAVITY SYMBOLISM. The logic of oral cavity magnitude symbolism, as reflected in Sapir's statement above, is that diminution is associated with reduction in oral cavity volume. This is, as is well-known, accomplished by fronting and/or raising the tongue to narrow the oral passage. Augmentation is of course, obtained by the reverse process. The following Rengao expressives illustrate such oral cavity symbolisms:

2.11. TONGUE ADVANCEMENT PAIRS.

(8)

FRONT/BACK	DIM/AUG
tabrɛn/tabrɔn	'very small/small amazingly patterned'
prɛ̃w/prɑ̃w	'very tightly/tightly woven'
təplip/təplup	'very short (plump)/short (plump) person'
ragɛw/ragaw	'very skinny (tall)/skinny (tall) person'
rəhĩk/rəhũk	'smaller/larger person with protruding nose'
chahɛh/chahɔh	'smaller/larger person with large lips'
tagɛk/tagak	'smaller/larger hole'
rəñeŋ/rəñoŋ	'smaller/larger fire (bonfire vs. house on fire)'
hwĩw/hwə̃w	'smaller/larger object with a hole in it'
rabɛm/rabam	'smaller/larger person's teeth'

2.12. TONGUE HEIGHT PAIRS

(9)

HIGH/LOW	DIM/AUG
tahrouy/tahrɔy	'sight of a couple/group walking in single file'
ʔbri/ʔbre	'sight of smaller/larger red object'
rəhĩk/rəhẽk	'sight of smaller/larger person with protruding nose'
chəhuh/chəhoh	'sight of smaller/larger person's mouth'
təbluy/təbloy	'sight of smaller/larger sphere (pumpkin vs. moon)'

2.2. PHARYNGEAL CAVITY SYMBOLISM

The examples in 2.1 involved the familiar magnitude symbolism based on sound relations in <u>oral space</u> which may be initially schematized as (cf. Section 1):

I U

E O

A TABLE 6

From a magnitude symbolism perspective, in this kind of space, as the examples illustrated, front and high = DIM while back and low = AUG.

But this is only half the story, for each of the above oral space positions may be <u>further multiplied by a pharyn-</u>

geal space factor, which may be diagrammed as follows:

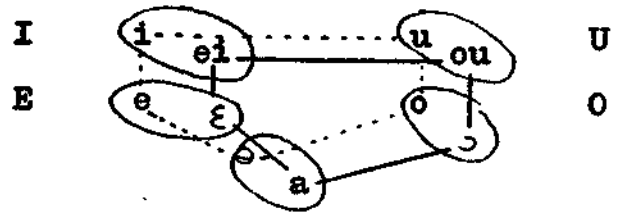

TABLE 7.

The lower and retracted variant of each of the oral positions (I,E,A,O,U) is RTR (narrow pharynx) and the upper fronted variant is ATR (wide pharynx). Rengao speakers call the ATR pronunciation of words broŋ 'loosely woven' and the RTR pronunciation brŏŋ 'tightly woven'; they use the former to symbolize AUG and the latter DIM referents in their semantic universe. The following expressives illustrate this contrast:

(10) RTR ('brŏŋ')/ATR ('broŋ') DIM/AUG

a. ei/i

?brei/?bri 'sight of small/large red object'

kaweik/kəwik 'sight of a small/large black elongated object'

?ŋeiŋ ?ŋɔŋ/?ŋiŋ ?ŋoŋ 'sight of small/large creature crawling'

b. ɛ̆/ĭ

taŋɛ̆l/təŋĭl 'sight of small/large head'

tahm̃ɛ̆n/təhm̃ĭn 'sight of small/large animal baring its teeth'

c. ɛ/e

ta?ɛ/tə?e 'sight of small/large hand'

cha?ŋɛt/chə?ŋet 'sight of small/large green object'

ta ?yɛŋ/tə?yeŋ 'sight of billowing skirt/large parachute'

d. a/ə

chagra/chəgrə 'sight of small/large prone body'

tapăw/təpŏw 'sight of large person crouching'

ta?bwăŋ/tə?bwŏŋ 'sight of small/large thick object with a hole in it'

e. ɔ/o

hahrɔt/həhrot 'sight of small/large person running'

rahɔ?/rəho? 'sight of small/large person with broken tooth'

