On the (Ir)regularity of Dunan Verbal Morphophonology*

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Abstract

Against claims of Yamada, Pellard, and Shimoji (2015) and Pellard and Yamada (2017), I argue that the verbal morphophonology of Dunan (Yonaguni) is in most respects systematic and rule-governed. I first identify the relatively low-level rules that govern the reduction of hiatus at stem boundary and then review stem and suffix alternations, showing that in each case there is only a limited amount of lexically listed allomorphy. After summarizing the proposed analysis and displaying representative derivations, I propose a set of principles on the basis of which the central elements of that analysis could be attained by language learners. Finally, I consider the reasons for the divergence between the conclusions reached here and those of Yamada, Pellard, and Shimoji, suggesting that an even more important factor than the unreceptiveness of those authors to the postulation of phonological rules is their skepticism about the concept of the morpheme.

Keywords: Dunan, Yonaguni, verb, morphophonology

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 recent work, Yamada, Pellard, and Shimoji (2015) (see also Yamada, Pellard, and Shimoji 2013) and Pellard and Yamada (2017) fully embrace this "complexity thesis", proposing (Yamada et al. 2015:458-459) that Dunan "stems and suffixes are arbitrarily co-indexed", that it is necessary to "[posit] a complex system with several dozens of inflectional verb classes and eight stems", that "[s]tem-shape alternation patterns are lexeme-based and follow no general (morpho)phonological rule", and that "[t]here is ... no single form or stem that can serve as a principal part or reference form and predict a verb's paradigm, ..."[1]

In the present paper, I argue that while the morphosyntactic conditioning of certain stem alternations is indeed complex, Dunan verbal morphophonology is in most respects systematic and rule-governed, so that claims of the sort just cited cannot be upheld. In particular, we will find that the vast majority of Dunan stems and suffixes have unique lexical representations that furthermore are maximally concrete in coinciding with occurring phonetic forms. We will also show that the essentials of our account follow from a small number of basic assumptions about how children approach phonological analysis, thus providing motivation for it in terms of principles that appear to have general validity.

The paper is organized as follows: after introducing background assumptions in Section 2 and relevant suffixes and suffix combinations in Section 3, we discuss regular stem-boundary alternations in Section 4. Section 5 deals with the allomorphy of suffixes, and Section 6 with that of stems. Section 7 reviews the derivational processes our analysis postulates, and Section 8 proposes principles on the basis of which children could be led to an analysis of the type in question. Section 9, our conclusion, examines the reasons that the picture of Dunan verbal morphophonology sketched here differs so sharply from that presented by Yamada et al. (2015) and Pellard and Yamada (2017).

2 Background assumptions

2.1 Lexicon and grammar

One of the most basic questions with which linguists have to deal is that of what speakers memorize and what they derive productively—the question, that is, of the boundary between the lexicon and the grammar. This is true in

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[1] Yamada (2016:280-283) presents a somewhat more systematic view and is in particular more receptive to the postulation of phonological rules. A further precedent for a rule-based account of Dunan phonology is provided by the Lexical Phonology analysis of Arimoto (2001a, 2001b, 2002a, 2002b).

particular for the area of inflectional morphology. In approaching this question, we may start from the observation that inflectional material is typically the realization of morphosyntactic features and feature complexes that are manipulated by the syntax; indeed, the criterion of syntactic relevance in this sense is a plausible way to define the domain of inflection within morphology more generally (Anderson 1982). While the range of features and feature complexes syntax deals with is of course not given in advance, we can assume that it includes elements corresponding to negation and to argument-structure-changing operations like passivization and causativization. Under widely adopted assumptions (Chomsky 2000), it also includes verbal inflectional categories such as tense/aspect and mood, as well as structural case marking and agreement. With the exception of case marking and agreement, all these categories are realized internal to the inflected verb in Dunan, as in other Japonic languages.

It goes without saying that speakers do not normally memorize—that is, record in the lexicon—strings of words or morphemes that are productively derived and compositionally interpreted. Thus an English speaker will not memorize a string such as *(He) will not be made to sing*, which involves a lexical verb and morphemes expressing the categories of Causative, Passive, Negative, and Tense. By the same token, a speaker of Tokyo Japanese will not memorize the equivalent expression *utaw-as-are-na-i*, whose morphemes are in one-to-one correspondence (setting aside Infinitive *to*) with those of English, but are all contained within a single inflected word; the same conclusion holds for Japonic languages in general. As this example illustrates, proposals that large numbers of regular inflected forms are lexically listed are inherently suspect for languages in which multiple syntactic categories are realized word-internally, because they amount to the claim that speakers memorize many instances of syntactically generated configurations. This point is relevant in the present context because Pellard and Yamada (2017:46) suggest concerning Dunan that "The most realistic hypothesis is that speakers memorize whole inflected forms (minimally, principal parts) ...."

Another assumption I will make relevant to the boundary between lexicon and grammar is that there is a linguistically significant difference between genuine suppletion, which is characterized by phonologically idiosyncratic relationships, on the one hand, and, on the other, alternations that involve recurrent and systematic phonological correspondences, regardless of how those alternations are conditioned. It is thus a non sequitur to assimilate systematic and recurrent alternations to suppletion because the morphosyntactic environments of the alternants are complex or arbitrary. This conclusion, too, is relevant here because Pellard and Yamada (2017:45) quite explicitly do just that, rejecting "rules or constraints that ... lack any generality because of their lexically or morphologically restricted character" and reasoning that since "[n]o phonological rule can relate 'be' *an* to its negative form *minun*"—that is, since suppletion undeniably exists—descriptive parsimony ("[a] unified treatment") requires treating non-suppletive alternations as well (presumably apart from exceptionless phonotactic generalizations) by means of lexical listing of allomorphs rather than by means of phonological rules.

In fact, it has long been argued that phonology is not in general "natural" (Anderson 1981), and more specifically that the nature of the conditioning of an alternation is irrelevant to whether that alternation is the result of listed allomorphy or a phonological rule (Kiparsky 1996). Further, a recent review of phonological experimentation (Moreton and Pater 2012) suggests that while the relationship between the input and the output of a potential phonological rule is highly relevant to whether speakers will generalize it, the relevance of the relationship between the output and the conditioning environment is far less clear. This point is confirmed, finally, by the existence in various languages of innovative word-level phonological rules that are conditioned by factors such as stem boundary and lexical category (see e.g. the case studies in de Chene 2016). Below, then, we will not take non-phonological conditioning, in particular conditioning by morphological categories or morphosyntactic features, as an obstacle to the postulation of phonological rules.

In spite of the central role of phonological rules in the analysis offered below, there is a yet more fundamental element of that analysis. This is postulation of the morpheme as an sub-constituent of the inflected word, a position already entailed (at least in part) by our observation that multiple syntactic elements are realized word-internally in Dunan, as in other Japonic languages. While it would be possible, that is, to replace most of the phonological rules given below with lists of allomorphs and still preserve the basic contours of the analysis, abandonment of the morpheme, in line with the claim (Pellard and Yamada 2017:33) that "[m]orpheme-based approaches are not well-suited for the analysis of Dunan's verb morphology", would render any analysis of the type proposed here unstatable. We will return to this point in Section 9.

2.2 Dunan phonology: vowel length, aspiration, accent

Concerning the Dunan phonological system, I will assume with Uemura (1997:331), Izuyama (2012:413), and Yamada et al. (2015) that Dunan lacks contrastive vowel length, while noting that this question has been to some degree controversial (Takahashi 1997:413). In representing the contrast between glottalized and aspirated voiceless stops, I will write aspiration with a superscript *h* and use plain voiceless stop symbols for the glottalized series.[2] I will assume that morphological segmentation and the analysis of segmental alternations can proceed independently of an account of accentual alternations, and will leave the latter for future research.[3] Data will be drawn from Hirayama and Nakamoto (1964), Uchima (1980), Hirayama (1988), Takahashi (1987a, 1987b), Takahashi (1997), Izuyama (2012), Yamada et al. (2015), Yamada (2016), and Pellard and Yamada (2017).

3 Dunan verb morphology: Suffixes and suffix combinations

In this section, we will survey the inflectional suffixes and suffix combinations that will be discussed in Sections 4 through 6. Table 1 below illustrates twelve such suffixes with the stem *dum-* 'read' (J(apanese) *yom-*). As labels for the categories *syuusikei, rentaikei, ren'yookei* ("Conclusive", "Adnominal", "Adverbial"), I use the abbreviations SS, RT, RY (cf. Unger 1977 [1975]); I assume further that, in their central uses, these three categories reflect the position of the verb in syntactic structure rather than expressing any modal or aspectual content and are in that respect roughly parallel to the structural cases Nominative, Accusative, and Genitive. While I take the stem-forming suffixes Passive/Potential *-arir-* and Causative *-(a)mir-*, reflecting their presumed syntactic status, to be inflectional (as are their Japanese equivalents), I omit them from the table.

Table 1 Dunan Inflectional Suffixes

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

Note that the last three suffixes are added to the RY rather than to the stem. 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 4.

