

# Rotuman ‘Phase’ Distinctions and the Architecture of the Grammar

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## SUMMARY

In this paper, we first survey earlier and recent attempts to reconceptualize the Rotuman phase distinction as being driven by non-phonological considerations and conclude that such attempts fail to provide a reasonable account of the phenomenon. In the course of that survey, we point out that the OT analysis of McCarthy (2000) suffers a fatal circularity. The main argument of the paper considers the possibility, first presented in Hale, Kissock, and Reiss (1998), that a more ‘serial’ derivation is required to account for the Rotuman data, asking in particular whether a Harmonic Serialism approach can salvage McCarthy’s (2000) analysis. We conclude that HS does not appear to provide an appropriate architecture for resolving the problems with that analysis, and that a model which allows for greater independence of strata is required (e.g., ‘Stratal OT’, or, indeed, some version of a traditional rule-based system).

## 1 INTRODUCTION

It is with great pleasure that we offer this ‘big picture’ treatment of the Rotuman phase distinctions in honor of Glyne Piggott, whose constant demand to always keep issues of scientific methodology and ‘the big picture’ at the forefront of their concerns on his students, friends, and colleagues<sup>1</sup> has been an inspiration to each of the authors.

## 2 ROTUMAN PHASE

Rotuman is the language of the island of Rotuma (which is, politically, part of Fiji), a member of the Central Pacific branch of the Oceanic languages—itsself a subgroup within the Austronesian language family. There are approximately 12,000 speakers of the language, world-wide. While the language has many linguistically interesting features, it is most famous in phonology circles

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<sup>1</sup> And probably ‘neighbors’, as well, although on this matter we, unfortunately, have no direct evidence.

for its distinction between two ‘forms’ of individual words/morphemes, the so-called ‘complete phase’ vs. the so-called ‘incomplete phase’. An assessment of the various proposed descriptions and analyses of this distinction will form the focus of the first portion of the present paper. A brief characterization of the contrast might be stated something like the following.

- (1) a. **Incomplete Phase:** realization of morphemes with underlying light CV final syllables as outputs with final heavy syllables, the heavy syllables arising via a variety of (descriptively speaking) processes.  
 b. **Complete Phase:** realization of these same morphemes with seemingly intact light final CV syllables.

Since we are not presenting a general theory of phase formation today, we only need concern ourselves with a few (descriptively, of course) of the processes responsible for the Incomplete Phase:

- (2) a. **metathesis:** /hosa/ → h<sub>o</sub>as ‘flower’<sup>2</sup>  
 b. **deletion:** /asa/ → as ‘name’, /aso/ → as ‘kiss’  
 c. **umlaut:** /futi/ → f<sub>ü</sub>t ‘pull’

We provide two examples of the ‘deletion’ process to make it clear that the so-called ‘complete phase’ forms need to be the ‘underlying form’ of the morphemes involved: an incomplete phase form *as* could represent the ‘deletion’ output of either /asa/ or /aso/. It would thus be impossible to generate both of the ‘complete phase’ forms (*asa* and *aso*) from an underlying /as/. The two phases appear in a variety of contexts (see Churchward (1940), or, for a quick overview, Hale and Kissonock (1998), for further information) but one of the most widely discussed contexts involves data such as:

- (3) a. *hosa* ‘the flowers’ (definite plural, complete phase)  
 b. *h<sub>o</sub>as* ‘flowers’ (indefinite plural, incomplete phase)

Because of such examples, and the analysis of them found in Churchward (1940), for many modern analyses of the phenomenon the contrast has been treated as being essentially about definiteness or specificity. It is important to point out, however, that complete phase forms such as *hosa* may occur in indefinite contexts and incomplete phase forms such as *h<sub>o</sub>as* may occur in definite contexts:

- (4) a. *hosa-t* ‘a flower’ (indefinite singular, *hosa* in the complete phase)  
 b. *h<sub>o</sub>as fisi* ‘the white flower’ (definite singular, *hosa* in the incomplete phase)

We now turn to a review of what linguists have made of this phenomenon.