?jrɔyh/?jroyh 'sight of someone carrying a small/large person on his back'

f. ɔ/u

haɗrɔ̆l/həɗrŭl	'sight of tree laden with small/large fruit'
ʔjrɔ̆n/ʔjrŭn	'small/large person standing'
tapɔ̆m/təpŭm	'small/large person sitting'

g. ou/u

chahout/chəhut	'smaller/large black animal'
hatrouy?/hətruy?	'small/large wet object'
?dout ?dout/?dut ?dut	'heavy/weakened breathing'

2.3. CAVITY COMPLEMENTARITY

The brɔ̆ŋ/broŋ pairs of expressives above (2.2) reflect the fact that precisely opposite to what is expected in an oral cavity symbolism system, the lower vowel is DIM and the higher AUG in pharyngeal cavity symbolism. In fact, this mirror image effect characterizes all the relations between these cavities. This cavity reciprocality may be summarized as follows for Rengao vowels (where + and - indicate wider and narrower cavity respectively):

PHARYNX WIDTH		(PHARYNX WIDTH)		ORAL WIDTH
AUG	+	i e u ə o	−	
ATR		ei ɛ ou a ɔ		
RTR	−		+	
DIM		ORAL WIDTH		AUG

TABLE 8.

Thus, Rengao magnitude symbolism is such that:

1) On the vertical axis of the chart, it is pharynx width, not oral width (which latter therefore I bracket with parentheses) that is chosen as the basis for the DIM vs. AUG contrast. Thus although from an oral cavity point of view e is closer

(higher) than ɛ and might therefore be expected to symbolize DIM, oral width is not in focus. Rather ɛ which has a narrower pharynx than e is selected as the DIM. This is true for each pair of vowels.

2) On the horizontal axis of the chart it is oral width not pharynx width (which again I therefore bracket with parentheses) that is chosen for the DIM vs. AUG contrast. Again although from a pharynx cavity perspective o is narrower than e and might therefore be a candidate to symbolize DIM, pharynx width is not in focus. Rather e, being on the - pole of an oral width dimension is selected as more DIM than the orally wider vowel o. Likewise i, being narrower than e is DIM in an oral cavity scheme. It was these contrasts that were illustrated under 2.1 above.

These constraints which accord to each cavity its unique role in magnitude symbolism are presumably to be interpreted in the light of the observation that in some sense the oral cavity is associated with F_2 characteristics and the pharyngeal cavity with F_1 (Joos,

The examples cited so far in 2.1 and 2.2 have, for ease of exposition treated magnitude oppositions as though they were all binary, that is I have cited them in pairs. As it turns out this binary opposition, is only binding on pharynx cavity symbolism. Observe that in Figure above narrow pharynx (RTR) vowels on the lower row are in binary opposition to wide pharynx (ATR) vowels in the upper row. Members of each row are in direct symbolic opposition to their counterparts in the other row. As we shall see below the lower row RTR vowels are all as a set lower than all the upper row ATR vowels.

While pharynx cavity symbolism must be binary in Rengao (and probably universally), oral cavity symbolism may be binary for a given expressive pair but is often gradient

or multivalued (cf. Ladefoged, 1975:238). That is, referring again to Figure magnitude increases with oral cavity size in a front to back order that ignores 'height' distinction such as i vs. e, u vs. o, etc.

Rengao magnitude symbolism depends on the fact that oral cavity effects and pharyngeal cavity effects interlock to form a homogeneous overall system for the vowels of the following sort:

