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On the (Ir)regularity of Dunan Verbal Morphophonology (complete version at http://www.f.waseda.jp/dechene/RP-IDVM.pdf)

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1. Introduction

The complexity of Dunan (Yonaguni) verbal morphology and morphophonology has elicited comment from a number of researchers (Hirayama and Nakamoto 1964:110, Kajiku 1984:357, Takahashi 1997:418). In a recent article, Yamada, Pellard, and Shimoji (2015:458-459) present a very explicit form of this "complexity thesis" as it concerns morphophonology, claiming about variation in the shape of both stems and suffixes that "There is generally no synchronic phonological motivation for these alternations" and about stem alternations in particular that postulating rules to account for them would be "pointless". In the present paper, I argue that while the morphosyntactic conditioning of certain stem alternations is indeed complex, in most respects, Dunan verbal morpho(phono)logy is systematic and rule-governed, displaying a remarkably limited amount of listed allomorphy. After introducing relevant suffixes and suffix combinations in section 2, I discuss regular stem-boundary alternations in section 3. Section 4 deals with suffixal allomorphy and with the loss of vowel-stem inflection, and section 5 covers stem alternations and their contexts. Section 6 reviews the derivational processes postulated by the proposed analysis, and section 7 considers the wider implications of the discussion.

2. Morphology: Suffixes and suffix combinations

In this section, we will survey the inflectional suffixes and suffix combinations that will be discussed in sections 3 through 6. Table 1 below illustrates twelve such suffixes with the stem *dum-* 'read' (J(apanese) *yom-*). As labels for the three structurally determined categories *syuusikei, rentaikei, ren'yookei* (lit. "Conclusive", "Adnominal", "Adverbial"), I use the abbreviations SS, RT, RY (cf. Unger 1977). While I take Passive/Potential *-arir-* and Causative *-amir-,* reflecting their syntactic status, to be inflectional (as are their Japanese equivalents), I omit them from the table. The last three suffixes are added to the RY rather than to the stem.

Category	Suffix	Example
Hortative	-u	dum-u
Negative	-anun	dum-anun
SS	-un	dum-un
RT	-u	dum-u

Category	Suffix	Example
Prohibitive	-unna	dum-unna
Conditional 1	-uba	dum-uba
Conditional 2	-ja	dum-ja
Imperative	-i	dum-i

Category	Suffix	Example
RY	-i	dum-i
Conjunctive	-ti	dum-i-ti
Past	-tan	dum-i-tan
Perfect	-an	dum-i-an

Table 1 Dunan Inflectional Suffixes

The only respect in which the representations of Table 1 are phonologically abstract is that Perfect /dum-i-an/ is realized as [dumjan] as the result of a rule that will be discussed in section 3.

Several of the suffixes of Table 1 require comment. First, the final *n* of the Negative, SS, Past, and Perfect suffixes is an SS morpheme, although in citing examples I will typically suppress the morpheme boundary before it. Not listed in Table 1 is a Conditional suffix alternant *-iba,* which occurs only after vowels and is in complementary distribution with both Conditional 1 *-uba* and Conditional 2 *-ja,* which occur only after consonants. While *-iba* is generally considered an allomorph of *-uba* (Hirayama and Nakamoto 1964, Takahashi et al. 1987b, Takahashi 1997, Yamada et al. 2015), it shares with *-ja* the property of being usable as a weak Imperative, suggesting that it corresponds semantically to both *-uba* and *-ja.* This judgment is expressed in the realization rules (1), where the feature "[Conditional]" represents what *-uba* and *-ja* have in common, the feature "[Realis]", in rough accord with the examples of Izuyama (2012:447-448), represents how they differ, and the rules apply following the conventions of Halle (1997:428).

(1) a. [+Cond –Real] ↔ uba/C __ b. [+Cond +Real] ↔ ja/C __ c. [+Cond] ↔ iba

3. Vowel sequences at stem boundary

In section 3, we will examine what occurs when two vowels come together at verb stem boundary. We will find first that there is a small

set of natural rules governing hiatus at stem boundary and second, that those rules are plausibly understood as repair mechanisms whose function is to enforce compliance, within the inflected word, with constraints that also hold (with minor exceptions) morpheme-internally.