<sup>2</sup> There is considerable variation in the transcription and interpretation of the complex nuclei which result from metathesis. McCarthy (2000) writes this form *h<sub>o</sub>as*, Churchward (1940) says the stress is ‘evenly distributed’ across the two vowels. On the other hand, Schmidt (2000), Besnier (1987) and others write the forms *hw<sub>á</sub>s*. The general analysis is that they are stressed rising diphthongs. We will not worry further about their precise nature here.

### 3 REVIEW OF APPROACHES TO DATE

Under each of the various analyses in the literature all heavy syllable variants (i.e., ‘incomplete phase’ forms) occur in the same set of contexts, even though they arise via different phonological ‘processes’. The analyses differ in terms of model invoked, of course, but more significantly, they differ in their hypothesis regarding what actually conditions the observed alternations. Claimed determinants include:

- (5) a. Semantic conditioning (Churchward, 1940; McCarthy, 1995)
- b. Syntactico-semantic conditioning (den Dikken, 2003)
- c. Morphosyntactic conditioning (den Dikken, 2003)
- d. Morphological conditioning (Anderson, 2005; Kurisu, 2001)
- e. Phonological conditioning (Hale and KISSOCK, 1998; McCarthy, 2000)

While space considerations will require that we be relatively brief, we will sketch these various approaches, shuffling their order a bit for ease of presentation.

#### 3.1 CHURCHWARD (1940)

Churchward’s (1940) grammar is the foundation for all subsequent work on Rotuman, even in those rare cases in which scholars had access to informants. It is a sufficiently rich and comprehensive treatment, written by someone with extensive experience of the language, that very little has been overlooked in it. Churchward’s ultimate conclusion (and here we brutally summarize a complex and extensive discussion) can be seen in his §III.16.1-2:

... To what extent, if at all, can we discover an underlying unity behind the various rules that govern the respective uses of the two phases? It appears to me that... in general, the complete phase indicates some kind of completeness, the incomplete phase some kind of incompleteness.

In general, in subsequent generative accounts of the phenomenon, Churchward’s vague ‘some kind of completeness’ vs. ‘some kind of incompleteness’ distinction has morphed into a ‘definiteness’ or ‘specificity’ vs. ‘indefiniteness’ or ‘non-specificity’ one. Churchward’s ‘solution’ has been the one generally adopted in modern work on Rotuman, including work by phonologists on the phonological details of the alternations. So, for example, McCarthy’s first OT analysis of the phase distinction (McCarthy, 1995), states that: “Rotuman has a contrast in major-category words between two phases, the complete and the incomplete, distributed according to syntactico-semantic principles.” McCarthy’s goal was then to provide a phonological account of the alternations, assuming inputs already specified for which phase they should surface in via the alleged *syntactico-semantic* principles.<sup>3</sup>

<sup>3</sup> McCarthy actually seems to treat the ‘incomplete phase’ as being triggered by a specific, phonologically null morpheme, whose distribution presumably reflects the underlying *syntactico-semantic* principles.

### 3.2 HALE & KISSOCK (1998)

Hale and Kissock (1998), by contrast, claim that the phases are the epiphenomenal by-product of regular phonological processes. Briefly, the analysis proposed there is:

- (6) a. build binary strong-weak mora-based feet right-to-left;
- b. assign stress to the penultimate mora;
- c. delete unstressed vowels at the right edges of feet

Under this analysis, the association of complete phase with ‘definiteness’ is illusory. Those cases where a noun and an adjective show no *superficially apparent* phonological conditioning for complete vs. incomplete phase forms, but *do* show a syntactic/semantic distinction in definiteness are the result of a segmentally underspecified but moraic definite determiner. Like other D elements in Rotuman, the segmentally-null moraic definite determiner (D) is final in its phrase. The moraic D counts for foot construction, but, like other moraic nuclei, will delete when at the right edge of a foot. Thus a complete phase form such as *hosa* ‘the flowers’ is to be derived from /hosa/ ‘flower’ + /-∅<sub>μ</sub>/ (the moraic, but segmentally empty, definite plural determiner).