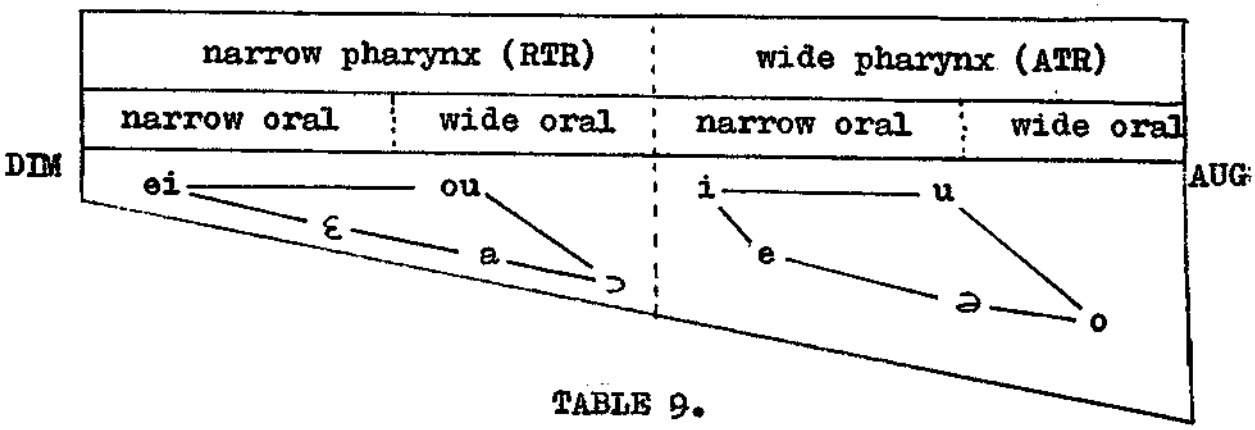

TABLE 9.

The chart reflects the fact that there is a major pharynx opposition of the set of RTR vowels on the symbolic DIM pole and the set of ATR vowels on the AUG pole. Note further that although I have displayed each set in a kind of standard vowel array, the entire set of 10 vowels may be viewed as a single progression from DIM to AUG as follows:

$$(ei < \varepsilon < ou < a < ɔ)_{RTR} < (i < e < u < ə < o)_{ATR}$$

That is, beginning with the narrow pharynx cavity one proceeds from narrow to wide oral cavity in a DIM to AUG progression. Then proceeding across to the wide pharynx cavity one again progresses from narrow to wide oral cavity in a DIM to AUG direction.

The sets of expressives below will exemplify the magnitude progression just described. It will be observed that while some sets are rather full, most of them exploit only a few of the theoretically possible vowel grades. These idiosyncrasies are simply part of the lexical description of each particular expressive 'family.' It will also be noticed that

in a few forms not only the vowel but the final consonants may vary. As I will discuss later, these consonant alternations are also symbolically motivated. Keeping in mind the general vowel progression scheme in Figure consider these subsets of that progression:

(12)a. (ɛ̃ < a) (ə̃ < ɜ̃)

prɛ̃w	'sight of very tightly woven material'
prã̂w	'sight of tightly woven material'
prə̃w	'sight of less tightly woven material'
prɜ̃w	'sight of rather loosely woven material'

b. (ɛ < a) < (ə)

phaphɛ̆r	'impression of a small amount of water gushing'
phaphach	'impression of a medium amount of water gushing'
phəphəch	'impression of a large amount of water gushing'
ragɛw	'sight of a tall very thin person'
ragaw	'sight of a tall thin person'
rəgəw	'sight of a tall big person'

c. (ei) < (i < ə)

ragleiw	'sight of small eyes'
rəgliw	'sight of rather large eyes'
rəgləw	'sight of very large eyes'

d. (ɛ̆ < ɔ̆) < (ĭ < ŭ)

taplɛ̆p	'sight of very small plump person'
taplɔ̆p	'sight of small plump person'
təplĭp	'sight of large plump person'
təplŭp	'sight of very large plump person'

e. (ɛ̆ < ɔ̆) (e < o)

rañɛ̆l	'sight of a tiny fire (a match)'
rañɔ̆ŋ	'sight of a small fire (candle)'
rəñeŋ	'sight of a rather large (bonfire)'
rəñoŋ	'sight of a huge fire (burning house)'

f. (ei < ɛ) < (i < e)

ʔbrei	'sight of tiny red object'
ʔbrɛ	'sight of small red object'
ʔbri	'sight of medium-sized red object'
ʔbre	'sight of large red object'

g. (ŏ) < (u < o)

tablŏy	'sight of small sphere (marble)'
təbluy	'sight of a medium-sized sphere (pumpkin)'
təbloy	'sight of a large sphere (moon)'

h. (ĕ < ɛ < ɔ) < (ə < o)

tabrĕŋ	'sight of tiny intricate patterned object'
tabrɛn	'sight of small intricately patterned object'
tabrɔn	'sight of medium-sized intricately patterned object'
təbrən	'sight of a rather large intricately patterned object'
təbroŋ	'sight of a huge intricately patterned object (tiger!)'

