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Strong syllable reduplication in Mokilese

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1.0. Introduction

The primary purpose of this paper is to present an analysis of 'strong syllable' reduplication pattern in Mokilese based on proposals in Raimy 1999. A secondary purpose is to argue the analysis presented here is superior to present Optimality Theory approaches.

2.0. Mokilese Progressive Reduplication

Harrison 1976 is the main source of data for Mokilese, a Micronesian language. Harrison describes the progressive aspect reduplication pattern as 'strong syllable' where strong syllables either contain a long vowel (CVV) or end in a consonant (CVC). The progressive reduplication pattern in Mokilese is presented in (1).

(1) Mokilese strong syllable reduplication

		Stems	*Progressive Form*		*Gloss*
			Conservative	*Innovative*	
(a)	CVC	pɔdok	pɔd-pɔdok	pɔɔ-pɔdok	'plant'
		dɔp^{w}ɔ	dɔp^{w}-dɔp^{w}ɔ	dɔɔ-dɔp^{w}ɔ	'pull'
		m^{w}iŋe	m^{w}iŋ-m^{w}iŋe	m^{w}ii-m^{w}iŋe	'eat'
(b)	CVV	kookɔ	koo-kookɔ		'grind coconut'
		sɔɔrɔk	sɔɔ-sɔɔrɔk		'tear'
		jaak	jaa-jaak		'bend'
(c)	CV	pa	paa-pa		'weave'
		wi.a	wii-wi.a		'do'
		di.ar	dii-di.ar		'find'
(d)	CVG	pou.ce	pou-pou.ce	poo-pou.ce	'connect'
		au.do	au-au.do	aa-au.do	'fill'
		dau.li	dau-dau.li	daa-dau.li	'pass by'
(e)	VC	ir	ir-r-ir	ii-ir	'string'
		onop	on-n-onop	oo-onop	'prepare'
		idip	id-d-idip	ii-idip	'draw water'

Two different progressive forms are listed in (1). The consertative forms show an older pattern of reduplication. The innovative forms are used by younger speakers of Mokilese indicating that these forms show an innovation in Mokilese.

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The data in (1) is broken into sub-patterns based on the prosodic and segmental make up of the base. (1a) shows bases that begin with a CV syllable that is followed by a consonant. These bases reduplicate a CVC syllable in the conservative grammar. The bases in (1b) have a long vowel in the first syllable and always reduplicate a CVV syllable. (1c) shows forms that begin with a CV syllable that is not followed by a consonant. These bases reduplicate a CVV syllable with lengthening of the short V in the base. (1d) are bases beginning with a (C)VG syllable. These bases reduplicate the (C)VG syllable in the conservative grammar. Finally, (1e) presents vowel initial forms that reduplicate VC with gemination to produce a VCC reduplicant in the conservative grammar.

The innovative forms show a simpler pattern than the conservative forms because a single reduplicant shape is produced regardless of the prosodic or segmental makeup of the base. The innovative pattern of reduplication consists of the copying of the initial (C)V with lengthening of this V to produce a (C)VV reduplicant.

Mokilese strong syllable reduplication has been considered strong empirical evidence in favor of an output based target for reduplication (McCarthy and Prince 1986). The output based nature of this generalization results from the diverse changes that can occur to produce the bimoraic syllable (vowel lengthening (1c), consonant gemination (1e)) and the different prosodic structures that satisfy this template (CVC, CVV, and CVG are all allowed).

3.0. A Generative Phonology Account

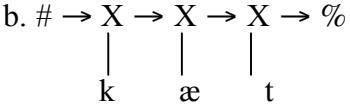
This section will present an analysis of the patterns of reduplication in (1) based in generative phonology modified by the proposals made in Raimy 1999.

3.1. Precedence in Phonological Representations

Raimy 1999 proposes a revision to how precedence is represented in phonological representations. Simply, precedence in phonological representations must be explicitly encoded. Consider the representations in (2).

(2) Precedence in phonology

a.


b.