Of the suffixes of Table 1, one, Hortative *-u* (phonetically, accented [o:]), is obsolete for some speakers, with other constructions filling the gap (Izuyama 2012:422, Yamada 2016:276 (footnote 18)). Further, the final *n* of the Negative, SS, Past, and Perfect suffixes of that table is in fact an SS morpheme, as shown by the forms of Table 2 below, which display the contrast between SS and RT forms; in each of the subtables, the shared content is indicated in the upper left cell using features [Neg(ative)] and [Perf(ect)].[4]

[2] The distribution of aspiration is restricted both syntagmatically (it occurs only word-initially) and paradigmatically (/k^h t^h/ occur, but */p^h c^h/ do not), so that aspirated stops are clearly the marked members of the opposition. It is nevertheless typical to mark glottalization rather than aspiration either everywhere (Hirayama and Nakamoto 1964, who use italicization for this purpose) or in environments of contrast only (Izuyama 2012, who uses the apostrophe); the latter practice has the consequence that glottalization is marked on word-initial /k t/, but not on medial /k t/ or on /p c/ anywhere. Takahashi (1997) and Yamada et al. (2015) mark both aspiration and glottalization, but only word-initially.

[3] A reviewer claims that the present account is called into question by its failure to consider accentual alternations. This is hardly the case, however. The separate treatment of segmental and accentual phonology is standard practice; no account of Japanese segmental phonology, for example, would be faulted for its failure to treat accent simultaneously. In fact, insofar as accentual alternations may be the consequence of segmental changes, as when contour tones result from vowel coalescence, it is advisable to have a firm grasp of segmental phonology before beginning work on accent. A treatment of Dunan inflectional accentology would require a separate paper.

[4] For the most part, the segmentations of Table 2 follow Yamada et al. (2015:461-462), for whom, however, what we have called SS *-n* is an Indicative suffix, and RT *-∅* and *-ru* are Participial.

Table 2 Dunan SS and RT Forms

[–Neg –Perf]	[–Past]	[+Past]
SS	dum-u-n	dum-i-ta-n
RT	dum-u-∅	dum-i-ta-ru

[+Neg]	[–Past]	[+Past]
SS	dum-anu-n	dum-anu-ta-n
RT	dum-anu-∅	dum-anu-ta-ru

[+Perf]	[–Past]	[+Past]
SS	dum-i-a-n	dum-i-a-ta-n
RT	dum-i-a-ru	dum-i-a-ta-ru

Table 2 thus shows that the Negative suffix is *-anu-*, the Past suffix is *-ta-*, and the Perfect suffix is *-a-*. It also shows that the SS form *dumun* of Table 1 contains a suffix *-u-*, which I will identify with the *-u* of RT *dumu* and take to be a realization of the feature complex [–Past –Perf –Neg]. Finally, I postulate a [–Past –Perf] RT suffix *-∅* corresponding to the RT suffix *-ru* that appears elsewhere—that is, in [+Past] and in [+Perf] forms. Below, I will in principle assume the segmentations of Table 2, but in citing examples, will typically suppress the morpheme boundary before SS *-n*. Negative *-anu-* and Perfect *-a-*, as well as those suffixes in combination with Past *-ta-*, may also be followed by either of the Conditional suffixes (Yamada et al. 2015:461), but I will omit those forms here.

4 Vowel sequences at stem boundary

In this section, we will examine what occurs when two vowels come together at verb stem boundary in Dunan. 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 (letting Japanese historical *kana* spellings stand in for ancestral forms) a pair like *i* 'cooked rice' < *ipi* (J *ii*) and *i* 'picture' < *we* (J *e*) are homophones (see the word list of Takahashi 1987a). Inherited and derived V*u* sequences have been eliminated by assimilation of V to *u* and shortening: *su* 'tides, current' (< **siu*) < *sipo* (J *sio*), *su* 'pole' (< **sau*) < *sawo* (J *sao*), although unassimilated *au-* 'blue' < *awo-* (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 *k*^{h}*wa-* '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 functioning to resolve 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-*), which will be discussed in Section 6. Note that Perfect *-an* appears to be added directly to this vowel-final allomorph, without the intervention of the RY suffix.

Table 3 Hiatus at Verb Stem Boundary in Dunan

	-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]

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 (1) through (3) below ("+" = morpheme boundary).[5]

(1) Shortening $V_i \rightarrow \varnothing \; / \; V_i + \_\_$

[5] Apart from not appealing to morpheme boundary, Yamada's (2016:280) (27) 3. coincides with rule (1); his (27) 2. represents half of rule (3), that portion applying to *u*.

(2) *u*-Deletion u → ∅ / V + __

(3) Desyllabification V → [– syllabic] /__ + a
[+high]

While rules (1)–(3) would be justified on the basis of the input-output relations of Table 3 alone, they gain further plausibility, as we have already noted, from the fact that their results mirror the situation observed morpheme-internally, where *ai* and *ui* are the only VV combinations that occur freely.

Before leaving the topic of stem-boundary hiatus, there is one more rule that needs to be postulated. As initial motivation, consider the two Perfect forms reported by Izuyama (2012:423) for the verb *mui(r)-* 'burn (intr.)', *mwan* and *mun*, the second involving a Perfect suffix allomorph *-u-n* that will be discussed in Section 5.3. As with the verbs of Table 3, it is the vowel-final allomorph of *mui(r)-* that appears in the Perfect, so that phonologically, the two forms cited appear to be /mui-an/ and /mui-un/, respectively. As is immediately clear, however, the medial *i* of those representations is not reflected in the attested forms, which follow from inferred intermediate representations /mu-an/ and /mu-un/ by rules (3) and (1) (or (2)), respectively. I will therefore assume a rule deleting intervocalic *i*, ordered before rules (1)-(3):

(4) Intervocalic *i*-Deletion i → ∅ / V __ V

The apparent failure of the RY suffix to appear in the Perfect forms of Table 3 can be attributed to rule (4), since, assuming the presence of that suffix, those forms will have the phonological representations /ba-i-an/, /mu-i-an/, and /ugi-i-an/, respectively. Since by the same token, the two Perfects of *mui(r)-* 'burn' noted above will have the phonological representations /mui-i-an/ and /mui-i-un/, it is clear that rule (4) must either be written so as to delete a sequence of one or more occurrences of *i* or be allowed to apply iteratively; I will leave both possibilities open.

5 Suffixal allomorphy

Variation in the shape of stems and suffixes that is due to rules (1) through (4) will of course not have to be recorded in lexical entries. Cases in which multiple allomorphs of a single stem or suffix do have to be lexically listed exist as well, however, and the next two sections will be devoted to the question of how much listed allomorphy Dunan displays. Section 5 deals with suffix allomorphy, and we will begin with the topic of suffixes that alternate depending on the consonant-vowel polarity of the stem-final segment.

5.1 The residue of the distinction between consonant-stem and vowel-stem inflection

Table 4 below displays consonant-stem (C-stem) and historical vowel-stem (V-stem) inflection in Tokyo Japanese, Hirara Miyako (Karimata 1997), and Dunan for five inflectional categories.

Table 4 C-stem and Historical V-stem Inflection in Tokyo, Hirara, and Dunan

	C-stem inflection ('write')				*V-stem inflection ('arise')			
Category	Suffix	Tokyo	Hirara	Dunan	Suffix	Tokyo	Hirara	Dunan
Imperative	-e	kak-e	kak-i	k^{h}ag-i	-ro	oki-ro	uki-ru	ugir-i
Hortative	-au < -amu	kak-oo	kak-a	k^{h}ag-u	-u < -mu	oki-yoo	uki-Ø	ugir-u
RY	-i	kak-i	kak-ï	k^{h}at-i	-Ø	oki-Ø	uki-Ø	ugi < ugi-i
Negative	-anu	kak-ana-	kak-an	k^{h}ag-anu-	-nu	oki-na-	uki-n	ugir-anu-
Causative[6]	-asime-	kak-asime-	kak-asïmi-	k^{h}ag-amir-	-sime-	oki-sime-	uki-sïmi-	ugi-mir-

The forms of that table show that (a) all three dialects display reflexes of the same C-stem suffixes, with the reinterpretation of the Negative suffix as an adjective-stem formant shown by the Tokyo form representing the only

[6] A second Causative suffix, *-as-* (Japanese C-stem *-as(e)-* ～ V-stem *-sas(e)-*), is said by Hirayama and Nakamoto (1964:123) to be frequent in the RY form in Dunan, but their only example involves a C-stem verb, and I am not aware of any evidence for the shape of the suffix in Dunan after historical V-stems.

nonphonological development (the alternation of stem-final *g* with *t* seen in the Dunan RY *k^{h}ati* is due to a rule that will be discussed in Section 6.1); (b) Tokyo and Hirara show reflexes of the same V-stem suffixes, 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 for the first four categories, inflecting the representative example 'arise' by adding C-stem suffixes to an *r*-final stem (with loss of *r* before RY *-i*, as illustrated in Table 3). There is a single exception to this statement for the Negative suffix, namely the Negative of *k^{h}u-* 'come', which is *k^{h}u-nu-*, preserving the old C-initial allomorph of the suffix that is seen in Tokyo *oki-na-* and Hirara *uki-n*.