i. (ɛ < a < ɔ) < (u < ə < o)

chahɛh	'sight of very small mouth'
chahah	'sight of small mouth'
chahɔh	'sight of medium-sized mouth'
chəhuh	'sight of rather large mouth'
chəhəh	'sight of large mouth'
chəhoh	'sight of very large mouth'

j. ei < ɛ < i < e < a < ɔ < u < ə < o

rʌhẽik	'sight of very small nose'
rahẽ̌k	'sight of medium small nose'
rəhĩk	'sight of slightly small nose'
rəhẽk	'sight of smallish regular nose'
rahãk	'sight of medium regular nose'
rʌhɔ̃̌k	'sight of largish regular nose'
rəhũk	'sight of fairly large nose'
rəhə̃k	'sight of large nose'
rəhõk	'sight of very large nose'

k. (a) < (ə < u)

rəlak	'sight of one flag, leaf wafting'
rələk	'sight of several flags, leaves wafting'
rəlŭk	'sight of many flags, leaves wafting'

l. (ou < ɔ) < (o < əŋ)

tʌhrouy	'sight of two or three people walking single file'
tahrɔy	'sight of a dozen people walking single file'
təhroy	'sight of scores of people walking single file'
təhrəŋ	'sight of a multitude of people walking single file'

The expressive sets cited above can be seen, then, to select vowels that while not necessarily adjacent, regularly maintain the sequential relationships stated above as:

(13) DIM AUG

$(ei < ɛ < ou < a < ɔ)_{RTR} < (i < e < u < ə < o)_{ATR}$

Looking at the various subsets of this sequence reflected in the twelve sets of expressives above, both phonetic and phonological patterns may be observed, some symmetrical, some asymmetrical. I summarize these magnitude symbolism patterns in terms of phonetic and phonological perspectives (see vowel arrays in Section 1) as follows:

(14) Phonetic Patterning

	DIM	AUG
a.	(ɛ < a) < (e < ə)	
b.	(ɛ < a) < (ə)	
c.	(ei) < (i < ə)	
d.	(ɛ < ɔ) < (i < u)	
e.	(ɛ < ɔ) < (e < o)	
f.	(ei < ɛ) < (i < e)	
g.	(ɔ) < (u < o)	
h.	(ɛ̆ < ɛ < ɔ) < (ə < o)	
i.	(ɛ < a < ɔ) < (u < ə < o)	
j.	(ei < ɛ) < (i < e) < (a < ɔ) < (u < ə < o)	
k.	(a) < (ə < u)	
l.	(ou < ɔ) < (o < əŋ)	

Phonological Patterning

	DIM	AUG
a.	$(E < A)_{RTR}$	$< (E < A)_{ATR}$
b.	$(E < A)_{RTR}$	$< (A)_{ATR}$
c.	$(I)_{RTR}$	$< (I < A)_{ATR}$
d.	$(E < O)_{RTR}$	$< (I < U)_{ATR}$
e.	$(E < O)_{RTR}$	$< (E < O)_{ATR}$
f.	$(I < E)_{RTR}$	$< (I < E)_{ATR}$
g.	$(O)_{RTR}$	$< (U < O)_{ATR}$
h.	$(\breve{E} < E < O)_{RTR}$	$< (A < O)_{ATR}$
i.	$(E < A < O)_{RTR}$	$< (U < A < O)_{ATR}$
j.	$(I < E)_{RTR}$	$< (I < E)_{ATR} < (A < O)_{RTR} (U < A < O)_{ATR}$
k.	$(A)_{RTR}$	$< (A < U)_{ATR}$
l.	$(U < O)_{RTR}$	$< (O < A\eta)_{ATR}$

Some observations may be made regarding the abstracted patterns summarized above:

(i) Note that patterns (14)a, e and f are very symmetrical progressing from narrow to wide oral cavity for narrow pharynx vowels and then proceeding to a narrow to wide oral cavity progression for the counterparts of those vowels in the wide pharynx set. Set (14)e while not as symmetrical as the related pattern (14)f, still reflects a very natural progression. That is, although the narrow pharynx vowels ɛ and ɔ are not opposed to their exact wide pharynx counterparts e and o as in pattern (14)e, they are opposed by even wider pharynx vowels in the orally narrower, but pharyngeally more expanded vowels i and u. Again, the progression from narrower pharynx on the DIM pole to wider on the AUG pole is maintained.