The representation in (2a) comes with the assumption that temporal precedence follows from left-to-right graphic orienting. Coinciding with this assumption about temporal precedence are the assumptions that precedence is necessarily asymmetrical, irreflexive, and transitive in nature. The representation in (2b) explicitly encodes temporal precedence via the symbol →. → encodes the

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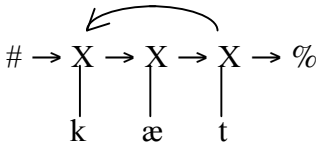
relationship 'α temporally precedes β' and the symbol # indicates word beginning and % indicates word end. # and % are not boundaries (in the SPE sense) but symbols for the null set that mark which segment is preceded by no other segment (#) and which segment precedes no other segment (%).

The addition of the explicit marking of temporal precedence allows some assumptions (in particular asymmetry and irreflexivity) about the nature of precedence to be relaxed. The benefit of this expansion of possible temporal structures allowed in phonological representations is that a new representation of reduplication is possible. Raimy 1999 argues that reduplication results from precedence structures that loop. Consider the representation in (3).

(3) Reduplicated forms



The representation in (3) results in the reduplicated form *cat-cat.* The additional temporal precedence relationship (added on top of the form) indicates that 't temporally precedes k' and this creates a loop in the representation. Looping representations can not be interpreted by the motor control system and thus representations are linearized at a point in the derivation to ensure that they are interpretable. Linearization, in general optimizes phonological structures for the following considerations: (1) the output must not have any contradictory temporal precedence requirements, (2) prefer to use more recently added information, (3) use as many links as possible, and (4) use as many segments as possible. One result of this linearization process is that structures that contain loops will produce repetition of the elements that are within these loops. In other words, loops cause reduplication. (For full details of these proposals see Raimy 1999.)

A morpheme will define its precedence relationships by specifying which segments in a base it concatenates to via ANCHORS. ANCHOR 1 specifies what precedes the morpheme and ANCHOR 2 specifies what follows the morpheme. Depending on the segments anchored to, a morpheme may create a loop in a phonological form. This is the case in Mokilese and with this idea in hand we can develop an analysis of the Mokilese data.

3.2. Strong syllable reduplication in Mokilese

The conservative pattern of reduplication in Mokilese can be accounted for by specifying the morphology of progressive as in (4).

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(4) Progressive Morpheme in Mokilese

ANCHOR 1 → X → ANCHOR 2

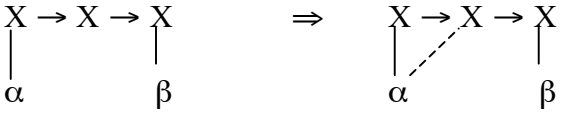
ANCHOR 1:	(a)	C / # μ_	(special)
	(b)	# μ	(elsewhere)
ANCHOR 2:	# _		

"The segment that {that is a C and follows the first mora / corresponds to the first mora} precedes an empty X slot which precedes the first segment"

(4) indicates that progressive reduplication in Mokilese results from the addition of an empty X slot which when concatenated to a base produces a looping structure. The interpretation of ANCHOR 2 is straightforward (attach to the first segment of the base) but ANCHOR 1 deserves some commentary. ANCHOR 1 requires a two clause definition (governed by the Elsewhere Condition (Kiparsky 1973)) due to the differing behavior between the forms in (1a, e) and (1b-d).

The empty X-slot that is part of the progressive morpheme must be interpreted somehow. This is handled by the rule in (5) which states that an empty X slot will receive place features from the preceding segment.

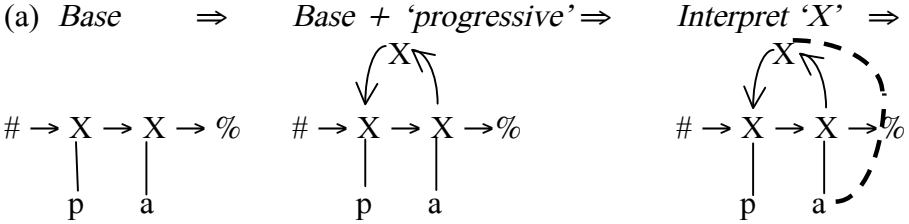
(5) Interpret X



(4) and (5) will account for all of the Mokilese data presented so far with the addition of a phonological rule that simplifies tautosyllabic geminates (presumably provided by UG). Example derivations are in (6).