McCarthy’s (2000) revision of his earlier paper accepts in its basics the account offered by Hale and Kissock (1998) for the essential conditioning of the phenomenon, with some suggestions for improvement of some of the finer points of the analysis. For reasons of space, we can’t worry here about all the details of his treatment, we note merely that he has appropriate constraints to derive heavy-final syllables (in practice usually  $-(C_1)VC_2$ , with a moraic coda  $C_2$ ) in so-called ‘incomplete phase’ forms. The constraints have, as McCarthy notes, the following implications (2000, p. 173):

- (7) a. The metathesis pattern ( $-\check{V}_1V_2C$ ) is preferred. (*hosa* → *h<sub>o</sub>as* ‘flower’)
- b. The umlaut pattern ( $-\check{V}_1C$ ) is next in preference (*futi* → *f<sub>ü</sub>t* ‘pull’)<sup>4</sup>
- c. The deletion pattern ( $-\check{V}_1C$ ) is least preferred. (*haŋa* → *haŋ* ‘feed’)

Without going into the details of the analysis, it should be possible for the reader to deduce why, e.g., Metathesis is a better way to get a heavy final syllable than is Deletion. In general, Deletion would incur a gratuitous MAX violation and respecting MAX is more important than respecting LINEARITY (the constraint against metathesis). *h<sub>o</sub>as* (< /hosa/) preserves its final /a/ by violating LINEARITY. Deletion would only be preferred in cases in which Metathesis gives rise to an illicit vowel sequence (e.g., /asa/ → *aas*).

### 3.3 TROUBLE IN PARADISE

As McCarthy (2000, p. 182) notes, there is a problem candidate which confronts his analysis. The lexeme /rako/ has as its incomplete phase form [rak] (with deletion), rather than [raok] (with metathesis).<sup>5</sup> However, a candidate incomplete phase form [raok] has the desired heavy final syllable, does not incur the gratuitous MAX violation that the winner *rak* does, and has a perfectly licit

<sup>4</sup> We will not consider umlaut cases further here.

<sup>5</sup> We note, since it will be relevant in the subsequent discussion, that given the Rotuman stress rules (essentially ‘stress the penultimate mora’), this problematic candidate would be stressed *raók*.

vowel sequence, as can be seen from the well-formedness of *rao* ‘reddish on account of being ripe or nearly so’. McCarthy summarizes the problem thusly (2000, p. 182): “Most serious of all [problematic cases] is (39d) [ra.ó̄k–mh/mk/cr]—it has metathesis and a hiatal sequence, both of which the language tolerates freely, and it spares all other complications.”

To solve this problem, McCarthy invokes an Output-Output Correspondence Constraint, HEAD-MATCH:

(8) If  $\alpha$  is in  $H'(\text{PrWd})$  and  $\alpha\mathcal{R}\beta$ , then  $\beta$  is in  $H'(\text{PrWd})$ .

In simple prose, as McCarthy puts (2000, p. 183) it, “two forms will satisfy HEAD-MATCH if their main-stressed vowels are in correspondence.” He notes that HEAD-MATCH selects (*rák*) over *\*ra.(ó̄k)* by comparing the incomplete-phase candidates to the complete-phase form (*rá₂ko₄*). The alleged complete phase form (*rá₂ko₄*) is not a word, unfortunately, though it is the *rako*-portion of a potential word like *rákot* ‘a school’ (with the so-called ‘stress-neutral’ indefinite article *-t*). We say ‘unfortunately’ because the suggested process involves reshaping an unsuffixed ‘basic’ form of /*rako*/ on the basis of OOC with a suffixed form, in violation of the limitations on the use of OOC envisioned in almost all work which attempts to restrict the power of that mechanism, including quite explicitly work by McCarthy.

Notice further, and perhaps more seriously, that the word *rákot* pretty blatantly violates Rotuman’s “stress falls on the penultimate mora” stress assignment rule. Contrast *rakó̄á̄ŋ* ‘learning’, with the ‘stress-shifting’ suffix /-ŋa/, which does not violate the rule. Clearly, one would expect, given the stress rules of Rotuman, *\*rakót*.