(ii) Patterns like (14)b, c, g , and others are asymmetrical, though they obey the magnitude progression scheme perfectly.

(iii) Pattern (14)h illustrates that length (ɛ̆ < ɛ) is used in Rengao magnitude symbolism. This, of course, is a well-known symbolism device. Though we shall see in the discussion of consonants that -ŋ is usually more AUG than -n as in tɔbroŋ, notice that the most DIM form, which uses ɛ̆, also takes ŋ rather than n. A possible explanation is that, perhaps sound symbolically, constructing air flow as early as possible (at the velar rather than alveolar in this case) enhances the brevity needed to convey DIM.

(iv) Pattern (14)j is the most complete set, missing only ou. Notice that this set does not obey a strict front to back for narrow pharynx (RTR) vowels and then progress to a front to back sequence for wide pharynx (ATR) vowels. Rather there is an alternation proceeding from front RTR vowels to front ATR vowels then from non-front RTR vowels to non-front RTR vowels to non-front ATR vowels. Here again one is struck by the fact that magnitude symbolism integrates oral and pharyngeal cavity size in a non-contradictory fashion. The principle is simply this:

> Progressing from DIM to AUG must involve progressing to either a wider pharyngeal or a wider oral cavity.

Diagrammatically, this interlocking sequence can be viewed as follows:

FIGURE 2.

(v) Patterns and deviate from the expected left to right progression as regards the non-front vowels. Note the pattern in and was U < ə < O,

which constitutes a narrow to wide oral cavity sequence. However in(14)k. ə̲ precedes and is therefore more DIM than u̲, perhaps reflecting a pharyngeal cavity focus in which ə̲ has a narrower pharynx than u̲ and is therefore more DIM. The vowel e̲ in pattern(14)l. is probably displaced in an AUG direction due to its cooccurrence with -ŋ, since nasal sounds in Rengao tend to outrank oral sounds in magnitude (see the discussion below in connection with consonant symbolism).

Oral cavity size and pharyngeal cavity size tend generally to complement or enhance each other in achieving magnitude symbolism. In this regard there is a regular pattern among certain partial sets involving two members to oppose vowels which possess the features narrow pharynx and narrow oral cavity against those that have wide pharynx and wide oral cavity. This may be charted as follows

DIM ⟵ ⟶ AUG

NARROW PHARYNX (RTR)					WIDE PHARYNX (ATR)				
narrow oral cavity		wide oral cavity			narrow oral cavity			wide oral cavity	
ei	ɛ	ou	a	ɔ	i	e	u	ə	o

TABLE 10.

That is, e̲i̲ or ɛ̲ (narrow both as to oral and pharyngeal cavity) symbolize the DIM member in an expressive pair while ə̲ or o̲ (wide both as to oral and pharyngeal cavity) symbolizes the AUG member of the set. The following expressives illustrate this tendency for cavity width features to agree:

(15)a. (ei < ə)

bʌglɛ̃iw 'sight of small eyes (mouse)'

bʌglə̃w 'sight of large eyes (monkey)'

bʌglə̃k 'sight of very large eyes (tiger)'

b. (ɛ < ə)

ka?mrɛ̆w 'sight of small filthy person'

kə?mrə̆w 'sight of large filthy person'

rawɛ̆ŋ	'sight of <u>small</u> curving path'
rəwɔ̆ŋ	'sight of <u>large</u> curving road'
chor khɛ̆r	'sight of <u>mouse</u> tracks'
chor khɔ̆r	'sight of <u>cow</u> tracks'

c. <u>(ɛ) < (o)</u>

gagrɛ̆k	'sight of <u>small</u> <u>utensil</u> boiling'
gəgrok	'sight of <u>large</u> <u>pot</u> boiling'
jajrɛŋ	'sound of <u>small</u> person whining'
jəjroŋ	'sound of <u>large</u> person whining'
ŋlaŋlɛ̆ŋ	'sight of a <u>small</u> <u>amount</u> of liquid'
ŋləŋloŋ	'sight of a container <u>brimful</u> of liquid'