(6) Example Derivations

(a)



Linearize ⇒ *Phonetics*

paa.pa paa.pa

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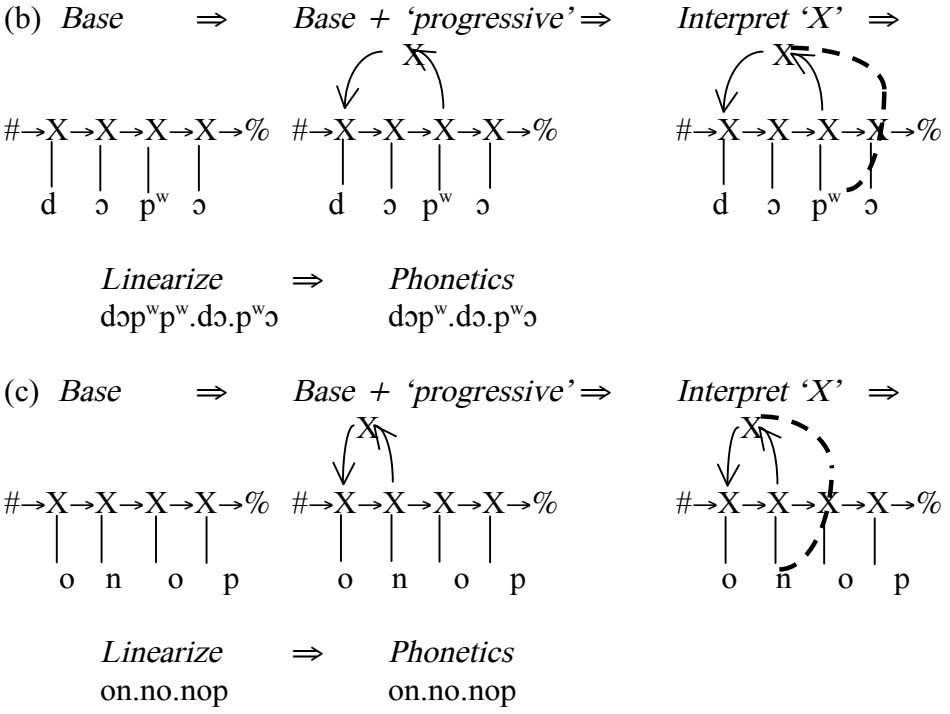

Example derivation (6a) presents the case where the empty X-slot anchors onto a vowel in the base (per clause (b) in (4)). The vocalic melody is spread into the empty X-slot and this results in a form that shows vowel lengthening at the surface. (6b) presents the CVC pattern where the progressive morpheme anchors to the consonant that follows the first vowel (per clause (a) from (4)). The consonant (/pʷ/ in this particular case) spreads into the empty X slot. This produces a tautosyllabic geminate that is shortened in the phonology after linearization and results in a surface CVC reduplicant. (6c) is similar to (6b) except the geminate that is created by spreading can be syllabified as the onset of the following syllable (because the base is vowel initial) after linearization. Heterosyllabic geminates are not shortened and thus appear in the phonetic form.

One remaining form requires special attention. This form is *andip* 'to spit' which has as its conservative form /and-andip/ and is special because of the copying of the /nd/ cluster. McCarthy and Prince 1986 and Blevins 1996 both suggest that the /nd/ cluster is copied to provide an onset for the base. In contrast, Harrison (1976, p.c.) proposes that the special behavior of /nd/ is due to its diachronic development from a geminate structure (Harrison 1976, Blevins and Garrett 1993). For the purposes of this paper, the "nd" cluster will be analyzed as a geminate prenasalized stop /ⁿdd/. No phonetic evidence is available at the present time that can determine the phonetic status of the "nd" cluster nor are there C initial forms with an /nd/ cluster word internally (such as /sandip/) to provide suggestions as to /andip/'s behavior. The derivation of /andip/ follows from the same rules as the derivations in (6) with no modifications.

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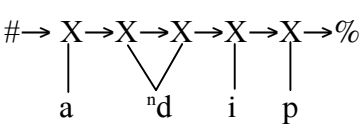
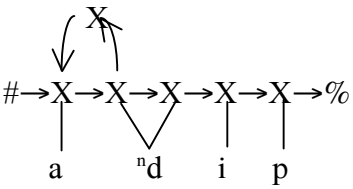
(7) Prenasalized Geminates

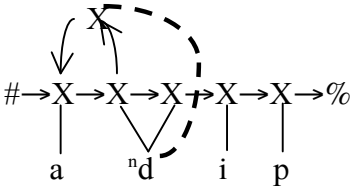
Base ⇒



Base + Progressive ⇒



Interpret X ⇒



Linearize ⇒ *Phonetics*

$a^nd.da^nd.dip$ $a^nd.da^nd.dip$

3.3. Language Change

The innovative forms in (1) show that the 'strong syllable' generalization can be achieved by simply copying and lengthening the first vowel of the base regardless of the segmental makeup of the base. This change produces CVV reduplicants for all base types.