A more systematic exception to the generalization that Dunan has eliminated the distinction between C-stem and V-stem inflection, however, is seen in the Causative, where historical V-stems like *ugi-* < *oki-* 'arise', rather than adding the C-stem suffix *-amir-* to a stem that has been augmented by *r*, retain a V-stem suffix that, like those of Tokyo and Hirara, differs from its C-stem counterpart in lacking initial *a* (the syllable *si* has been lost to phonological change).[7] Since the a ～ Ø alternation is (apart from the *-nu-* of *k^{h}u-nu-*) specific to the Causative suffix, the allomorph *-mir-* will need to be lexically listed alongside *-amir*. Two further wrinkles in the morphology of the Causative as reported by Yamada (2016) are that (a) the Causative of 'come', *k^{h}ur-amir-*, does involve *-amir-* added to an *r*-final stem allomorph and (b) the small number of stems in *ui(r)-* (notably *ubui(r)-* 'remember', *mui(r)-* 'burn (intr.)', *mui(r)-* 'sprout, bud') take *-amir-*, but add that suffix to their V-final allomorph. This results in phonological forms like /ubui-amir-/; the latter undergoes rules (4) and (3) above to surface as [ubwamir-]. The tendency for *-amir-* to be generalized beyond its original post-consonantal environment illustrated by the *ui(r)*-stem forms suggests that it is the unmarked or default form of the suffix; if so, the environment of *-mir-* will be "after *i*, except when that is preceded by *u*".

The Dunan Causative suffix, then, involves a clear case of listed allomorphy. As Table 4 shows, however, Dunan shows less listed allomorphy in response to the consonant-vowel polarity of the stem-final segment than do more conservative dialects like Tokyo and Hirara. Thus, while Yamada et al. (2015:458) characterize the Dunan system of verbal morphology as "without doubt the most complex one within the whole Japonic family", it is clear that there is at least one aspect of that system with regard to which Dunan is in fact simpler and less irregular than many other dialects.

5.2 The Conditional suffixes

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, following a verb stem, only after consonants.[8] *-iba* is considered an allomorph of *-uba* by Hirayama and Nakamoto (1964), Takahashi (1987b), Takahashi (1997) (for all of whom *-uba* and *-iba* are alternate forms of the "Zyooken A" suffix), Yamada et al. (2015), and Yamada (2016). There is reason to believe, however, that this is an oversimplification, and that *-iba* shares semantic properties with *-ja*. Notably, forms suffixed with *-iba* and *-ja*, but not those suffixed with *-uba*, can be used as weak imperatives (the "Meirei A" and "Meirei B", respectively, of Hirayama and Nakamoto 1964 and Takahashi 1987b).[9,10]

I will therefore assume that to a first approximation the semantic range of *-iba* covers both that of *-uba* and that of *-ja*, so that *-iba* is not an allomorph of either *-uba* or *-ja* to the exclusion of the other. This judgment can be captured formally in a framework where suffixes start out as morphosyntactic feature complexes and are phonologically realized by rules that associate phonological forms with those complexes (see, for example, Halle and Marantz 1993 and Halle 1997). In the present case, we will need both a feature that represents what *-uba* and *-ja* have in common and a feature

[7] The most detailed source of information on Dunan Causatives that I am aware of is Yamada (2016); earlier sources (e.g. Hirayama and Nakamoto 1964, Takahashi 1987b) tend to characterize the Causative suffix, like those of the Negative and the Passive, as added to the *Mizenkei*, or 'Irrealis' form, and to characterize the *Mizenkei* of historical vowel stems as ending in *ra*, thus predicting (in our segmentation) **ugir-amir-* for the Causative of 'arise', parallel to Negative *ugir-anu-* and Passive *ugir-arir-*. In addition to the data of Yamada (2016), citations of Causatives formed with the short suffix alternant *-mir-* on the original vowel-final stem can be found in Hirayama (1988:375) and in Kokuritsu Kokugo Kenkyūjo (1989-2006), maps 118 and 121.

[8] Additionally, according to the data of Yamada et al. (2015:461), the Conditional 2 suffix is *-ja* after Past *-ta-* and Perfect *-(j)a-*, but *-rja* (my segmentation) after Negative *-anu-* and Perfect *-(j)u-*; the Conditional 1 suffix is *-ba* in all four cases.

[9] This Imperative use of Conditional forms is also observed throughout the Yaeyama dialect area as well as in Okinawan (Hirayama and Nakamoto 1964:139-140), and has a parallel in Tokyo Japanese V-*(r)eba* (with final rise) "why don't you V?"

[10] A reviewer cites Takahashi's (1997:416) mention of "*iba* or *uba*" as expressing a weak imperative as calling this generalization into question. Takahashi immediately adds, however, that his statement holds only for (verb classes corresponding to) *s*-stems and vowel-stems (see Section 6) plus the irregular verb 'come'. *s*-stems and vowel-stems show a vowel-final allomorph in the relevant categories and thus take *-iba*. And if the stem of 'come' is *k^{h}u-*, as assumed above, the relevant form *k^{h}uba* is plausibly analyzed without invoking *-uba* as well (on this form, see also Section 6.4). The reference in question thus provides no support for the idea that *-uba* can express an imperative meaning.

that represents how they differ. Call these two features "[Conditional]" and, in rough accord with examples cited by Izuyama (2012:447-448), "[Realis]". The rules realizing the three Conditional suffix allomorphs may then be written as in (5).

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

In interpreting realization rules of the form (5), we assume with Halle (1997:428) that (a) in order for a realization rule to apply to a phonologically unrealized suffix, the features of the rule must constitute a subset (proper or improper) of the morphosyntactic features of that suffix; and (b) realization rules with more specific feature specifications take precedence over those with less specific specifications. In accordance with (b), rules (5a) and (5b) will apply before rule (5c), and *-iba* will be, formally speaking, the default realization of the specification [+Cond].

5.3 The Perfect suffixes

In the case of the Conditional suffixes, the conditioning of the extra allomorph *-iba* is phonological, and no complication of the lexical entries of stems is required. In the case of Perfect *-a-* and *-u-* (below, *-an* and *-un*), in contrast, there is clearly a degree of lexical conditioning, although the distinction between the two suffixes appears for the most part to be conditioned semantically.

As Yamada et al. (2015:460 (footnote 4)) and Yamada (2016:284-287) observe, the distribution of *-an* and *-un* correlates at least in part with the agentivity of the verb. In one direction, this correlation is in fact highly reliable: of the 80 or so verbs recorded in the word list of Takahashi (1987a) as having Perfects in *-un*, virtually all are clear unaccusatives, verbs taking a non-agentive subject. The correlation with unaccusativity raises the possibility that the two Perfect suffixes are semantically distinct, perhaps along the lines of the "have" Perfect auxiliaries (German *haben*, French *avoir*, etc.) and the "be" Perfect auxiliaries (German *sein*, French *être*, etc.) of European languages, with the semantics of the latter but not the former involving a state resulting from the action of the verb. The proposal that the two suffixes are semantically distinct is also consistent with Izuyama's (2012:423-424) observation that for a subset of verbs, the two forms coexist and contrast in meaning, a phenomenon that can be seen as parallel to the variable unaccusativity that is documented in European languages for certain types of verbs (Sorace 2000). If this proposal is on the right track, Perfect *-an* and *-un*, rather than constituting a case of allomorphy, will represent two distinct morphemes.

We have suggested that verbs forming Perfects in *-un* are reliably unaccusative. The converse implication, that unaccusatives form Perfects in *-un*, appears to be subject to two types of counterexample. To begin with, there are isolated lexical exceptions; thus *nk-* 'become full' has the Perfect *ntjan* (Hirayama and Nakamoto 1964:112, Takahashi 1987a:18). A far more systematic class of apparent counterexamples is constituted by unaccusative *ar*-stems such as *nar-* 'become', *atar-* 'strike (intr.)' and *agar-* 'become light', which appear to invariably have Perfects in *-an*. The lack of *ar*-stem *un*-Perfects, however, can be attributed to phonological rules that we have already seen. Specifically, a Perfect form of the shape /Xa-i-un/ will reduce to [Xan] as a result of the application of Intervocalic *i*-Deletion and *u*-Deletion (rules (4) and (2) above). The Perfects of unaccusative *ar*-stems, then, appear in the end to be consistent with the idea that the choice of Perfect suffix depends in principle on the unaccusativity of the verb.

5.4 The Hortative suffix

Uchima (1980:465) reports that Dunan verb stems ending in *as* form their Hortatives in *-a* rather than in *-u;* of the twelve *as*-stems whose paradigms are given in Takahashi 1987b, six are recorded with *a*-Hortatives, and six with *u*-Hortatives. I will assume that, as this account suggests, the allomorphy of the Hortative suffix is (or was) conditioned both by stem-type and by individual lexical item.

6 Stem allomorphy: forms and contexts

We have seen that lexically listed suffix allomorphy in Dunan is quite limited, and that with regard to the historical distinction between C-stem and V-stem inflection in particular, it is less extensive than in representative Japonic dialects

such as 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 quite simple. This will mean that, just as in the case of suffixes, lexically listed stem allomorphy is relatively limited.