While cavity size features generally tend to agree as to width as the forms above illustrated or to vary either pharynx size or oral size, forms like the following reflect the fact that complete mixture of oral and pharyngeal width values are possible, though marginal

(16)	ka?dɔ̆r	'sight of <u>small</u> convex shape (turtle)'
	kə?der	'sight of large turtle'

This pair opposes <u>narrow</u> pharynx (RTR), <u>wide</u> oral cavity vowel ɔ̆ with <u>wide</u> pharynx (ATR), <u>narrow</u> oral cavity <u>e</u>. By magnitude symbolism logic this is a highly marked pair.

2.4 CONSONANT SYMBOLISM. Sound symbolism involves consonants as well as vowels in Rengao. <u>Initial consonants</u> reflect certain 'phonestheme' patterns (cf. Householder, 1946). That is, <u>bl-</u>, <u>pl-</u>, <u>gl-</u> often appear in words with round objects for referents, <u>w-</u> for curved objects, <u>ŋ-</u>, <u>ŋl-</u> for heads, etc. However, I will not further pursue here the symbolic patterns of initial consonants, for our topic is

magnitude symbolism and in this regard it is the final consonants that (will) require description.

As with vowels, magnitude symbolism in consonants rests again on the analogy that cavity closure is associated with semantic closure. These relations among final consonants may be diagrammed as follows:

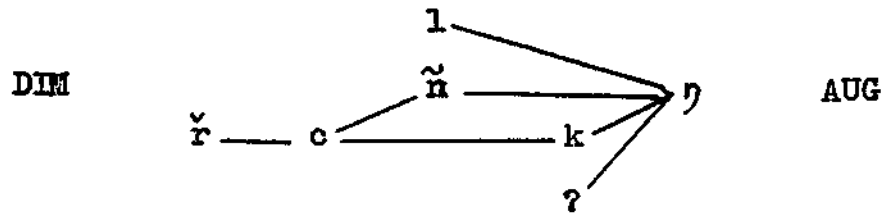

FIGURE 3

A single principle seems to control all the above consonant relations, namely:

Symbolically DIM consonants are produced with a relatively more constricted cavity while their AUG counterparts are produced with a relatively more open cavity.

More specifically,

(i) Front consonants (narrower oral cavity) Back consonants (wider oral cavity): l/ñ < ŋ; ř/c < k; ř < c/ñ.

(ii) Stops (oral and glottal constriction) nasal continuants (unrestricted nasal cavity).

The following sets of expressives illustrate these consonant alternations in Rengao magnitude symbolism:

(17)a. ñ < ŋ

təbroñ	'sight of a rather small patterned object'
təbroŋ	'sight of a huge patterned object (tiger)'

b. l < ŋ

bablɛl	'sight of a very small fire, light'
bablɔŋ	'sight of small fire'
bəblel	'sight of large fire'
bəbloŋ	'sight of very large fire'

c. ř < ñ

dədwɛ̌r	'sight of large rotating object'
dədwɛ̌n	'sight of small rotating object'

d. ř < k

gagɛ̌r	'sight of trickle of water'
gəgŭk	'sight of flood of water'

e. ř < c

kə?byor	'sight of small gaunt face'
kə?byoc	'sight of larger gaunt face'

f. k < ŋ

tʌblouk	'sight of very small round object'
tʌblouŋ	'sight of small round object (pot-bellied child)'

g. c < ŋ

kavɔŋ	'sight of very small nose (squirrel)
kavɔc	'sight of small nose (dog)'
kəvoŋ	'sight of larger nose (colt)'
kəvoc	'sight of very large nose (horse)'
kəluc	'sight of small pile of grain'
kəloŋ	'sight of larger pile of grain'

h. ? < ŋ

cřa?	'to illuminate with a flaming torch'
cřaŋ	'to illuminate with a flashlight'
taplɔy?	'sight of pot-bellied child (human)'
təploy?	'sight of pot-bellied adult (human)'
taplɔŋ	'sight of fat calf (animal)'
təploŋ	'sight of bloated buffalo (animal)'

Regarding the above examples of consonant symbolism:

(i) Observe that set (17)a. is an uncomplicated case of narrower oral cavity for DIM and wide for AUG, i.e. -ñ vs. -ŋ. This is true of set (17)e. also though -ř vs. -c perhaps also takes advantage of the shortness of the flapped ř to enhance its DIM

symbolism. Recall that length also appeared earlier as a factor (though marginal) for vowels in an ĕɛ < ɛ DIM vs. AUG progression.