The fact that a form like *rákot* had this stress placement problem was known to McCarthy. It is explicitly dealt with in a much earlier portion of his exposition (2000, p. 167):

(9) “Stress-neutral behavior [of the type seen in *rákot*—mh/mk/cr] can then be analyzed as an output-output faithfulness effect. . .”

But O-O Faith to what? Not, obviously, to the only other kind of Complete Phase form—those created with stress-shifting suffixes such as /-ŋa/, since they don’t have the stress in the needed place (*rakó̄á̄ŋ* ‘learning’).

The only other type of word-form that exists for such a morpheme is the incomplete phase form, which is of course, as we have just seen, *rák*. This does have the stress in the right position to serve as the O-O Faith basis for *rákot*. But how did *rák* beat out the competing candidate for the incomplete phase form, *\*raó̄k*? For this, you will recall, McCarthy invoked O-O Faith to *rákot*! Before we turn to the question of whether this circularity problem can be resolved by adopting a ‘harmonic serialism’ approach to the phonology of Rotuman, let us quickly present the *non-phonological* approaches to the Rotuman phase distinctions. After all, if the phenomenon is in the end not phonological, McCarthy’s circularity problem would happily go away (as would, of course, the positive aspects of his analysis, perhaps less happily).

### 3.4 DEN DIKKEN (2003)

Den Dikken (2003, p. 1-2) essentially follows Churchward's analysis in spirit, though in up-to-date Minimalist terms. He notes explicitly that "[f]or our purposes here, the phonology of the phase distinction will be entirely immaterial. What we are interested in in this work is the syntactico-semantic conditioning of the phase distinction. . . ." Den Dikken's major generalization is his (10) (2003, p. 9), which says "morphosyntactic COM(plete Phase)-marking is on the *rightmost* element in the checking domain of D[+def]". He is thus specifically interested in the alleged 'definiteness' trigger for complete-phase forms. He is aware that there are complete-phase forms for which definiteness is irrelevant. He thus appends the following footnote to his (10):

The emphatic restriction of (10) to morphosyntactic COM-marking is prompted by the fact that there are cases of COM which the (morpho)syntax arguably has nothing to say about: the instances of COM triggered by phonological properties of affixes, in particular. . . See Hale and Kissock (1998) for discussion of this—arguably not a syntactic issue.

So, den Dikken is attempting to provide an account for *a subset* of the cases of complete-phase "marking"—those which he feels are related to definiteness. He thus needs all of the seemingly independent phonological processes which convert complete phase forms into incomplete phase forms (metathesis, deletion, umlaut, glide formation, etc.) to be blocked under two distinct conditions: under the phonological conditions specified by Hale and Kissock (1998) and under his 'syntactico-semantic' conditions (i.e., in the alleged 'definiteness' context). He takes strong issue with Hale & Kissock's criticism of Churchward's 'semantic' analysis—you will recall that we argued in that work that the 'definiteness' contrast *sometimes* associated with complete phase forms was to be attributed not to direct semantic conditioning of phonological form, but rather to the presence of a null, moraic definite marker, postposed to the relevant forms. This permits, we argued, a unified treatment for the contexts within which complete phase is found (and thus, of course, for their converse—the contexts in which incomplete phase is found).

Den Dikken, in following Churchward's "syntactico-semantic" conditioning, severs this relationship, making it extremely difficult to see how the apparent unity of a wide range of phonological effects, now triggered in two distinct manners, could possibly arise. Aside from that, of course, he also needs a mechanism to get the relevant *semantics* ('definiteness', broadly construed) to be present in the *syntax*: the architecture of minimalism requires this of him. His summary at the end of the monograph (2003, p. 73) tells us how he intends to achieve this: "COM-marking can be viewed as the realization of a *clitic* in D[+def]." Since this clitic is inaudible, it must be a phonologically null clitic. If, allowing its segmental nullness, we simply specify that it has moraic structure (i.e., that it is a segmentally empty mora, rather than simply a segmentally empty clitic without moraic content), the phonological contexts for complete phase outside the 'definiteness' context, which den Dikken accepts in the form spelled out by Hale and Kissock (1998), and the complete phases found in the 'definiteness' context will be unified and all phase distinctions will be triggered phonologically. This seems to us significantly more elegant and satisfying.