Harrison indicates that the pattern in (1a) is particularly adopted by younger speakers (p. 60) thus these forms are treated as innovative with respect to language change. Harrison does not indicate which segment of the Mokilese population uses the forms in (1d) but these forms pattern along with the ones in (1a) so they are also considered to be innovative.

Altering the present analysis to produce the innovative forms is achieved by removing the special case clause from ANCHOR 1 in (5). The resulting rule for progressive in Mokilese is presented in (8).

(8) Simplified Progressive Reduplication

ANCHOR 1 → X → ANCHOR 2

ANCHOR 1:	~~(a)~~	~~C / # μ_~~	~~(special)~~
	(b)	# μ	~~(elsewhere)~~
ANCHOR 2:	# _		

The present analysis predicts the language change seen in Mokilese as a case of grammar simplification. Grammar simplification is one well attested type of language change (Kiparsky 1968) and the fact that the generative phonology analysis presented here identifies these innovative forms in Mokilese as such is a strong argument in its favor.

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4.0. An OT Account

This section presents an OT analysis of the Mokilese data based on proposals by Blevins 1996.

4.1. Blevins 1996

Blevins 1996 does not incorporate proposals made by McCarthy and Prince 1994b and will be modified along those lines. The main change in Blevins' account will be replacing the templatic constraint that she adopts, $R_I = \sigma_{\mu\mu}$, with a generalized alignment constraint that will delimit a prosodic shape equivalent to the template. This constraint is presented in (9).

(9) Non-templatic heavy syllable reduplication
ALIGN (R_I, R, $\sigma_{\mu\mu}$, R) (henceforth ALR)
"Align the right edge of R_I with the right edge of a heavy syllable"

ALR will be evaluated gradiently with one '*' for each segment distance that the edge of R_I is displaced from a heavy syllable. If there is no heavy syllable that coincides with any part of R_I then there is an infinite amount of violations (represented by ∞) because the existential claim of ALR is not satisfied.

Replacing the templatic constraint in Blevins 1996 with (9) does not affect the empirical adequacy of Blevins' analysis. One inadequacy in Blevins' account of Mokilese is the omission of forms in (1d), though. In order to compare this OT analysis with the analysis developed in section 3, both analyses must cover the same amount of empirical data. Consider the tableau in (10). Informal definitions of the constraints that Blevins adopts are as follows. ANCHOR requires the reduplicant and base to start with the same segment. CONTIGUITY requires the reduplicant to have the same precedence structure as the base. MAX and DEP have the familiar interpretations and refer to BR Faithfulness. ONSET also has its traditional definition. See Blevins 1996:526 for the exact formulations of these constraints that she adopts. (Note that DEP replaces MSEG in Blevins' analysis and this is purely a notational change.)

(10) Diphthong forms

	R_I + audo	ANCH	CONT	ONSET	ALR	MAX	DEP
a.	a**a**.au.do			**!		***	*
b. (☞)	au.au.do			**!		**	
c. ☜	au.dau.do			*	*	*	
d.	a.au.do			**!	*∞	***	
e.	a**a**.dau.do		*!	*	*	**	*

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The problem that the diphthong initial forms cause for the present constraint ranking is that they do not exhibit the 'onset grabbing' behavior that vowel initial forms do. Candidate (10c) shows the 'onset grabbing' effect and is the most harmonic given this particular constraint ranking (although (10b) is the occurring candidate). The ranking of ONSET >> ALR is required by the vowel initial forms that do show this 'onset grabbing' behavior (see Blevins 1996) so this ranking can not be altered without loosing the analysis of these forms.