Let us start, then, by briefly surveying the occurrence of hiatus morpheme-internally and the processes by which earlier occurrences thereof have been eliminated. Of the nine possibilities for hiatus afforded by Dunan's three vowels, only two, *ai* and *ui,* occur freely within a morpheme (*ai* 'indigo' (J *ai*), *ui* 'above' (J *ue*), *ui* 'melon' (J *uri*)). An earlier length contrast has been lost, so that a pair like *i* 'cooked rice' < **ipi* (J *ii*) and *i* 'picture' < **we* (J *e*) are homophones (see Takahashi et al. 1987a). Inherited and derived V*u* sequences have been eliminated by assimilation of V to *u* and shortening: *su* 'tides, current' (< **siu*) < *sio* (J *sio*), *su* 'pole' (< **sau*) < *sao* (J *sao*), although unassimilated *au-* 'blue' < *ao-* (J *ao-*) is a well-known exception. *ia* and *ua,* finally, have been eliminated by desyllabification of the high vowel. This is particularly clear for *ua,* as shown by adjective stems like *dwa-* 'weak' (< **dua-*) < *yowa-* (J *yowa-*) and *kwa-* 'hard' (< **kua-*) < *kowa-* (J *kowa-* 'stiff'); an example for *ia* is provided by *mjangi* 'gift' < *miage,* originally a compound (J *miyage*).

Given the situation morpheme-internally, it would not be surprising if there were processes resolving hiatus at verb stem boundary. Table 3 below illustrates all nine possibilities for V_iV_j at stem boundary using the suffixes Perfect *-an,* Prohibitive *-unna,* and RY *-i* from Table 1 and the vowel-final allomorphs of *ba(r)-* 'break' (J *war-*), *mu(r)-* 'serve [food]' (J *mor-*), and *ugi(r)-* 'receive' (J *uke-*), the latter to be discussed in section 5 (note that Perfect *-an* is added directly to this vowel-final allomorph, without the intervention of the RY suffix).

	-an	-unna	-i
ba(r)-	ba-an [ban]	ba-unna [banna]	ba-i
mu(r)-	mu-an [mwan]	mu-unna [munna]	mu-i
ugi(r)-	ugi-an [ugjan]	ugi-unna [uginna]	ugi-i [ugi]

Table 2 Hiatus at Verb Stem Boundary in Dunan

As Table 3 makes clear, of the nine VV sequences, only /ai/ and /ui/ survive unaltered: V_iV_i sequences are reduced (descending diagonal), *u* deletes after any vowel (middle column), and high vowels desyllabify before *a* (bottom left cell and the one above). These changes are codified in the rules of (2) through (4) below ("+" = morpheme boundary).

(2) Shortening $V_i \rightarrow \varnothing \ / \ V_i + \_\_$ (3) *u*-Deletion $u \rightarrow \varnothing \ / \ V + \_\_$ (4) Desyllabification $V \rightarrow [-\text{syllabic}] \ / \_\_ + a$ [+high]

4. Suffixal allomorphy

Variation in the shape of stems and suffixes that is due to rules (2) through (4) will of course not have to be recorded in lexical entries. Dunan also displays two cases of listed suffix allomorphy. The first of these, involving the neutralization of the contrast between Conditional 1 *-uba* and Conditional 2 *-ja* to *-iba* after a vowel, was treated in section 2 above. In that case, while an extra allomorph, *-iba,* must be lexically listed, the conditioning of that allomorph is phonological, so that no complication of the lexical entries of stems is required. The second case, involving the Perfect suffix allomorphs *-an* and *-un,* in contrast, involves a complex mix of semantic and lexical conditioning. Due to space limitations, I omit discussion of the allomorphy of the Perfect suffix here.