6.1 Nonalternating and velar-final stems

With one exception that we will examine below, Dunan stem alternations affect only stem-final segments, of which there are thirteen, eleven consonants and two vowels. 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 t d c m n,* first of all, are nonalternating in all environments (see e.g. Hirayama and Nakamoto 1964:111). By comparison with Tokyo Japanese, where six of nine stem-final consonants alternate before *t*-initial suffixes (*m* and *b* with *n*, *w* and *r* with *t*, *k* and *g* with *i*), or Shuri Okinawan, where all stem-finals except *t* and some occurrences of *r* alternate with zero in the same environment, the nonalternating status of the majority of Dunan consonantal stem-final consonants is striking.[11]

The second group of stem-final consonants with regard to alternation pattern 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 4. Assuming features [dorsal] and [coronal], the rule for the alternation of stem-final velars can be written as in (6), where the notation "i [+RY]" represents a element that includes both the phonological matrix corresponding to /i/ and the feature [+RY].

(6) Velar Dentalization

$$\begin{bmatrix} +\text{dor} \\ \langle -\text{nas} \rangle \end{bmatrix} \rightarrow \begin{bmatrix} +\text{cor} \\ -\text{nas} \\ \langle -\text{voi} \rangle \end{bmatrix} \; / \; \_\_ \; \text{i [+RY]}$$

The paradigm of velar-final stems is illustrated with *k*^{h}*ag-* 'write' in Table 5, using abbreviations of the category names introduced above.

Table 5 The inflection of velar-final stems

Hort	-u	k^{h}ag-u
Neg	-anun	k^{h}ag-anun
SS	-un	k^{h}ag-un
RT	-u	k^{h}ag-u

Proh	-unna	k^{h}ag-unna
Cond 1	-uba	k^{h}ag-uba
Cond 2	-ja	k^{h}ag-ja
Imp	-i	k^{h}ag-i

RY	-i	k^{h}at-i
Conj	-ti	k^{h}at-i-ti
Past	-tan	k^{h}at-i-tan
Perf	-an	k^{h}at-i-an

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. There is one fact about the inflection of velar stems that is not reflected in Table 5, however. This concerns how they combine with the Perfect suffix allomorph *-un.*

The stems *sag-* 'bloom' (J *sak-*) and *k*^{h}*arag-* 'dry (intr.)' (J *kawak-*), in keeping with their status as unaccusatives, form their Perfects with *-un* rather than with the Perfect allomorph *-an* that is illustrated in Table 5; the stem *t*^{h}*udug-* 'reach, arrive' (J *todok-*), similarly, allows *-un* in addition to *-an*. The Perfect forms for those stems are, respectively, *sat-un* (Yamada et al. 2015:458), *k*^{h}*arat-un*, and, in addition to *t*^{h}*udut-j-an*, *t*^{h}*udut-un* (Takahashi 1987a). Since the stems of the *un*-Perfects have undergone Velar Dentalization, it is immediately clear that those forms, like velar-stem *an*-Perfects, must involve the RY suffix, even though no reflex of that suffix appears on the surface. The question of how the RY suffix comes to be absent from forms like *satun* and *k*^{h}*aratun* will be taken up immediately below, in our discussion of *r*-stems.

Above, we have seen that stems ending in six of Dunan's eleven stem-final consonants are entirely non-alternating,

[11] This lack of *onbin* alternations is characteristic of the Sakishima languages generally (Karimata 2015:133).

and that stems ending in three more consonants undergo only Velar Dentalization. We may note further that after these nine stem-final consonants, suffixes, apart from the exceptions treated in Section 5, have a constant shape as well. With respect to morphological structure, Pellard and Yamada (2017:32) contrast Japanese, which they characterize as almost canonically agglutinative, with Dunan, which they claim "cannot easily be treated in the same way". In fact, the Dunan paradigms of stems ending in non-alternating or velar consonants are, apart from the Perfect, impeccably agglutinative; it is only the paradigms of *r*-stems, *s*-stems, and stems ending in the vowels *a* and *u* that are exceptional in this regard. Stems ending in those four segments may be characterized as displaying "compressed" rather than agglutinative paradigms, in the sense that many of their forms undergo deletion of the stem-final segment and reduction of the vowel sequences that arise from the juxtaposition of vowel-final stem allomorphs and vowel-initial suffixes. It is to stems showing such "compressed" paradigms that we now turn.

6.2 Truncating stems I: *r*-stems

The morphological environment of Velar Dentalization is straightforward, involving only a single suffix or inflectional category. The 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 complex, consisting of apparently arbitrary disjunctions of inflectional categories—and, by inference, of the morphosyntactic features that underlie those categories. We have already argued, in Section 2.1, that morphosyntactic conditioning does not prejudice the phonological status of an alternation. There is a further point to be made in this connection, however, namely that just such arbitrary disjunctions of morphosyntactic features, sometimes identified as "morphomes" (Aronoff 1994:25), have been argued in recent literature to represent in some cases significant generalizations that may be active in morphophonological change.

A well-documented example of this phenomenon, discussed in detail by Maiden (2011:223-241), is the disjunction of [+Subjunctive –Past] and [+Indicative –Past 1Person –Plural] in the Romance languages. For phonological reasons, the members of the corresponding set of inflected forms (all six forms of the present subjunctive plus the first person singular of the present indicative) display a distinctive stem alternant for many verbs. The resulting pattern of allomorphy, typically involving a stem-final *g* that appears precisely in those seven forms, has been extended in several languages to a number of verbs that did not originally show it, arguing for the psychological reality of the alternation and thus for its rule-governed status. There is thus positive evidence that phonological rules can be conditioned by disjunctive morphosyntactic environments.

For the alternations that affect stem-final *r, s, a,* and *u* in Dunan, both considerations of generality and considerations of simplicity and naturalness support the hypothesis that they are rule-governed: in addition to showing virtually no lexical conditioning, the phonological change involved is limited to truncation of the stem-final segment. There is one complication, namely that polysyllabic *s*-stems have not only an alternant that results from truncation of stem-final *s*, but an further alternant that results from truncation of the vowel that becomes stem-final as a result. The rules that affect *r*-stems, *s*-stems, and *a/u*-stems, however, are all special cases of the schema (7), where "x" represents a segment, either a vowel or a consonant, and E represents a (morphologically defined) environment.

(7) Generalized Truncation

$$x \rightarrow \varnothing \; / \_\_ \; V] \; / \; E$$

We will take the truncation rules that operate in the paradigms of *r*-stems, *s*-stems, and *a/u*-stems to be obtained by specifying values for x and E in (7). In specifying values for E, we will for convenience employ two ad hoc features representing disjunctions of inflectional categories. The feature [RY*] will be defined as having positive values for all and only the last four categories of Tables 1 and 5 above, namely RY, Conjunctive, Past, and Perfect. The feature [SS*] will be defined as having positive values for all and only the first four categories of the same tables, namely Hortative, Negative, SS, and RT.

The truncation of stem-final *r* has already been exemplified in Table 3. The distribution of the truncated alternant (underlined) is clear from Table 6, which shows the paradigm of *bar-* 'break (tr.)'.

Table 6 The inflection of *r*-stems

Hort	-u	bar-u
Neg	-anun	bar-anun
SS	-un	bar-un
RT	-u	bar-u

Proh	-unna	ba-nna
Cond 1	-uba	bar-uba
Cond 2	-ja	bar-ja
Imp	-i	bar-i

RY	-i	ba-i
Conj	-ti	ba-i-ti
Past	-tan	ba-tan
Perf	-an	ba-n

The rule truncating *r* ("*r*-Truncation"), accordingly, will take the form of (7) above with x = *r* and E = [+Proh] ∨ [+RY*]. The disjunctive nature of the environment underlines the fact that it has no natural basis, but, as already noted, the structural change itself is both simple and natural.

Ideally, it would be possible to say that Truncation applies in the same forms of all *r*-stems, but there are two sets of exceptions to this statement. The simpler of the two is that in the paradigms of *bur*- (animate existential (J *or*- < *wor*-)) and *ar*- (inanimate existential (J *ar*-)), Truncation applies in the SS as well as in the forms indicated in Table 6, so that the those two verbs have the SS forms *bun* (/bu-un/) and *an* (/a-un/), respectively. The more complex exception to the principle that the environments of Truncation are uniform across all *r*-stems involves the Causative forms that we reviewed above in Section 5.1. There we saw that *ir*-stems, but not *ar*- or *ur*-stems, occur in a vowel-final shape before the Causative suffix, reflecting their status as historical vowel-stems. Correspondingly, in addition to the environments indicated in Table 6, *r*-Truncation will need to apply to a stem-final *r* situated between *i* and the Causative suffix (although the rare *ir*-stem that is historically a *r*-stem, such as *t*^{h}*ir*- 'shine' (J *ter*-), may be exceptional in this regard).[12]

In Section 4, we saw that the apparent failure of the RY suffix to appear in *r*-stem Perfects like /ba-i-an/ *ban* was the result of rule (4), which deletes intervocalic *i*. The failure of the RY suffix to appear in Past /ba-i-tan/ *batan* (contrast Conjunctive /ba-i-ti/ *baiti*), however, cannot be attributed to rule (4), because the required intervocalic environment is lacking. When we note that the RY suffix appears before Conjunctive *-ti* in all verbs, and before Past *-ta*- in all verbs except those whose relevant stem allomorph ends in a vowel, it becomes clear that we need the morpheme-specific deletion rule (8).