### 3.5 KURISU (2001)

Kurisu (2001) adopts an analysis in which the phases are the direct reflex of a morphological difference between the forms in question. Her inputs are objects such as *hoʔa<sub>IncPh</sub>* ‘take’ vs. *hoʔa<sub>ComPh</sub>* ‘take.’ She notes, regarding where these two forms come from, that “[t]he selection of the appropriate phase in a given context is governed by various principles outside phonology (Churchward 1940, p. 88-89).”

Since the objects are morphologically distinct (Kurisu uses the REALIZEMORPHEME constraint to trigger the phase distinctions), and since *hoʔa* ‘take’ must itself be a morpheme, it is clear that we are dealing with three morphemes in the above examples: *hoʔa* ‘take’, IncPh and ComPh.

Recall that before monomoraic affixes and clitics, we always find the Complete Phase, while before bimoraic ones we find the Incomplete Phase. Under a phonological analysis, such as ours, we thus have derivations such as:

- (10) a. *hoʔa* + *me* ‘bring’ > (ho)[ʔáme] > *hoʔam*  
 b. *hoʔa* + *kia* ‘take (trans)’ > [hoʔa][kía] > *hoaʔkia*

Under a morphological analysis, such as Kurisu’s we need:

- (11) a. *hoʔa* + ComPh + *me* + IncPh ‘bring’ > *hoʔam*  
 b. *hoʔa* + IncPh + *kia* + IncPh ‘take (trans)’ > *hoaʔkia*

Clearly, the sole ‘function’ of the ‘morphemes’ under such an analysis is to serve as a diacritic for when to trigger Incomplete Phase formation. This is disturbing in the cases where phase is indisputably predictable (as in the above data). The only point of contention, i.e., the only case in which we do not have full predictability of the type seen in the two examples above, involves the underspecified moraic definite marker posited by Hale & KISSOCK. If one refuses to posit such an entity, *limited* unpredictability ensues.

Kurisu’s analysis is picked up by Anderson (2005), which discusses the analysis of Rotuman by Kurisu, McCarthy, and Hale & KISSOCK. Basically, Anderson says that Kurisu shows that Hale and KISSOCK (1998) can’t get the data (without, ‘somewhat suspiciously’ positing a null moraic marker), so a morphological solution is better. He then makes the following strange assertion: “it is uncontroversial that the phase distinction appears only on the final word of the phrase. . .”

Unfortunately, this is just empirically false: any open class lexical item or suffix takes its phase based on its footing relative to the material which follows it, regardless of its position in the string. The first element of /*hoʔa* + *me*/ ‘take hither’ (+‘bring’) will always surface in the complete phase, regardless of where in the ‘phrase’ the word occurs. The phase of /*me*/ will depend upon what follows it. By contrast, the first element of /*hoʔa* + *kia*/ ‘take (trans)’ will always surface in the incomplete phase, regardless of where the word appears in the phrase.

The only link between the phase alternations and phrase-finality arises from the fact that DPs are head-final, so the null moraic determiner (which triggers complete phase and then deletes) will only have an effect on the final element of DP. It is this element that Anderson (2005) clearly has in mind, when he wraps up his discussion with: “Kurisu concludes that the alternation is triggered (at least in part) by morphological factors. But since its realization is at the right edge of a phrasal

constituent, this must be phrasal morphology: a special clitic” (p. 101).

Surely whatever his ‘special clitic’ might be (it sounds *somewhat suspiciously* like a phonologically contentless, process-triggering element), he would not want to stick it in the middle of /ho?a + me/!

### 3.6 INTERMEDIATE CONCLUSION

The discussion above is intended to make clear that, although alternatives to phonological approaches to the phase distinctions in Rotuman have been touted, none fares particularly well. The proposals of Hale and Kissonck (1998) were essentially descriptive and framework neutral. In Hale et al. (1998) we argued that a more ‘serial’ derivation than was present in the then prominent version of OT. Following up on that suggestion, and considering that the ‘classical OT’ analysis of McCarthy suffers from a fatal circularity, it might be worthwhile exploring whether any of the OT models which reintroduce a limited kind of serialism may fare better than ‘classical OT’ on the problem. It is to this question that we next turn.