The most notable fact about listed suffix allomorphy in Dunan, however, is arguably how little of it there is. Specifically, a look at the full set of Table 1 suffixes plus the stem-forming suffixes (*zyodoosi* 'auxiliary verbs') that were omitted from that table reveals that Dunan displays significantly less listed suffix allomorphy than more conservative Japonic dialects such as Tokyo Japanese and Hirara Miyako. Table 3 below displays consonant-stem (C-stem) and historical vowel-stem (V-stem) inflection in Tokyo, Hirara (Karimata 1997), and Dunan for six inflectional categories. The forms of that table show that (a) all three dialects display reflexes of the same C-stem suffix alternants, with the reinterpretation of the Negative suffix as an adjective-stem formant shown by the Tokyo form representing the only nonphonological development; (b) Tokyo and Hirara show reflexes of the same V-stem suffix alternants, with nonphonological developments in the Tokyo Hortative as well as the Tokyo Negative suffix; (c) Dunan, in contrast, shows no reflex of distinctive V-stem inflection, inflecting the representative example 'arise' by adding C-stem suffixes to an *r*-final stem.

	C-stem inflection (‘write’)				*V-stem inflection (‘arise’)			
Category	Suffix	Tokyo	Hirara	Dunan	Suffix	Tokyo	Hirara	Dunan
Imperative	-e	kak-e	kak-i	k^hag-i	-ro	oki-ro	uki-ru	ugir-i
Hortative	-au < -amu	kak-oo	kak-a	k^hag-u	-u < -mu	oki-joo	uki-Ø	ugir-u
RY	-i	kak-i	kak-ï	k^hat-i	-Ø	oki-Ø	uki-Ø	ugi < ugi-i
Negative	-anu	kak-ana-	kak-an	k^hag-anu-	-nu	oki-na-	uki-n	ugir-anu-
Causative 1	-as(e)-	kak-as(e)-	kak-as-	k^hag-as-	-sas(e)-	oki-sas(e)-	*	ugir-as-
Causative 2	-asime-	kak-asime-	kak-asïmi-	k^hag-amir-	-sime-	oki-sime-	uki-sïmi-	ugir-amir-

Table 3 C-stem and Historical V-stem Inflection in Tokyo, Hirara, and Dunan

Several of the Dunan forms of Table 3 require further comment. The alternation of stem-final *g* with *t* seen in RY *k^hati* is due to a rule that will be discussed in section 5. Causative 1 *-as-,* although not mentioned in recent sources on Dunan, is noted as occurring frequently in the RY by Hirayama and Nakamoto (1964:123), who cite the example *tub-as-i-busa-n* ‘want to cause to fly’. The interpretation of RY *ugi* as /ugi-i/, already seen in Table 2, finally, eliminates the one point on which the inflection of historical V-stems appears (Hirayama and Nakamoto 1964:19) to diverge from that of *r*-stems (the loss of V-stem inflection is discussed in more detail in section 7).

The implications of Table 3 regarding the relative degree of listed suffix allomorphy in Tokyo and Hirara, on the one hand, and Dunan, on the other, are clear: since the relation between C-stem suffixes and V-stem suffixes in Tokyo and Hirara follows no rule, both alternants must be listed in the lexical entries of the six suffixes of that table for those two dialects. The same is true, of course, for many other dialects as well. Dunan, in contrast, displays no listed allomorphy at all for the six categories in question. It seems clear, then, that suffixal allomorphy fails to support the view (Yamada et al. 2015:458) that Dunan verbal inflection is uniquely complex within Japonic.

5. Stem alternations

5.1. Nonalternating and velar-final stems

We have seen that lexically listed suffix allomorphy in Dunan is quite limited, and in particular less extensive than in Hirara Miyako or Tokyo Japanese. In this section, we will examine stem allomorphy. Essential to our account will be distinguishing between two issues, the phonological relation of stem alternants to each other and the morphosyntactic environments in which those alternants occur. We will find that while the relevant morphosyntactic environments are quite complex for some alternations, the phonological relations among stem alternants are rule-governed and relatively simple. This will mean that, just as in the case of suffixes, lexically listed stem allomorphy is quite limited.