(ii) In set (17)b. a narrow pharynx (RTR) pair of expressives oppose narrow oral vs. wide oral cavity vowels and that the final consonants agree as to oral cavity size, thus -ɛl vs. -ɔŋ. Similarly, for the corresponding wide pharynx (ATR) expressives, the opposition -el vs. -oŋ occurs. That is, as we saw in earlier discussion, oral cavity size for vowels was multiplied by a pharynx width factor, we see here further that the oral volume factor pertains both to vowels and (final) consonants, which are then multiplied again by pharynx width. In addition, it may be noted that pair also constitutes an association of lateral with DIM as opposed to nasal for AUG (cf. Ultan, :4).

(iii) Set (17)d. also shows how vowel and final consonant agree as to cavity size. Notice that with narrower oral vowel and consonant there is also a cooccurrence of narrow pharynx, i.e. -ĕr for DIM and wider oral vowel and consonant with wide pharynx, i.e. -ŭk for AUG. Again all features 'conspire' to maximize the magnitude symbolism of the pair.

(iv) Set (17)f. involves the opposition of (voiceless) oral stop -k to (voiced) nasal continuant -ŋ. An unrestricted nasal cavity seems to outrank a more constricted oral cavity in magnitude. Newman (19 :63, 69) also noted that in experiments on English phonetic symbolism the labial nasals were judged to be of greater magnitude (and darkness) than voiced stops and they in turn than voiceless stops. For alveolars, however, the voiced stop was judged to be of greater magnitude (and darkness) than the nasal sound (unfortunately, no voiceless counterpart was tested). Measurements by Perkell (1969:33,34) reflect the fact that nasals may be produced with greater pharynx

width than voiceless (though again, not voiced) stops. If this distinction holds for Rengao -k vs. -ŋ it means that though they share a feature of open oral cavity, they contrast as to closed vs. open nasal and pharyngeal cavities.

(v) In set (17)h a narrower oral cavity determines both the higher vowel u and the more fronted consonant -c, i.e. -uc as the DIM counterpart of the more open vowel o and the back consonant -ŋ, i.e. for AUG. Again oral vs. nasal features cooccur.

(vi) In set (17)i in which a nasal continuant -ŋ is opposed to a glottal stop, openness of air passage vs. closure is clear enough as the basis of the AUG vs. DIM opposition. Perhaps DIM is further enhanced by constricting air flow as near its source as possible, i.e. at the glottis.

(vii) From a semantic point of view, note set (17)j involves not only size as reflected in the vowel symbolism (ɔ vs. o) familiar from earlier examples in which narrow pharynx is DIM and wide pharynx is AUG, but a human vs. animal distinction is carried in the final consonant alternation (-y? vs. -ŋ). What appears to be going on here is that a fairly transparent primary DIM vs. AUG opposition (size) is cross-referenced with a more abstract DIM vs. AUG opposition of humanness in which animals are characterized symbolically not as unimportant "little creatures," as they are in some languages, but rather as "big brutes." The situation may be charted as follows (noting that historically -y? regularly derives from the palatal -c):

	DIM ('human') narrow oral cavity	AUG ('animal') wide oral cavity
DIM ('small') narrow pharynx	taplɔy?	taplɔŋ
AUG ('large') wide pharynx	təploy?	təploŋ

TABLE 11

Interestingly enough, whereas Rengao consonant symbolism designates humans as DIM and animals as AUG, in Grebo (according to Ultan, 197 :4) the reverse is apparently true for pronouns, i.e. humans are grouped with large, important, valuable things as opposed to small, worthless things. Parallel to Rengao, it appears that in Grebo oral cavity magnitude system interlocks with a pharyngeal cavity system to produce an array that looks similar to the one above. The difference is that for Grebo it seems to be oral cavity volume (of the vowels) that symbolizes size while pharyngeal cavity volume represents number (i.e. sg. vs. pl.). These relations in Grebo may be diagrammed as follows for comparison with the Rengao chart above:

		DIM ('small') narrow oral cavity	AUG ('large') wide oral cavity
DIM ('sg.')	narrow pharynx	ɛ	ɔ
AUG ('pl.')	wide pharynx	e	o

TABLE 12

Again, the study of sound symbolism is enriched by tracing the effects not only of the oral cavity but also of the pharyngeal cavity.