## 4 HARMONIC SERIALISM

Harmonic Serialism shares with ‘classical OT’ the notion of a single constraint ranking. It differs architecturally from classical OT in two crucial respects: it involves an iterated evaluation process and a reconceptualization of the nature of the GEN function. The basics are:

- (12) a. GEN reconceived: candidate set limited to forms ‘one step away’ from input
- b. Single Constraint Ranking (as in Classical OT)
- c. Serialism: pass each winning candidate back through GEN and CON until winning candidate matches latest input (at which point, convergence is achieved)

It is, of course, impossible for us to show that there is no possible analysis for the Rotuman phase distinction under HS which could be made to work, given the limited space available to us here (or, indeed, perhaps at all), so we will not make the attempt. We will instead focus on the narrow question of whether or not a HS derivation of a form such as *rák* < /rako/ readily avoids the *\*raók* problem (but still allow metathesis where needed). If it does not, we will try to understand what structural properties of HS are in the way.

As far as we can see, HS does nothing to help the ‘classical OT’ analysis of McCarthy (2000). To get the licit metathesis cases, we need MAX-V to outrank LINEARITY (because it needs to be more important to preserve the final vowel than to avoid metathesis). The Deletion cases, recall, require constraints on possible  $V_1V_2$  sequences to outrank MAX-V (such that deletion of a final vowel is even better than preservation via metathesis), but the candidate *\*raók* does not contain one of those illicit sequences.

- (13) Pass 1 (*raók* not in candidate set; more than one step away from /rako/):

rako	HEAVYFINAL	STRESSPENULT- $\mu$	MAX-V	LINEARITY
rako	*	*		
ráko	*			
raok		*		*
rak		*	*	

(14) Pass 2 (ráko no longer in candidate set; more than one step away from raok):

raok	HEAVYFINAL	STRESSPENULT- $\mu$	MAX-V	LINEARITY
rako	*			*
raok		*		*
rak		*	*	
raók				

It appears that [raók] will win forever, since it violates none of the relevant constraints.

We next turn to the examination of a somewhat more elaborate example which reveals more clearly, in our view, just how much more straightforward a *more* stratal approach to the phenomenon in question than that offered by HS would be. It concerns a process in Rotuman whereby *stressed a* is realized as  $\alpha$  before a following *e*, as can be seen when the word /pare/ surfaces before the clitic directional /=me/:

(15) /pare-me/ → [párem] ‘to defend in this direction, hither’

No such fronting is found when an unstressed /a/ precedes an /e/:

- (16) a. /tapene/ → [tapén] ‘what sort of’  
 b. /halea/ → [haléa] ‘to turn over on one’s back so as to lie face upwards’

Opaquely, when unsuffixed, /pare/ surfaces without the *e*-trigger, but with  $\alpha$  nevertheless:

(17) /pare/ → [pár] ‘defend’

Also opaquely, when the stem /pare/ is suffixed by the ‘gerundial’ suffix /-ŋa/, we find a stress-shift, such that the relevant /a/ is no longer stressed, but  $\alpha$ -formation takes place nevertheless:

(18) /pare-ŋa/ → [pæɾéŋ] ‘defending’

We see a different effect on word stress between combination with the nominalizing suffix /-ŋa/ (traditionally referred to as a ‘stress-shifting’ suffix, since the stress is shifted from its assumed to be original penultimate position in the stem *pére*) and combination with the directional enclitic /=me/ ‘hither’ (traditionally referred to as a ‘stress-neutral’ suffix, because no such shift is seen):

- (19) a. /pare-ŋa/ → [pæɾéŋ]  
 b. /pare-me/ → [párem]