With one exception that we will note below, Dunan stem alternations affect only stem-final segments, of which there are thirteen, eleven consonants and two vowels (vowel-final stems correspond to Japanese *w*-stems). Dunan’s eleven stem-final consonants can be divided into three groups according to whether they alternate and if so, how. The six stem-finals *b d t c m n,* first of all, are nonalternating in all environments. The second group of stem-final consonants consists of the three velars *k g ŋ.* Before the RY suffix *-i* these become dentals, with nasals denasalizing and non-nasals devoicing. Stem-final *ŋ* thus alternates with *d,* while *k* and *g* both alternate with *t,* as we saw for *g* in Table 3. Assuming features [dorsal] and [coronal], the rule for the alternation of stem-final velars can be written as in (5), where “$_V$]” marks the end of a verb stem and “[RY” indicates that the immediately following suffix is that of the *ren’yookei.*

(5) Velar Dentalization

$$\begin{bmatrix} +\text{dor} \\ <\!-\text{nas}\!> \end{bmatrix} \rightarrow \begin{bmatrix} +\text{cor} \\ -\text{nas} \\ <\!-\text{voi}\!> \end{bmatrix} \; / \; \_\_ \; {}_V] \; [\text{RY}$$

To the extent that all velar-final stems alternate in the same way, no information about the alternations in question will need to be included in the lexical entries of individual verbs.

5.2 Truncating stems: *r*-stems, *a/u*-stems, *s*-stems

The morphological environment of Velar Dentalization is straightforward, involving only a single suffix or inflectional category. The morphological environments for the alternation that affects the remaining stem-final consonants, *r* and *s,* and the stem-final vowels *a* and *u,* on the other hand, are relatively complex. The alternation itself, however, is simple and phonologically natural: stem-final *r* and *s* and stem-final vowels all undergo truncation in certain morphological environments. There is one complication, namely that *s*-stems have not only an alternant that results from truncation of stem-final *s,* but a further alternant that results from truncation of the vowel that becomes stem-final as a result. The rules that affect the three stem-types in question, however, are all special cases of the schema (5), where "x" represents a segment, either a vowel or a consonant, and E represents a (morphologically defined) environment.

(6) Generalized Truncation x → ∅ / __ v] / E

The environments in stems ending in *r, a/u,* and *s* undergo truncation will be catalogued in section 6. We will also note there the environment in which the RY suffix is deleted, a phenomenon noted above in connection with the Perfect forms of Table 2.

6. Summary and derivations

To this point, we have introduced the rules we are postulating for Dunan verbal morphophonology individually, without systematic consideration of their interaction and order of application. In this section, we will document in a bit more detail how those rules mediate the relation between phonological and phonetic forms. While we appeal to the notion of a derivation, the analysis postulated involves no phonological abstractness: the phonological form of every morpheme, whether a stem or a suffix, coincides with an actually occurring phonetic alternant of that morpheme.

Concerning the organization of the grammar, I will assume that both productive stem-forming suffixes such as Passive and Causative and uncontroversially inflectional elements such as tense and mood suffixes and the markers of the structurally determined SS, RT, and RY are syntactic elements or the result of syntactic operations, so that the construction of inflected forms is in the first place the responsibility of the syntax. Concerning the phonological realization of stems and suffixes, I will assume that stems are inserted into syntactic structure from the lexicon along with their phonological forms, but that suffixes are phonologically unrealized morphosyntactic feature complexes until the end of the syntactic derivation, acquiring phonological forms only as the result of realization rules of the type we saw in (1). This asymmetry in the phonological realization of stems and suffixes is appealed to in our account of the two Conditional suffixes, which are *-uba* and *-ja* after a consonant, but *-iba* after a vowel. Crucially, it is a derived rather than underlying vowel-final alternant that conditions the choice of *-iba* in the case of *s*-stems, showing that the phonological realization of suffixes presupposes not only the prior realization of stems, but application of the rules governing stem alternations that we identified in section 5, notably Truncation. The operations that we are postulating are summarized in (7), where (7a) must precede (7b), (7b) must precede (7c) (depending on the formulation of the latter), and (7a)-(7c) must precede (7d). Of the rules included in (7), only those of (7d) are free from conditioning by morphosyntactic category.