(8) RY suffix deletion

$$i\,[+RY] \rightarrow \varnothing \,/\, V\_\_\; ta\,[+Past]$$

As we will see in Section 6.3, RY suffix deletion applies in the paradigm of *a/u*-stems and the paradigm of *s*-stems in addition to that of *r*-stems.

For the Perfect, Table 6 illustrates only the suffix *-an.* As we noted in Section 5, however, many *r*-stems form their Perfects in *-un.* These *r*-stem *un*-Perfects, particularly those based on *ir*-stems (the vast majority) provide important evidence about the morphophonology of Perfect forms. Remember first that we took the application of Velar Dentalization in forms like *satun* (*sag*- 'bloom') as evidence that the RY suffix must be present abstractly in that form. *satun,* that is, derives from /sag-i-un/, just as *k*^{h}*atjan,* the Perfect of 'write', derives from /k^{h}ag-i-an/. The difference between the two cases is that whereas the vowel sequence of /k^{h}ag-i-an/ will correctly reduce to *ja* by Desyllabification (rule (3)), the vowel sequence of /sag-i-un/ must not undergo *u*-Deletion (rule (2)), which would, after the application of Velar Dentalization, predict **satin.* The same difference between *an*-Perfects and *un*-Perfects can be illustrated with *r*-stems. As we saw in Table 3, the Perfect /ugi-i-an/ of *ugir*- 'receive' surfaces as *ugjan.* /ugi-i-un/, the Perfect of *ugir*- 'arise', however, surfaces as *ugun.*

It might appear, then, that we need a rule deleting *i*, whether that vowel is the RY suffix or part of the stem, before Perfect *-un.* A handful of monosyllabic *ir*-stem *un*-Perfects, however, suggest a slightly different analysis. Specifically, consider the Perfects /hi-i-un/ and /ni-i-un/ of *hir*- 'go' (and its segmental homophone *hir*- 'become cold' (J *hie*-)) and *nir*- 'cook (intr.)' (J *nie*-). After the application of Intervocalic *i*-Deletion, these surface as *hjun* and *njun,* forms that apparently derive from a process that desyllabifies, rather than deletes, *i* before *-un,* although the resulting semivowel will have to be deleted in the vast majority of cases. These processes of desyllabification and semivowel deletion

[12] The Causative of *t*^{h}*ir*- remains to be verified (Masahiro Yamada, personal communication).

appear to be conditioned by a single suffix, Perfect *-un*, and so manifestly lack generality. They interact, however, with processes that do display generality, namely Velar Dentalization and *r*-Truncation, and failure to postulate them would force complication of both those rules and the principles determining the morphological composition of inflected forms. If *satun*, for example, were to be derived from /sag-un/ rather than from /sag-i-un/, Velar Dentalization would have to apply before Perfect *-un* as well as before the RY suffix, and the principle that Perfect forms contain the RY suffix would have to be made sensitive to the identity of the Perfect suffix allomorph. Similarly, if we wished to derive *ugun* from /ug-un/ rather than from /ugi-un/ < /ugi-i-un/, we would need to say that before Perfect *-un*, but in no other environment, *r*-stems undergo truncation not only of their stem-final consonant, but of the preceding vowel as well. I will therefore adopt the two rules in (9), ordered after Intervocalic *i*-Deletion, as a treatment of the vowel sequence /iu/ resulting from suffixation of Perfect *-un*.

(9) Hiatus resolution before Perfect *-un*
  a. i → j / __ un [+Perf]
  b. j → ∅ / [$\sigma_1 C_1$ __ un [+Perf] $_V$]

(9b) is written so as to delete *j* before *-un* after a consonant in Perfect forms with polysyllabic stems; preconsonantal *n* in stems like *nkir-* 'sink (intr.)' , Perfect *nkun* (Takahashi 1987a) counts as syllabic for the purposes of that rule. Because Perfects of compounds with second member *hir-* 'go' fail to undergo (9b) (*hansi-hir-* 'remove, unfasten', Perfect *hansi-hjun; sui-hir-* 'take (s.o.) along with', Perfect *sui-hjun* (Takahashi 1987a)), we must assume that the verb form [$_V$] that constitutes the rule's environment is minimal—that is, that the sequence $\sigma_1 C_1$ contains no V-boundary. Correspondingly, the Perfect *t^{h}intjun* (Takahashi 1987b:212) for the stem *t^{h}intir-* 'shorten, shrink' (cited as transitive) suggests that that stem is, at least historically, reduplicated.

6.3 Truncating stems II: V-stems and *s*-stems

As we have noted, Dunan *a-* and *u*-stems correspond to Japanese *w*-stems, specifically to *aw*-stems and to *ow-* and *uw*-stems, respectively. Because of the conversion of historical *i*-stems and *e*-stems to *r*-stems that we observed in Section 5.1 and the fact that the two verbs in which stem-final *w* was originally preceded by a front vowel have become consonant- stems in Dunan (*nd-* < *iw-* 'say', *bir-* < *wew-* 'become intoxicated'), *a*-stems and *u*-stems exhaust the set of Dunan vowel-final stems, and may be referred to simply as V-stems. The distribution of the basic (vowel-final) and truncated alternants for the sample stem *sima-* 'put away, finish (doing)' (J *simaw-*) are shown in Table 7, with instances of the truncated alternant underlined; truncation applies in the same forms of all V-stems. While Negative *simanun* could be analyzed as /sima-anun/, with hiatus reduction due to rule (1) above, the corresponding form of *madu-* 'get lost', *madanun*, must be /mad-anun/, since /madu-anun/ would give **madwanun* by rule (3). A uniform treatment of vowel-stems thus requires /sim-anun/ as well.

Table 7 The inflection of V-stems

Hort	-u	sim-u	Proh	-unna	sim-unna	RY	-i	sima-i
Neg	-anun	sim-anun	Cond 1	-uba	sima-iba	Conj	-ti	sima-i-ti
SS	-un	sim-un	Cond 2	-ja		Past	-tan	sima-tan
RT	-u	sim-u	Imp	-i	sima-i	Perf	-an	sima-n

Given the distribution of the truncated alternant, the rule truncating stem-final *a* and *u* will take the form of (7) above with x = V and E = [+Proh] ∨ [+SS*]. Just as was the case with *r*-stems, the failure of the RY suffix to occur in the Past of V-stems is the result of the morpheme-specific rule (8), while the failure of the RY suffix to occur in the Perfect can be attributed to phonological processes: /sima-i-an/ reduces to [siman] by Intervocalic *i*-Deletion and Shortening (rules (4) and (1)).

As noted above, polysyllabic stems ending in *s*, our last stem-final segment, have three alternants, with the first derived alternant being obtained by truncation of *s* and the second by further truncation of the preceding vowel. The alternants for the stem *nubas-* 'stretch (tr.)' (J *nobas-*) are thus *nubas-*, *nuba-*, and *nub-*, and the alternants for *utus-* 'drop

(tr.)' (J *otos-*) are *utus-*, *utu-*, and *ut-*. Table 8 shows the inflection of the sample stem *bagas-* 'boil (tr.)' (J *wakas-*), with the first derived alternant indicated by a single underline and the second by a double underline.

Table 8 The inflection of *s*-stems

Hort	-u	bag-u
Neg	-anun	bag-anun
SS	-un	baga-n
RT	-u	baga

Proh	-unna	baga-nna
Cond 1	-uba	baga-iba
Cond 2	-ja	
Imp	-i	baga-i

RY	-i	bagas-i
Conj	-ti	bagas-i-ti
Past	-tan	baga-tan
Perf	-an	bagas-i-an

The first rule truncating *s* will take the form of (7) above with x = *s* and E the disjunction of the categories showing the alternant *baga-* in Table 8; the second will take the form of (7) with x = Vs and E the disjunction of the set of categories whose suffixes, in the traditional analysis of Japanese verb inflection, are attached to the *Mizenkei*.

On the interpretation of (7) that we have assumed to this point, that schema is only an abbreviation, and the actual truncation rules are those that result from specifying values for x and E. On an alternative interpretation, (7) is the actual truncation rule in all cases, and that rule is associated with statements of the form "For stems ending in segment S, (7) applies in environment E"—for example, "For *r*-stems, (7) applies in the environment [+Proh] ∨ [+RY*]." On the latter interpretation, the double truncation seen in the Hortative and Negative of Table 8 can be obtained by saying that for polysyllabic *s*-stems, two iterations of (7) apply in *Mizenkei* categories. In either case, however, what is important about the various instantiations of truncation is that there is no need for lexical listing of truncated alternants and, with the exception of the fact that the existentials *ar-* and *bur-* take truncated alternants in the SS, the operation is not sensitive to the identity of individual stems and will thus not need to be referred to in verbal lexical entries.

6.4 Conclusion: Irregular verbs, lexical statistics, comparison with Yaeyama dialects

In Section 6, we have seen that, in terms of the alternations that they undergo, Dunan verb stems can be divided into three groups, nonalternating stems (stem finals *b t d c m n*), velar stems (stem finals *k g ŋ*), which undergo the Velar Dentalization rule (6), and truncating stems (stem finals *r a u s*), which undergo some instantiation of the truncation schema (7). Truncating stems are further divisible into *r*-stems, V-stems, and *s*-stems depending on the morphological environments in which truncation operates. We have also seen that the RY suffix is deleted post-vocalically in Past forms (rule (8)) and that the Perfect suffix allomorph *-un* triggers a pair of idiosyncratic processes that we formulated in (9). In closing the section, let us say a word about irregular verbs, examine the relative frequency in the lexicon of the various stem types, and comment briefly on the degree of divergence in verbal morphology and morphophonology between Dunan and its closest relatives.