What determines the difference in stress behaviour? A plausible hypothesis is that we are looking at the difference between *enclisis* and *suffixation*. Supporting evidence for such a position is not hard

to find. For example, the directional morpheme *-me* 'hither' is 'non-stress shifting' (contrast *suruáŋ* 'entrance', with stress-shifting *-ŋa*):

- (20) *iris sūru-m*  
 they enter=HITHER  
 'they came in'

And it is a phrase-final clitic (Churchward 1940: §III.31.1a), as can be seen from the fact that it is attached to the VP-final adverb rather than to the verb in examples such as:

- (21) *iris sur mǐji-m*  
 they enter quickly=HITHER  
 'they came in quickly'

Similarly, the indefinite article *-t* is 'non-stress shifting':

- (22) *háni-t*  
 woman=INDEF.ART  
 'a woman'

And it is a phrase-final clitic:

- (23) *hén físi-t*  
 woman white=INDEF.ART  
 'a white woman'

As a final example, the 'transitive' marker *-a* is 'non-stress shifting' (contrast *futiáŋ* 'pulling'):

- (24) *fā ta fūti-a lū ta*  
 man the pulled=TR rope the  
 'the man pulled the rope'

And it is a phrase-final clitic (Churchward 1940: §III.31.1d):<sup>6</sup>

- (25) *fā ta fūt leléi-a lū ta*  
 man the pulled well=TR rope the  
 'the man pulled the rope well'

These examples contrast sharply with true suffixation, which is stress-shifting, and attaches, as expected, to an appropriate lexical host. For example, the causative morpheme *-'aki* is stress shifting (contrast *sūru-m* above):

- (26) *iris sur'aki e*  
 they enter-CAUS there  
 'they caused (him) to enter there'

<sup>6</sup> We leave to one side the question of the relative position of the adverb and the direct object.

And it is *not* a phrase-final clitic (Churchward 1940 §III.31.2), as can be seen by its inability to be ‘delayed’ to the post-adverb position in example such as:

- (27) \**iris sur a‘lelei-‘áki e*  
 they enter well=CAUSE there  
 ‘they caused (him) well to enter there’

It seems quite clear, then, that the proper analysis of the relationship between the host and ‘attached’ morphemes is simply this: stress-shifting elements are suffixes, non-stress shifting elements are, in fact, clitics.<sup>7</sup> To see how this relates to the proper conception of the kind of ‘serialism’ we require to account for the Rotuman data, let’s recap the *æ* evidence. There are three particularly interesting realizations of the morpheme /pare/:

- (28) a. unsuffixed páer < /pare/ (which McCarthy can’t get to beat out [pæér], and which has an opaque *æ*)  
 b. suffixed pæreáj < /pare-ŋa/ (which also has an opaque *æ*)  
 c. clitic-bearing párem < /pare+/me/ (which has misplaced stress, and whose *æ* is only not opaque because of this misplaced stress)

Note that no generable form of /pare/ has both properly placed stress and non-opaque *æ*.

Let us consider this data in light of the architectural differences between, for example, Harmonic Serialism and Stratal OT (Bermúdez-Otero, 2011)<sup>8</sup>.

- (29) a. HS: Candidates iteratively subjected to the *same* constraint ranking, with ‘harmonic improvement’ on all but the final pass.  
 b. Stratal OT: Candidates subjected to distinct constraint rankings at each stratum.
- (30) a. HS: All material of relevance to the derivation of the final output form is present from the beginning.  
 b. Stratal OT: Computation first limited to stem level material, then to word-level material, and finally to phrasal material. Earlier strata don’t know about (and cannot reference the phonological properties of) material not yet affixed.

It is fairly straightforward to demonstrate that a ‘Stratal OT’ derivation of the relevant opacities is possible. In the interest of space we will not walk through construction of the appropriate constraint rankings and tableaux, which should be a relatively trivial matter to anyone armed with McCarthy’s (2000) ‘classical OT’ analysis and the willingness to exploit architectural machinery of Stratal OT where ‘classical OT’ was dependent upon O-O Faith. The schematic treatment would look like this:

- (31) Stem-Level: penultimate stress assignment and *a-to-æ* before following *e*:  
 a. /pare-/ → páere-
- (32) Word-level: suffixation with stress reassigned (if needed)

<sup>7</sup> There is no evidence that they are ‘special clitics’: we appear to be dealing with cases of *in situ* cliticization.