The diphthong initial forms are behaving in a special way so diphthong specific constraints can be added to solve the present problem. Specifically, two conjoined constraints must be added. These constraints will consist of constraints already utilized in the present analysis conjoined with *DIPHTHONG (*D). Utilizing *D as part of the conjoined constraints limits the effects to only the candidates that contain diphthongs. The specific conjoined constraints that are required are DEP & *D (D & D) and ALR & *D (A & D). Both constraints must be ranked above ONSET in order to override the 'onset grabbing' effect. To simplify constraint rankings, I will assume that the only ranking that is added is *D >> ONSET. Once this ranking is added, the rankings of A&D >> ONSET and D&D >> ONSET are both derived from proposals made by Smolensky which require conjoined constraints to be ranked above the constraints they are composed of. The tableau in (11) verifies that the addition of these particular constraints allows the diphthong forms to be accounted for.

(11) Final Conservative Grammar

	R_I + audo	CONT	D&D	A&D	*D	ONSET	ALR	DEP
a.	a**a**.au.do		*!		*	**		*
b. ☞	au.au.do				**	**		
c.	au.dau.do			*!	**	*	*	

Both A & D and D & D are necessary. D & D removes candidates (11a) while A & D removes candidates (11c). (11b) will not be the most harmonic candidate if either of these constraints are omitted.

4.2. Language Change

Blevins 1996 argues that the innovative forms in (1a) provide evidence to support *the emergence of the unmarked* (McCarthy and Prince 1994a) and OT in general. Blevins reasons that by promoting NOCODA (NC) in the Mokilese constraint ranking in the innovative grammar, consistent CVV reduplicants should be produced. Specifically, by reranking NOCODA above ALR ($R = \sigma_{\mu\mu}$ in Blevins 1996), the alternative forms should be produced. Consider the tableaux in (12). ANCHOR, CONTIGUITY, and DEP are suppressed due to space considerations.

(12) Innovative Grammars

A	R_I + pɔdok	D&D	A&D	*D	NC	ONSET	ALR	MAX
a. ☞	pɔɔ.pɔ.dok				*			***
b.	pɔd.pɔ.dok				**!			**

B	R_I + onop	D&D	A&D	*D	NC	ONSET	ALR	MAX
a. (☞)	o**o**.o.nop				*	**!		***
b.	on.**n**o.nop				**!	*	*	**
c.	on.o.nop				**!	**		**
d. ☜	o.no.nop				*	*	*∞	**

C	R_I + audo	D&D	A&D	*D	NC	ONSET	ALR	MAX
a. (☞)	a**a**.au.do	*!		*		**		***
b. ☜	au.au.do			**		**		**
c.	au.dau.do		*!	**		*	*	*

We see in the tableaux in (12) that the promotion of NOCODA in the constraint ranking is necessary but not sufficient to produce all of the innovative forms. In particular, the reranking of NOCODA allows the CVC base forms (tableau 12A) to be accounted for but vowel initial forms require more than this specific reranking. Candidate (d) in (12B) and (b) in (12C) are the most harmonic given the present constraint hierarchy but they are not the occurring surface forms.

Vowel initial and diphthong initial forms do not behave as a uniform group within this OT analysis. Because of this, there is no single change in the constraint ranking that will produce the innovative forms. The addition of the conjoined constraint ONSET & ALR (O&A) allows the innovative vowel initial forms to be accounted for. The ranking of O&A is derived directly from the requirement that conjoined constraints are ranked higher than the constraints they are composed of.

The most direct way to account for the diphthong forms is to remove both diphthong specific conjoined constraints. The tableaux in (13) incorporate the proposed modifications to the constraint ranking and shows that all the innovative forms are now accounted for.