There are at least seven Dunan verbs that have been cited by various researchers as displaying various types of irregularity, typically involving stem allomorphy, but in some cases suffix choice as well. In the paradigm of 'come', first of all, RY* forms (the RY itself and forms including it) are based on a stem *s-*, while most of the rest of the paradigm is based on k^h*u-*. We noted above in the discussion of Table 4 that Negative k^h*u-nu-* preserves an old consonant-initial V-stem suffix alternant, and the same is true of Conditional 1 k^h*u-ba;* these two forms appear to correspond precisely to Old Japanese *ko-nu, ko-ba,* as well as to Shuri Okinawan *kuu-n, kuu-wa* (see Kinjō and Hattori 1955:334, 338). Similarly, Imperative k^h*u,* suffixless, corresponds to OJ *ko* and Shuri *kuu.* In addition to the stem k^h*u-*, postulation of an alternant k^h*ur-* is necessitated by Conditional 2 k^h*ur-ja* and Passive k^h*ur-arir-*, in which the *r* originally belongs to the suffix, and by Causative k^h*ur-amir-*, in which the *r* is innovative (for all these forms, see Yamada 2016:269). Finally, the stem vowel of Past *sutan* has evidently been influenced by Perfect *sun* (cf. Conjunctive *siti*).

The verb 'enter' has a paradigm that is a mixture of forms based on the three stems *hair-*, *haj-*, and *ha-*. In some cases, the respective forms compete with each other; thus, Yamada (2016:269) cites Prohibitives *hai-nna, haj-unna, and ha-nna.* A further verb said to conjugate like 'enter' is *aj-* (SS *ajun*) 'fight' (see Takahashi 1987a:39, 131). Next, there are two verbs in whose paradigm stem-final *r* alternates with *s* in RY* forms, *ir-* ～ *is-* 'do' and *mair-* ～ *mais-* 'die (honorific)' (Hirayama and Nakamoto 1964:112). For 'do', the forms cited by Yamada (2016:269) show that stem-final *s* undergoes regular truncation in the Past (*i-tan*) and that the Causative (*isi-mir-un*) appears to require postulation of an additional stem alternant *isi-*. Finally, *nk-* 'fill (intr.)' is cited as alternating with *nt-* not only in RY*

forms but in the Conditionals *nt-uba* and *nt-ja* (Hirayama and Nakamoto 1964:112) and as being in variation more generally with the stem *ntir-* (Takahashi 1987a:18), and Yamada (2016:268) cites irregular RT *curu* and Past *cutan* for *c-* 'know'.

With regard to lexical frequency, useful information is provided by the word list of Takahashi (1987a). That list includes designations of lexical class and, for verbs, designations of conjugation class that correspond closely to stem type as determined by the stem-final segment. Verbs are entered in the list in their SS forms, and entries also in principle include the Perfect, although some of the sources the authors have drawn from do not list that form. Searches of the pdf version of the wordlist, while depending on optical character recognition and thus not completely accurate, show 626 occurrences of the lexical category indication [動] for verbs, a figure that differs by less than one percent from the 622 total occurrences of the twelve conjugation class designations shown in Table 9 below. Given the close correspondence between those two figures, I will take the conjugation class search results shown in the table as broadly representative of the relative frequencies of the corresponding stem types in the Dunan lexicon.

Table 9 Relative Frequencies of Dunan Verb-stem types

Class	Stem type	Count	%
1 A	*k*-stem	13	2.1
1 B	*g*-stem	18	2.9
1 C	*ŋ*-stem	11	1.8
1 D	Nonalternating	39	6.3
2 A	*ar*-stem	87	14.0
2 B	*ur*-stem	31	5.0
3 A	*as*-stem	109	17.5
4 A	*us*-stem	21	3.4
5 A	*a*-stem	18	2.9
5 B	*u*-stem	5	0.8
6 A	*ir*-stem (Pf *-an*)	204	32.8
6 B	*ir*-stem (Pf *-un*)	66	10.6
	(Total)	622	100.1

As the figures of Table 9 show, *ir*-stems (historical vowel-stems) comprise about 43% of Dunan verbs, and *r*-stems as a whole comprise about 62%. Since about 21% of verbs are *s*-stems, *r*-stems and *s*-stems together comprise about 83% of the verbal lexicon. In terms of lexical frequency, then, verbs ending in the other eleven stem-final segments may be considered representatives of minor types.

Finally, let us say a word about the degree to which the verbal morphology and morphophonology of Dunan set it apart from the dialects of the Yaeyama language to its east, against the background of Pellard and Yamada's (2017:32) claim that "In sharp contrast with its relatives, Dunan exhibits a unusually complex verb morphology for a Japonic language, ..." With regard to the paradigms of non-truncating stems, first of all, the conjugation tables of Hirayama (1967) show that, apart from the phenomenon of Velar Dentalization (rule (6) above), Dunan appears to be no more divergent from the nine Yaeyama dialects surveyed than those dialects are from each other. Non-truncating stems, then, do not support the idea of a sharp divergence between Dunan and its closest relatives. The same is true for Dunan vowel-stems, which arise, as we have noted, from historical **w*-stems by deletion of the stem-final consonant. Loss of stem-final *w*, first of all, is universal in Yaeyama (see Hirayama 1967:162-190), although the resulting hiatus is maintained in many dialects. But in western Yaeyama dialects, those closest geographically to Dunan, we observe for at least some verbs the same alternation between a consonant-final allomorph in SS* categories and the Prohibitive and a vowel-final allomorph otherwise that we saw in Table 7 above. Thus the Hatoma paradigm of *umu-* 'think' (J *omow-*) (Hirayama 1967:189) is virtually identical to that of Dunan, and the same is true, modulo loss of initial *u*, in Hateruma (Hirayama 1967:181-183). The Sonai dialect of Iriomotejima (Hirayama 1967:175-176) has gone yet further and leveled the alternation in question in favor of the consonant-final allomorph. In the context of Western Yaeyama dialects, then, the Dunan treatment of **w*-stems by no means stands out as divergent.

It is probably truncation of stem-final *s* and reduction of the resulting vowel sequences that, more than any other factor, makes the Dunan verb look complex. Even here, however, the Dunan state of affairs is foreshadowed in the Yaeyama dialects that display the developments *s* > *h* and *h* > ∅ for stem-final *s*. *h* appears for the stem-final *s* of polysyllabic **okos*- 'bring about' before one or more vowels in Kohama, Kuroshima, and Hateruma (Hirayama 1967), and in Kohama, this *h* has gone to zero before *i* (Hirayama 1967:185). Truncation of stem-final *r* in in the RY and categories derived from it as the result of loss of intervocalic *r* before **i*, finally, represents a Dunan innovation, if a relatively minor one; this change is not characteristic of Yaeyama dialects, although it is common in Miyako and in Northern Ryukyuan. But it seems fair to say that the overall impression given by Dunan verbal morphology and morphophonology is that it has taken certain tendencies apparent in its closest neighbors a step or two further, rather than that it displays any sharp discontinuity with those neighbors.

7 Summary and derivations

To this point, we have introduced the rules we are postulating for Dunan verbal morphophonology individually, without consideration of their interaction and order of application. In this section, we will document how our set of rules mediates the relation between phonological and phonetic forms. While we appeal to the notion of a derivation, our analysis involves no phonological abstractness at the level of the morpheme: as we noted at the outset, the phonological form of each stem and suffix coincides with an actually occurring phonetic alternant thereof.

Concerning the organization of the grammar, I will assume that both productive stem-forming suffixes such as Passive and Causative ("auxiliary verbs" in the Japanese grammatical tradition) and uncontroversially inflectional elements such as tense and mood suffixes and the markers of the structurally determined forms 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 assume that while verb stems, as lexical categories, are inserted into syntactic structure along with their phonological forms, functional categories are phonologically unrealized morphosyntactic feature complexes until the transfer of the syntactic representation to the phonological component ("spellout"). The phonological realization of those morphosyntactic feature complexes, the process known as "exponence" (Matthews 1974:144, Trommer 2012), results from application of rules of the sort that we saw in (5).

The interaction of exponence and phonological computation in Dunan presents an apparent paradox for the widely accepted view that, in the derivation from spellout to phonetic form, morphological operations necessarily precede phonological ones. This is because in two cases, the choice among the members of a set of listed suffix alternants depends on a phonologically derived property of the stem, suggesting that in those cases at least, some phonological computation must precede the operation of rules of exponence. Specifically, remember that the two Conditional suffixes are *-uba* and *-ja* after a consonant, but that the contrast is neutralized to *-iba* after a vowel. The vowel-final stem alternant that conditions the choice of *-iba* coincides with the underlying form in the case of stems ending in *a* and *u*, but is derived by truncation in the case of *s*-stems. In the same way, the choice of the V-stem Causative suffix allomorph *-mir-* in the paradigm of *ir*-stems depends on prior truncation of stem-final *r*.