(7) a. Stem allomorphy (Velar Dentalization and Truncation ((5)–(6) above))
b. Suffix realization
c. RY Suffix Deletion
d. General stem-boundary hiatus resolution ((2)–(4) above)

Of the rules of (7), Velar Dentalization applies only in the RY (and forms based on the RY) of velar-final stems. The remaining rules, Truncation, RY Suffix Deletion, and the general hiatus resolution rules of (2)-(4), interact in relatively complex ways in the paradigms of *r*-stems, *a/u*-stems, and *s*-stems. This interaction is summarized in Table 4, which covers all applications of these rules apart from the resolution of /i+a/ in the Perfects of nonalternating and velar-final stems. In the table, an underline between morpheme boundaries represents the deleted RY suffix, and other underlines represent deleted stem-final segments. When the stem alternant ends in a vowel, the table also shows the following segment, thereby displaying the input to the hiatus resolution rules (2)–(4). Below, we briefly examine the sixteen numbered cells of Table 4 individually.

	r-stem	*a/u*-stem	*s*-stem
Hort	① Vr	⑦ C_	⑪ C_ _
Neg			
SS			⑫ Cu^{a}_+ u
RT			
Proh	② V_+ u		
Cond 1	③ Vr	⑧ Cu^{a}+ i	⑬ Cu^{a}_+ i
Cond 2			
Imp			
RY	④ V_+ i		⑭ Cus^{a}
Conj			
Past	⑤ V_+ _+ t	⑨ Cu^{a}+ _+ t	⑮ Cu^{a}_+ _+ t
Perf	⑥ V_+ _+ a	⑩ Cu^{a}+ _+ a	⑯ Cus^{a}

Table 4 Truncation and RY-Suffix Deletion

In the paradigm of *r*-stems, ① and ③ are cells in which the stem appears untruncated and the corresponding inflected forms are entirely parallel to those of nonalternating and velar-final stems. Truncation does occur in ⑤, but because RY Suffix Deletion occurs as well, the segment following the truncated stem alternant is a consonant, and no hiatus arises. The cells ②, ④, and ⑥ are those in which hiatus does arise; as illustrated in Table 2, all nine VV combinations are attested. (8) below displays a representative derivation.

(8) Derivation of the Perfect [mwan] of /mur-/ 'serve [food])'

Output of syntax	mur-RY-Perf
Stem allomorphy	mu-RY-Perf
Suffix realization	mu-i-an
RY Suffix Deletion	mu-an
Hiatus resolution	mwan

(9) Derivation of the SS [bagan] of /bagas-/ 'boil (tr.)'

Output of syntax	bagas-SS
Stem allomorphy	baga-SS
Suffix realization	baga-un
RY Suffix Deletion	-------
Hiatus resolution	bagan

In the paradigm of *a/u*-stems, cell ⑦ comprises those inflected forms in which the stem-final vowel is truncated, resulting in a C-final stem allomorph. In ⑧, there is no truncation and hiatus thus arises, but it is limited to the permissible combinations *ai* and *ui,* so that no resolution occurs. In ⑨, RY Suffix Deletion has the consequence that the suffix following the vowel-final stem is consonant-initial, while in ⑩, hiatus arises and is subject to resolution. In the paradigm of *s*-stems, the forms of ⑪ show double truncation, resulting in a secondary C-final stem alternant. The forms of ⑫ and ⑬ show single truncation and thus a V-final stem alternant; suffixes begin with u and i respectively, so that hiatus arises in both cases but undergoes resolution only in the first. (9) shows the derivation of a representative cell ⑫ form. Of the remaining cells, the stem appears untruncated in ⑭ and ⑯, and the corresponding inflected forms are parallel to those of nonalternating and velar-final stems. In ⑮, finally, the stem undergoes truncation, but, as in cells ⑤ and ⑨, the RY suffix is deleted as well, and no hiatus arises.