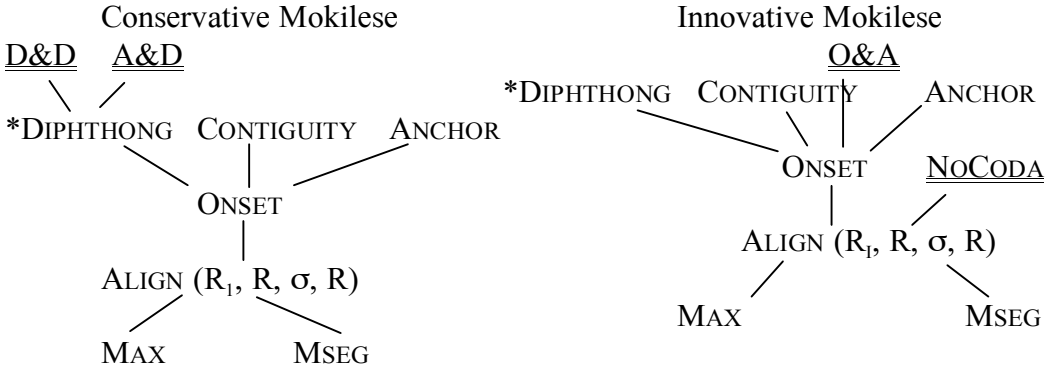
(13) Revised innovative grammar

A	R_I + onop	*D	O&A	NC	ONSET	ALR	MAX	DEP
a. ☞	o**o**.o.nop			*	**		***	*
b.	o.no.nop		*!	*	*	*∞	**	

B	R_I + audo	*D	O&A	NC	ONSET	ALR	MAX	DEP
a. ☞	a**a**.au.do	*			**		***	*
b.	au.au.do	**!			**		**	
c.	au.dau.do	**!			*	*	*	
d.	a.au.do	*		*!	**	*∞	***	

Now that there are empirically adequate constraint rankings that will account for the conservative forms and the innovative forms, we can compare the two rankings to see how the language change is being characterized.

(14) OT Grammars of Mokilese



(14) presents the conservative and innovative grammars developed in this section. Ranking arguments for the constraints adopted from Blevins 1996 can be found there. *D > > ONSET is the only extrinsic ranking that is added to Blevins' ranking. This ranking within the innovative grammar is evidenced in tableau (13B). If *D is ranked below ONSET, the correct surface form (a) in (13B) will not be produced. This ranking is assumed in the conservative grammar to maximize similarity between the grammars and to reduce explicit ranking in the conservative grammar (if *D is not ranked above ONSET in the conservative grammar then both D&D and A&D must be extrinsically ranked wrt ONSET).

The difference between the conservative and innovative grammars is indicated by double underlining the constraints in (14) that are reranked. Four constraints alter their rankings. To change the conservative grammar into the innovative grammar, D&D and D&A must be removed, O&A must be added and NOCODA promoted above ALR.

There does not appear to be any reason for these changes to the conservative grammar though. Recent learnability proposals in OT (Prince and

Tesar 1999) do not address conjoined constraints and the presence of the conservative surface forms with codas in the reduplicant should be sufficient to cause a learner to rank NOCODA below ALR. Because there is no motivation for the change between the conservative and innovative grammars, the OT analysis developed here does not provide an explanation for the language change seen in Mokilese. This result is primarily due to OT lacking an evaluation metric (Archangeli and Ohno 1999) that could provide a reason for a learner to value the innovative grammar more, thus motivating the language change.

5.0. Points of Comparison

The analyses of Mokilese developed in sections 3 and 4 will now be compared with each other. The comparisons will be based on language change and generalizations made.

5.1. Language Change

The generative phonology analysis presented in section 3 provides an analysis of the language change that characterizes it as a case of grammar simplification. This kind of language change is a well attested type (Kiparsky 1968) and the analysis relates the change found in Mokilese with other instances of grammar simplification. Additionally, the fact that the surface forms in Mokilese become more complicated by the addition of overlong vowels is treated as a result of the change in the formal grammar.

The OT analysis in section 4 does not offer any clear reason as to why the particular language change in Mokilese has occurred. The change in constraint ranking does not appear to offer any formal advantage through the simplification of constraint ranking or number of active constraints, nor does there appear to be some sort of surface functional advantage since the language change adds super long vowels to the surface inventory of Mokilese.

Considering the above summaries of how the language change is characterized by these particular generative phonology and OT analyses, we must conclude that the generative phonology analysis is superior to the OT one. In particular, the generative phonology account reaches the level *explanatory adequacy* (Chomsky 1965) because there is a reason why the innovative grammar is adopted by the younger speakers of Mokilese. The innovative grammar is simpler because it lacks the specific (a) clause in ANCHOR 1 of (4) and thus more highly valued. The OT analysis only reaches the level of *descriptive adequacy* because there is no way to distinguish in value the conservative and innovative grammars developed in section 4. The lack of an evaluation metric for OT has been pointed out by Archangeli and Ohno 1999 and without some way of distinguishing the value of different grammars OT analyses can not reach the level of *explanatory adequacy*.