Other cases in which the choice of a suffix alternant depends on a phonologically derived property of the stem have been reported in the literature. For example, Czech data discussed by Spencer (1988, 1991:122-124) is naturally interpreted as showing that the choice of Prepositional Plural *-ích* [i:x] (versus *-ech* or *-ách*) for velar-final noun stems depends on the prior application of Second Velar Palatalization, as a result of which /k g h x/ become /ts z z ʃ/. Cases like those of Dunan and Czech, however, are compatible with a restrictive theory of the interaction between morphology and phonology—for example, one in which morphology in principle precedes phonology and (as in Embick 2010) exponence proceeds monotonically outward from the stem or root—as long as a degree of stratality or cyclicity is incorporated into the architecture of the morphophonological component. The minimally necessary assumption would seem to be that the stem constitutes a cyclic domain for the application of phonological rules (Bermúdez-Otero 2011). If so, Dunan Truncation will have a chance to apply to verb stems before suffixes are phonologically realized, and the vowel-final allomorphs of *s*-stems and *r*-stems that are necessary to condition the correct choice for, respectively, the Conditional and Causative suffixes will be in place at the time exponence occurs.

The rules that we are postulating are summarized in (10). Regarding their order of application, (10a) must precede (10c), since the post-vocalic environment that triggers RY Suffix Deletion in Past forms is derived by truncation for

r-stems and *s*-stems. (10d) must precede (10e) and (10g) in order to obtain the correct output for sequences of three vowels, and (10e) must precede (10g) in order to allow the survival of Perfect *-un*.

(10) a. Truncation ((7) above)
b. Velar Dentalization ((6) above)
c. RY Suffix Deletion ((8) above)
d. Intervocalic *i*-Deletion ((4) above)
e. i → j before Perfect *-un* ((9a) above)
f. *j*-Deletion before Perfect *-un* ((9b) above)
g. General stem-boundary hiatus resolution ((1)–(3) above)

Let us examine some representative derivations involving the operations of the rules of (10). The first two columns of Table 10 below show derivations of the SS forms of *s*-stems, with the notation "(stem)" indicating application on the stem cycle. Because *s*-stems undergo truncation of their stem final in the SS and RT, those forms occasion hiatus at stem boundary and undergo rules (1) and (2) (Shortening and *u*-Deletion); because *s*-stems are the only stems that show a vowel-final allomorph in those two forms, *as*-stems constitute the only case (apart from the SS *an* of existential *ar*-) in which the SS and RT end in *an* and *a* rather than in *un* and *u*.

Table 10 Derivations I

Item	'boil (tr.)' SS	'drop (tr.)' SS	'become' Cnd1	'become' Cnd2	'boil (tr.)' Cnd	'drop (tr.)' Cnd
Output of syntax	bagas-SS	utus-SS	nar-Cnd1	nar-Cnd2	bagas-Cnd	utus-Cnd
a. Truncation (stem)	baga-SS	utu-SS			baga-Cnd	utu-Cnd
Exponence	baga-un	utu-un	nar-uba	nar-ja	baga-iba	utu-iba
g. Hiatus Resolution	bagan	utun				
Phonetic form	[bagan]	[utun]	[naruba]	[narja]	[bagaiba]	[utuiba]

The remaining columns of Table 10 illustrate the realization of the two Conditional suffixes according to rules (5) above. As the third and fourth columns of the table show, the two suffixes, here represented as "Cnd1" and "Cnd2", contrast after a consonant and are realized as *-uba* and *-ja*, respectively. The last two columns show that after a vowel, a Conditional suffix is realized as *-iba* regardless of its specification for the Cnd1:Cnd2 contrast. As illustrated, for *s*-stems (as opposed to V-stems), the vowel-final stem allomorph is the result of stem-level truncation of the stem-final consonant.

The next set of derivations illustrate the application of RY Suffix Deletion, which operates when the RY suffix is situated after a vowel and before the Past suffix *-ta-*. The first column shows the expected structure of a Past form, with *-ta-* plus SS *-n* added to the combination of stem plus RY *-i*. In columns 2 and 3, truncation of stem-final *r* produces a vowel-final stem allomorph that triggers the rule, resulting in the deletion of the RY suffix. In column 4, the rule is triggered by the lexical form of a V-stem, and in the last two columns, it is truncation of stem-final *s* that produces a vowel-final stem allomorph and creates the environment for the rule.

Table 11 Derivations II

Item	'read' Past	'become' Past	'go' Past	'get lost' Past	'boil (tr.)'Past	'drop (tr.)' Past
Output of syntax	dum-RY-Past	nar-RY-Past	hir-RY-Past	madu-RY-Past	bagas-RY-Past	utus-RY-Past
a. Truncation (stem)		na-RY-Past	hi-RY-Past		baga-RY-Past	utu-RY-Past
Exponence	dum-i-tan	na-i-tan	hi-i-tan	madu-i-tan	baga-i-tan	utu-i-tan
c. RY Suffix Deletion		natan	hitan	madutan	bagatan	ututan
Phonetic form	[dumitan]	[natan]	[hitan]	[madutan]	[bagatan]	[ututan]

Since RY Suffix Deletion does not apply before Conjunctive *-ti*, Conjunctives are minimally different from Past forms

in preserving RY *-i* after a back vowel and before *t:* the Conjunctives corresponding to *natan* and *madutan* (columns 2 and 4) are *naiti* and *maduiti* (/hi-i-ti/ undergoes Shortening to surface as *hiti*, and stem-final *s* does not truncate in the Conjunctive, so that the Conjunctives of *bagas-* and *utus-* are *bagasiti* and *utusiti* (Takahashi 1987b)).

The derivations of our third and last set involve Perfect forms. The first two columns show the Perfects of the segmentally homophonous stems *sag-* 'tear', a transitive, and *sag-* 'bloom', an unaccusative. In response to that difference, the Perfect suffix is realized as *-an* in the first case and *-un* in the second, thereby determining the further course of the derivation.

Table12 Derivations III

Item	'tear (tr.)' Perf	'bloom' Perf	'go' Perf	'become' Perf	'soak (tr.)' Perf	'get lost' Perf
Output of syntax	sag-RY-Perf	sag-RY-Perf	hir-RY-Perf	nar-RY-Perf	kir-RY-Perf	madu-RY-Perf
a. Truncation (stem)			hi-RY-Perf	na-RY-Perf	ki-RY-Perf	
Exponence	sag-i-an	sag-i-un	hi-i-un	na-i-un	ki-i-an	madu-i-an
b. Velar Dentalization	sat-i-an	sat-i-un				
d. *i*-Deletion			hiun	naun	kian	maduan
e. Perfect *-un*: i → j		satjun	hjun			
f. Perfect *-un*: j → Ø		satun				
g. Hiatus Resolution	satjan			nan	kjan	madwan
Phonetic form	[satjan]	[satun]	[hjun]	[nan]	[kjan]	[madwan]

The forms of columns 3 through 6 illustrate the fact that, under the account proposed above, the failure of the RY suffix to appear in Perfect forms after vowel-final stem allomorphs is the result of Intervocalic *i*-Deletion rather than, as was the case for the Past forms we saw in Table 11, of RY Suffix Deletion. In column 3, the intermediate form /hiun/ undergoes rule (9a) but, since the result is monosyllabic, (9b) does not apply. The form of column 4 illustrates the fact that the failure of *ar*-stem unaccusatives to show *un*-Perfects can be attributed to hiatus resolution following loss of intervocalic *i*. The forms of the last two columns, finally, illustrate the operation of Desyllabification, rule (3) above.

To close this section, I present in Table 13 a synopsis of truncating stems, those ending in *r, a/u,* and *s,* showing in schematic form for the twelve categories of Table 1 the output of Truncation and RY Suffix Deletion. 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 (at least) the following segment, thereby displaying the input to Intervocalic *i*-Deletion and the hiatus resolution rules.

Table 13 Synopsis of Truncating Stems

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

Below, we briefly examine the sixteen numbered cells of Table 13 individually.

In the paradigm of *r*-stems, first of all, 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. In ⑤, Truncation does occur, but because RY Suffix Deletion occurs as well, no hiatus obtains in the input to the general hiatus resolution rules. The cells ②, ④, and ⑥ are those in which hiatus does arise at that level, in ⑥ after the application of Intervocalic *i*-Deletion; as illustrated in Table 3, all nine VV combinations are attested in those forms.

In the paradigm of V-stems (*a*-stems and *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, as in ⑤, RY Suffix Deletion eliminates potential hiatus before the stage of the general hiatus resolution rules, while in ⑩, as in ⑥, hiatus is subject to resolution following Intervocalic *i*-Deletion.

In the paradigm of *s*-stems, finally, the forms of ⑪ show double truncation in polysyllables, 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. 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 obtains in the input to the general hiatus resolution rules.

8 Motivation for the analysis

The above sections have presented an account of Dunan verbal morphophonology. Given that linguistic analyses are in the end proposals concerning native speaker competence, however, it is also appropriate to ask whether that account is one that could plausibly be attained by children acquiring the language. In this section, I will argue that in broad outline, if not in every detail, our account is in fact attainable on the basis of a small number of general principles.

In attempting to identify principles that would result in the choice of an analysis for Dunan verbal morphophonology along the lines of that proposed above, let us to begin with postulate the two principles (11), both of which can be characterized as conservative and relatively uncontroversial.