<sup>8</sup> Similar arguments would hold if we were to contrast Harmonic Serialism with a traditional rule-based approach; we leave demonstration of this fact as an exercise to the reader.

- a. pǎere- → pǎere (no suffixation)
  - b. pǎere-ŋa → pǎereŋa
- (33) Postlexically: cliticization, no stress deletion, FINALHEAVY effects, diphthongization)
- a. pǎere → pǎer (no cliticization)
  - b. pǎereŋa → pǎereǎŋ (no cliticization)<sup>9</sup>
  - c. pǎere-me → pǎerem

The correct forms appear to arise with relative ease. Of course, by adopting Stratal OT we have granted our model additional powers beyond those available to HS. Additional power should always permit broader empirical coverage. Such expansion of powers should only be advocated if the empirical evidence is compelling. To briefly explore this question, let’s ask just what architectural properties HS possesses which appear to limit its capacity to deal with the Rotuman data.

- (34) The limited serialism of HS seems to us to fail because of:
- a. the requirement that all relevant material be present and play a role in phonological computation throughout the derivation (which makes it difficult to meaningfully contrast stress-shifting suffixes from non-stress-shifting clitics, since both trigger phonological effects on the element to which they attach, but not the same effects)
  - b. the requirement that the constraint set be the same for each layer of phonological concatenation (which makes it difficult to be faithful to ‘earlier’ stress at the postlexical level, but unfaithful to it at the word level)

A fairly clear domain within which one might explore the needed powers for phonological theory thus would appear to be the relationship between word-level and postlexical phonology. Can HS handle the fairly well-established body of evidence concerning the so-called ‘phonology-syntax interface’, for example? If it cannot, the type of expansion of theoretical power which the Rotuman phase facts appear to demand will not be avoidable.

#### 4.1 CONCLUSIONS

For the Rotuman phase phenomenon we have sketched in this paper it appears that, contrary to recent discussions, a purely phonological solution is available and, indeed, to be preferred over the competing analyses. Only in the phonology can we do the computations required to account for the *phonological* properties of the phase distinction. Moreover, any morphological analysis would appear to involve positing abstract morphemes with no surface realizations, no semantics, no category membership, no inflectional/derivational status, and no clear mechanism for triggering the diversity of attested phonological effects. What is the relative cost of positing a significantly underspecified moraic segment against positing dozens of abstract, meaningless, functionless morphemes and corresponding morpheme-specific phonological processes? In any event, principles of science alone

<sup>9</sup> We remind the reader that the apparent stress shift between *pǎereŋa* and *pǎereǎŋ* is just that: apparent. The sequence represents a complex nucleus with the stress evenly distributed across its elements. We assume this can be captured by an appropriate characterization of the diphthongization process. See footnote 2.

demand that if a purely phonological account of the phase alternations can be provided, it is to be preferred *a priori* to an account that must appeal to *both* phonology and morphology.

Suggestions that we may be looking at syntactic-semantic, or merely semantic, effects in the phase data violate a healthy architectural constraint which requires that (morpho)syntactic effects at the phonological level need to be mediated by prosodic structure, rather than involving direct (morpho)syntactic effects on phonological rule application.

Finally, the failure of ‘classical OT’ to provide an account for the Rotuman facts appears, as we argued in 1998, to arise via the need to ‘hack’ a relatively clean version of the theory via the addition of Output-Output constraints (which, as the HS literature now notes, was just a way of reintroducing serialism). The minimal expansion of ‘classical OT’ via the introduction of a highly restricted type of serialism which HS represents, while praiseworthy for its scientific responsibility as an act of theory construction, does not address the empirical shortcomings of ‘classical OT’ when it comes to the data on Rotuman phase. A richer conception of strata is required, one which gives them (1) the ability to ignore material at earlier stages of the derivation *ultimately relevant* to the computation and (2) the ability to subject ‘intermediate’ forms to distinct computational systems in the course of the derivation.

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