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5.2. The Generalization behind Strong Syllable Reduplication

The generalization that has been investigated in sections 3 and 4 is the 'strong syllable' pattern of reduplication in Mokilese. The generative phonology analysis in section 3 proposes that the generalization of 'strong syllable' reduplication is the learning of a single morphological item. All aspects of this pattern of reduplication are directly encoded in this morpheme which specifies the placement (prefix, suffix, or infix) and shape of the reduplicant directly. The only additional information that is needed to interpret this morpheme is how to fill in the empty X slot which may be determinable from other processes in Mokilese that have not be investigated in this paper. There is little to no phonological processes that must be acquired along with this morpheme. Only the tautosyllabic degemination rule is required and this is presumably provided by Universal Grammar. The analysis in section 3 provides a clear statement of what kinds of generalizations are being encoded in the grammar of Mokilese with respect to this pattern of reduplication.

Evaluating the generalizations the OT analysis in section 4 makes is much more challenging due to the present status of *templates* within OT. The move to non-templatic analyses of reduplication patterns as argued for by McCarthy and Prince 1994b demands that constraint interaction produce templatic effects. The crux of the question here is what kind of generalizations do constraint interactions express. More specifically, if multiple constraints interacting with one another are required to encode a generalization for a particular phenomenon, this indicates that a generalization is being missed. This is the point raised by Kisseberth 1970 with respect to rule based phonologies.

One may try to offer up the ALR constraint as a generalization of 'strong syllable' reduplication but this constraint is not sufficient to produce the occurring reduplication pattern. Other constraints are required to identify progressive as a prefix, to ensure that the added phonological material is parsed into prosodic material, and other aspects of reduplication that are not discussed in this paper.

If Kisseberth's arguments are heeded, the fact that OT must rely on multiple constraints interacting to describe 'strong syllable' reduplication indicates that OT requires a *conspiracy* to express this generalization. Accordingly, since OT requires a *conspiracy* whereas the generative phonology analysis developed in section 3 does not, we must conclude that the generative phonology analysis is superior to the OT analysis.

6.0. Conclusion

This paper has presented two analyses of the 'strong syllable' pattern of reduplication in Mokilese. These analyses are compared using the metrics of

generalizations being made and how language change is characterized. Both of these metrics indicate that the generative phonology analysis provides deeper insight into the data under investigation than present OT analyses. Hopefully this result will spark a renewed interest in rule based generative phonology.

References

Archangeli, Diana and Kazutoshi Ohno. 1999. On motivating constraints and evaluating analyses. Talk presented at the P2K Conference, MIT/Harvard.

Blevins, Juliette. 1996. Mokilese reduplication. *Linguistic Inquiry* 27:523-530.

Blevins, Juliette and Andrew Garrett. 1993. The evolution of Ponapeic nasal substitution. *Oceanic Linguistics* 32:199-236.

Chomsky, Noam. 1965. *Aspect of the theory of syntax.* Cambridge, MA.:MIT Press.

Harrison, Sheldon. 1976. *Mokilese reference grammar*. Honolulu: The University Press of Hawaii.

Kiparsky, Paul. 1968. Linguistic universals and linguistic change. In E. Bach and R. T. Harms (eds.) *Universals in linguistic theory*. New York:Holt, Rinehar and Winston, Inc.

Kiparsky, Paul. 1973. 'Elsewhere' in phonology. In S. Anderson and P. Kiparsky (eds.), *A Festschrift for Morris Halle*. New York: Acad. Press, 277-314.

Kisseberth, Charles. 1970. On the functional unity of phonological rules. *Linguistic Inquiry* 1:291-306.

McCarthy, John and Alan Prince. 1986. Prosodic morphology. Ms. UMass., Amherst and Brandeis University, Waltham, Mass.

McCarthy, John and Alan Prince. 1994a. The emergence of the unmarked: Optimality in Prosodic Morphology. In *Proceedings of the North East Linguistics Society 24*, 333-379. GLSA, UMass., Amherst.

McCarthy, John and Alan Prince. 1994b. Two lectures on Prosodic Morphology. The Utrecht Workshop on Prosodic Morphology. ROA 59.

Prince, Alan and Bruce Tesar. 1999. Learning phonotactic distributions. Ms. Rutgers University. ROA 353.

Raimy, Eric. 1999. Representing reduplication. Ph.D. Dissertation, University of Delaware, Newark, DE.