(11) a. If a morpheme is non-alternating, its underlying representation (UR) coincides with its unique alternant.
b. If a morpheme alternates in such a way that its alternants are clearly divisible into a special case and a general or elsewhere case, the elsewhere case alternant is underlying.

(11a) will have the consequence that non-alternating stems, those ending in *b t d c m n*, will have URs coinciding with their single alternant, and (11b) will have the consequence that stems that end in dentals before the RY suffix but in velars otherwise will have URs coinciding with their velar-final alternant.

Next let us postulate two principles that, while less general than those of (11), are plausible a priori and will advance our account of the motivation for the analysis we have proposed.

(12) a. If a suffix has a constant alternant after all non-alternating stems (or a superset thereof), its UR coincides with that alternant.
b. If an inflected form has a constant morphological structure for all non-alternating stems (or a superset thereof), it has that structure for all stems.

The basic intuition underlying (12a) and (12b) is that, given an inflectional system with both regular and irregular paradigms, speakers will base their analysis of the irregular paradigms, insofar as possible, on their analysis of the regular paradigms. Specifically, (12a) will have the consequence that the UR for each suffix is the vowel-initial form that it takes after non-alternating (and velar-final) stems, as illustrated in Tables 1 and 5 above, and (12b) will have the consequence that the Conjunctive, Past, and Perfect of all stems include the RY suffix, given that this is transparently the case for non-alternating (and velar-final) stems. In this way, we hypothesize that speakers are able to take advantage of the transparent agglutinative structure of the paradigms of non-alternating stems when they come to analyze paradigms that display phonological or morphological irregularity.

Finally, let us postulate a principle, often assumed in phonological analysis, that is arguably not universally adhered to,[13] but which can be taken as a default that applies when not overruled by other principles.

(13) If a morpheme alternates in such a way that its alternants can be ranked with regard to informativeness, the UR of that morpheme coincides with its most informative alternant.

(13) will have the consequence that the UR for each stem that displays a segment-zero alternation at its right edge is the longer or longest alternant of that stem—concretely, that the URs of stems we have characterized as ending in *r, a, u,* and *s* are in fact the alternants ending in those segments.

All morpheme-level URs for Dunan verbal morphology follow from Principles (11)-(13), those of non-alternating stems from (11a), those of velar-final stems from (11b), those of truncating stems from (13), and those of suffixes from (12a). Word-level URs of inflected forms, as indicated above in Section 7, are the joint result of syntactic computation and rules of exponence. Consider now the relation between those word-level URs and the corresponding surface forms. For the forms of non-alternating stems, this relation, apart from the Perfect, is one of identity, as the examples of Table 1 illustrate; for those forms, no rules are necessary to mediate the relation between underlying and surface representations, again apart from the Perfect. For non-Perfect forms of velar stems, only the Velar Dentalization rule (6) is necessary for the derivation of surface forms, as illustrated by the examples of Table 5. It is only in Perfects and in certain forms of truncating stems, then, that further rules apply, deleting stem-final *r* and *s* and reducing sequences of vowels.

Of the phonological rules we have postulated, the general hiatus reduction rules (1)-(3), first of all, seem well supported, particularly given that their results mirror the distribution of vowel sequences morpheme-internally. And once we have taken as underlying the most informative alternants of stems that show segment-zero alternations at their right edge, postulation of rules of truncation seems inescapable. Our four remaining rules, RY Suffix Deletion, Intervocalic *i*-Deletion, and the desyllabification and *j*-Deletion rules that are specific to *un*-Perfects, might appear less obviously supported. It is nevertheless clear that the core of the account presented here follows from a small number of general assumptions about morphophonological analysis and in that sense can be said to be well motivated.

9 Conclusion

In Section 2, in an attempt to narrow down the range of proposals concerning inflectional morphology and morphophonology that need to be seriously entertained, we made two general claims concerning the boundary between lexicon and grammar. The first was that the idea that speakers record in the lexicon large numbers of regular inflected forms is implausible in proportion to the number of syntactic categories that are realized internal to those forms, given that syntactic representations can be assumed to be productively generated rather memorized. The second was that non-phonological conditioning does not justify treating systematic and recurrent alternations by means of lexical listing of allomorphs—treating such alternations, that is, as if they were suppletive. In line with these claims, we developed in Sections 3 through 7 an account of Dunan verbal morphophonology based on segmentation of inflected forms into stems and suffixes and application of phonological rules converting underlying into surface representations; a notable feature of that account is that each morpheme postulated has a unique lexical form that coincides with an occurring allomorph thereof. We then showed in Section 8 that the core of our account follows from a small number of hypotheses about how children analyze inflectional forms and alternations, thus establishing the plausibility of that account in explanatory as well as descriptive terms.

As we noted at the outset, the conclusions of Yamada et al. (2015) and Pellard and Yamada (2017) concerning Dunan verbal morphology and morphophonology are rather different. In particular, we quoted claims of Yamada et al. (2015:458-459) to the effect that stems and suffixes must be coindexed, that large numbers of inflectional classes and stems (i.e. listed stem alternants) are required, that patterns of alternation are in general lexically idiosyncratic, and that no unique reference forms exist. From the perspective we have developed here, however, none of these claims corresponds to the actual state of affairs. In closing, let us ask whether it is possible to say anything about why our conclusions differ so sharply from those of Yamada et al. (2015) and Pellard and Yamada (2017).

[13] de Chene (2016), for example, argues at length that (13) (among other principles) misidentifies the URs of the Japanese verbal suffixes that alternate according to the C/V polarity of the stem-final segment.

We may start from the observation that both of the articles in question emphasize the low level of interpredictability displayed by Dunan inflected forms, both internal to the paradigm of a single lexeme and over the lexicon as a whole. While we might expect this lack of predictability to be taken as evidence against a description of Dunan verbal morphology that is based on relations among full word forms, Pellard and Yamada (2017:33) appear to take it instead as evidence against a description based on morpheme-sized units, writing "few reliable inferences can be made from one inflected form about other forms. Morpheme-based approaches are not well-suited for the analysis of Dunan's verb morphology, ..." That conclusion, in addition to being a non sequitur, is factually unsupported, as our account above shows.

Part of Pellard and Yamada's resistance to morpheme-based accounts appears to be based on a parallel resistance to morphophonological rules. They write (Pellard and Yamada 2017:45), "The data presented and analyzed above clearly shows that a morpheme-based morphophonological approach is not apt for describing the verb morphology of Dunan. Such an approach would only lead to posit rules or constraints that are unnatural and lack any generality because of their lexically or morphologically restricted character." In fact, Pellard and Yamada's (2017) avoidance of phonological rules goes further than this; they decline to postulate even low-level processes like the hiatus-reduction rules (1)-(3) above. Whether to admit morphophonological rules and whether to admit morphemes are orthogonal issues, however (Kiparsky 1996:13), and resistance to rules with morpholexical conditioning will not explain claims like the existence of stem-suffix coindexation, the non-existence of unique reference forms, and the prevalence of lexically idiosyncratic alternations. For example, we could abandon the rules of truncation we postulated for *r*-stems, *s*-stems, and vowel-stems in Section 6 above and list all the relevant stem allomorphs, and, with longest alternants serving as reference forms, those claims would be no closer to being true than they are under a rule-based account.

In the end, then, it appears to be their resistance to the idea of the morpheme as a unit of morphological analysis, more than any other factor, that conditions the response of Yamada et al. (2015) and Pellard and Yamada (2017) to the facts of Dunan. This stance is particularly clear at the end of Pellard and Yamada (2017:46), where they suggest that "roots, stems, and affixes are only *post hoc* abstractions over existing full forms, ..." Abandonment of morphological analysis below the word, however, leaves them with nothing to work with analytically but a collection of unsegmented surface forms, which by their own account are not in general systematically related to one another. It is not surprising, then, that the picture of Dunan verbal morphophonology that emerges from their discussion is chaotic. Nor is it perhaps surprising that, for all their commentary, neither Yamada et al. (2015) nor Pellard and Yamada (2017) actually put forth a concrete analysis of the Dunan data they discuss; the "several [dozen]" inflectional classes they claim (Yamada et al. 2015:458) to be necessary, for example, are not enumerated, and both the inventory of such classes and the treatment of stem alternations are said to depend on analytic choices that remain unspecified (Pellard and Yamada 2017:34-35).[14] In this way, then, those two papers serve as an object lesson in the dangers inherent in abandoning what have been called the two major advances of nineteenth-century morphology (albeit due ultimately to Pāṇini), the morpheme and the morphophonological rule (Kiparsky 1996:13).

Remembering that Yamada et al. (2015), in particular, is part of a handbook that is now a standard reference for non-specialists, however, it would seem that there is a danger of this skepticism concerning morphological analysis creating a misleading impression of Dunan among readers who have little acquaintance with the language. We suggested above at the end of Section 6.4 that the same danger arises concerning the degree of divergence displayed by Dunan with respect to its closest relatives. In both these respects, then, it is to be hoped that the present paper has succeeded to some extent in demystifying Dunan verbal morphophonology.

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[14] While Pellard and Yamada (2017:32) do say that they have "fully formalized [their] description and implemented it as a finite state transducer", the details of this formalization are not shared with the reader.

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