7. Conclusion

Above, we began with the observation that numerous researchers have commented on the complexity of Dunan verbal inflection, and that Yamada et al. (2015) have claimed that morphophonology in particular is entirely lacking in rule-governed patterns. While I will omit a detailed consideration of Yamada et al.'s claims here, the above discussion makes it fairly clear that they have been unduly pessimistic about the degree of regularity displayed by Dunan verbal morphophonology. Without attempting to analyze the reasons for this, one lesson we can draw from our discussion of Dunan is that assuming from the outset that complexity in an inflectional system indicates the absence of rule-governed behavior is unlikely to prove a productive research strategy. One reason for this is simply that not looking for

something—in this case, regularity—sharply decreases the likelihood of finding it. But there is another, more substantive reason, namely that children do not just passively inherit the inflectional system of the previous generation, typically deformed to some extent by sound change, but are capable of actively reanalyzing and reshaping it. In our synchronic account of Dunan, the stem-boundary hiatus resolution rules (2)–(4), for example, would appear to reflect a generalization that speakers have made about permissible vowel sequences, a generalization that for the most part applies morpheme-internally as well as at verb stem boundary. In closing, I would like to touch on another generalization that speakers of Dunan can be inferred to have made at an earlier stage of the language.

In section 4, we compared suffixal allomorphy for six categories in Tokyo, Hirara, and Dunan, noting that Dunan differs from the other two varieties in showing no allomorphy for those categories in response to whether the stem ends in a vowel or a consonant. The fact that the Tokyo and Hirara C-stem and V-stem suffix allomorphs correspond precisely with each other once relatively superficial changes are factored out strongly suggests that those varieties represent something like the proto-Japonic state of affairs with regard to the suffixal alternations in question. This in turn means that Dunan, in which historical V-stems are represented by *r*-stems, must have eliminated distinctive V-stem inflection during the course of its history. We should note here that historical V-stems and historical *r*-stems are typically taken to constitute distinct inflectional types for Dunan (see e.g. Takahashi et al. 1987b and Takahashi 1997) the two paradigms having been described as differing in the RY, while overlapping otherwise (Hirayama and Nakamoto 1964:19). Specifically, the RY *ugi* of *ugir-* 'arise', when compared with the RY *ba-i* of *bar-* 'break' or the RY *mu-i* of *mur-* 'serve [food]', could be taken as preserving the old V-stem RY suffix alternant *-∅* displayed by Tokyo and Hirara. Given our analysis of *ugi* as /ugi-i/, however, the apparent distinction between the V-stem and *r*-stem paradigms disappears, as we noted in section 4. The reduction of long vowels at stem boundary, that is, means that there is no way historical V-stem inflection could approach *r*-stem inflection in Dunan any more closely than it already does.

Because of the lack of historical records, it would be difficult in the absence of comparative evidence to reconstruct the route by which Dunan came to assimilate vowel-stem verbs to the *r*-stem paradigm. But given relatively detailed accounts of the same development in Japanese and Northern Ryukyuan dialects (de Chene 2016, 2017), it is possible to be fairly confident about the rough sequence of events involved. Starting from a state similar to that represented by the Tokyo and Hirara paradigms of Table 3, speakers will have analyzed the alternation between C-stem and V-stem suffix alternants by identifying underlying forms with the C-stem alternants and taking the pre-existing alternation of *r* with zero in SS (originally RT) *-(r)u,* Conditional (originally *Izenkei*) *-(r)eba,* and Passive *-(r)are-* as representing a regular pattern of insertion of *r* between vowels at verb stem boundary. At that point, any V-stem suffix alternant not consisting of the corresponding C-stem alternant preceded by *r* will have become irregular and subject to replacement by an innovative alternant conforming to that formula. With the accumulation of such *r*-initial suffixes in the V-stem paradigm, finally, the *r* will have been reanalyzed as belonging to the stem. While (apart from the Conditional 2 form k^h*urja* of k^h*u-* 'come') no trace of the rule-governed *r*-zero alternation remains in modern Dunan, the effects of the rule are detectable in the absence of the listed C-stem/V-stem suffix allomorphy that characterizes more conservative varieties like Tokyo and Hirara. Examples of this sort show that if we are interested in what regularities speakers extract from the primary linguistic data, it is important to be sensitive not only to surface patterns but to what can be reconstructed of the regularization processes of the past.

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