REFERENCES

Chomsky, Noam and Morris Halle. 1968. The sound pattern of English. New York: Harper and Row.

Colarusso, John. 1974. Consonants with advanced tongue-root in the Northwest Caucasian languages. Papers from the Fifth Meeting, Northeastern Linguistic Society. 153-161.

Emeneau, M. B. 1969. Onomatopoetics in the Indian linguistic area. Language 45.274-299.

Ferguson, Charles.

Greenberg, Joseph H. and James J. Jenkins. 1966. Studies in the psychological correlates of the sound system of American English, III and IV. Word 22.1-2-3:207-242.

Gregerson, Kenneth. 1976. Tongue-root and register in Mon-Khmer. In Philip N. Jenner, Laurence C. Thompson, and Stanley Starosta, eds., Austroasiatic Studies, vol. I: 323-69. Oceanic Linguistics Special Publication No. 13. Honolulu: University Press of Hawaii.

Halle, Morris and Kenneth N. Stevens. 1969. On the feature 'advanced tongue root.' Quarterly Progress Report no. 94, Research Laboratory of Electronics, M.I.T. 209-215.

Henderson, Eugenie. 1952. The main features of Cambodian pronunciation. BSOAS 14:1.149-74.

Huffman, Franklin. 1967. An outline of Cambodian grammar. Unpublished Ph.D. dissertation. Cornell university.

Householder, Fred W. 1946. On the problem of sound meaning and English phonestheme. Word 2.83-84.

Joos, Martin. 1948. Acoustic phonetics. Language, Monograph no. 23. Supplement to Language 24.2.

Kiparsky, Paul. 1974. A note on the vowel features. Papers from the Fifth Meeting, Northeastern Linguistic Society. 162-171.

Ladefoged, Peter. 1964. A phonetic study of West African languages. London: Cambridge University Press.

_____. 1975. A course in phonetics. New York: Harcourt Brace Jovanovich, Inc.

Lindau, Mona, Leon Jacobson, and Peter Ladefoged. 1972. UCLA Working Papers in Phonetics. 22.76-94.

Newman, Stanley S. 1933. Further experiments in phonetic symbolism. American Journal of Psychology 45. 53-75.

French, Patrice L. 1976. Toward an Explanation of Phonetic Symbolism. WORD 28.3.305-322.

Perkell, Joseph. 1969. Physiology of speech production. Research Monograph 53. Cambridge: M.I.T. Press.

_____. 1971. Physiology of speech production: a preliminary study of two suggested revisions of the features specifying vowels. Quarterly Progress Report no. 102. Research Laboratory of Electronics, M.I.T, 123-139.

Pike, Eunice V. 19 . Phonetic rank and subordination in consonant patterning and historical change.

Pike, Kenneth L. 1967. Tongue root position in practical phonetics. Phonetica 17.129-40.

Renck, G. L. 19 . Ablaut as a means of verb inflection in Yagaria.

* Reichard, Gladys A., Romand Jakobson and Elisabeth Werth. 1949. Language and synesthesia. Word 5.2:224-33.

Sapir, Edward. 1929. A study of phonetic symbolism. Journal of Experimental Psychology 12.225-239.

Stevens, Kenneth N. and Arthur S. House. 1955. Development of a quantitative description of vowel articulation. Journal of the Acoustical Society of America 27.484-93. Also in Readings in Acoustic Phonetics, Lehiste. 34 ff.

Stewart, J. M. 1967. Tongue root position in Akan vowel harmony. Phonetica 16.185-204.

Ultan, Russell. 197 . Size-sound symbolism. Working papers in language universals. 1-31, i-xiii.

Watson, Richard. 1966. Reduplication in Pacoh. Unpublished M.A. thesis. Hartford Seminary.

* Wescott, Roger W. 1971. Linguistic iconism. Language 47.2. 416-28.