Phonetic explanation without compromise

The evolution of Mussau syncope

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Blust (2005, 2007a, 2007b) questions the phonetic motivation of a number of well-attested sound changes. One sound change in this class is the purported case of stressed vowel syncope in Mussau, an Oceanic language (Blust 1984, 2001, 2007a). Regular syncopes typically target unstressed vowels. By contrast, loss of stressed vowels is difficult to motivate, due to their inherent prominence. Close inspection of Mussau historical phonology suggests that, at its origins, syncope was limited to unstressed vowels, with subsequent developments obscuring its original phonetic motivation. Under the proposed analysis, the Neogrammarian insistence on phonetically motivated sound change is maintained.

Keywords: sound change, phonetic motivation, naturalness, vowel syncope, Mussau

1. The general problem

Are all sound changes phonetically motivated? The Neogrammarians believed so, and catalogued many instances where sound change was of a purely phonetic nature, triggered by the effects of surrounding sounds, accent, syllabic position, and general articulatory tendencies (Osthoff & Brugman 1878, Paul 1880). While Neogrammarian phonetic explanation was based primarily on the mechanisms of speech production, a range of students who studied in Leipzig during the latter part of the 19th century, from Baudouin de Courtenay to Gustaf E. Karsten, soon embraced perception as an additional explanatory mechanism of phonetically based sound change.[1] In more recent times, further evidence has accumulated for

1. On Baudouin's conception of misperception, see Blevins (2007a:144). Karsten, a student of Paul's, presents an eloquent and strikingly modern exemplar-based view of sound change and analogy in which perception and misperception are central in his 1894 paper "The Psychological Basis of Phonetic Law and Analogy".

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articulatory, acoustic, aerodynamic and perceptual explanations of a wide range of sound changes, from metathesis to dissimilation, from velar palatalization to rhinoglottophila, from compensatory lengthening to final vowel shortening (see summaries in Blevins 2004, Blevins 2006b, Blevins to appear).

Nevertheless, the phonetic basis of sound change has been challenged from a range of different perspectives (e.g. Kiparsky 1988, 1995, Hualde 2000). What these challenges have in common is the claim that certain sound changes have structural motivations which arise from phonological, as opposed to phonetic, organizing principles. However, recent work in exemplar based simulations of language change illustrates that structural effects of this kind emerge naturally from the production-perception feedback loop in the course of language acquisition (Pierrehumbert 2006, Wedel 2006, 2007). The general observation that categories include phonetic detail, and are influenced by this detail as they evolve, yields models of category change with opposing forces: noise in production and perception makes categories broader, while averaging across within-category exemplars leads to tighter categories. These models allow one to understand structural motivations in phonetic terms, since exemplars are phonetically detailed representations. Here, I do not challenge the role of structural motivation in sound change. On the contrary, evidence for such structural pressures continues to accumulate (e.g. Blust 2007a, Chitoran & Hualde 2007), and is consistent with exemplar-based models which offer solutions to other recalcitrant problems for theories of sound change (e.g. Yu 2007, Ettlinger 2007).

A more serious challenge to the phonetic basis of sound change has been raised by Blust (2005, 2007a, 2007b). In his 2005 *Diachronica* paper "Must sound change be linguistically motivated?", Blust questions the phonetic motivation of a number of well-attested sound changes.[2] In all cases he argues that: (i) that there is no phonetic basis for the change; and (ii) that there is no phonetically natural intermediate step that would be likely to result in the change. Already, several of Blust's one-step changes have been challenged. Goddard (2007) reviews the apparent one-step merger of Proto-Oceanic *w and *y to /p/ word-finally in Drehet and Levei. As he shows, it is possible to motivate a natural two-step progression of *w, *y merger to *w, and subsequent *w#>p#, by parallel developments in other languages.[3] Blevins (2007b) makes a similar argument with respect to word final

2. Blust concludes that social factors, not phonetic ones, can trigger regular sound change, though no particular social scenarios are put forth.

3. While Goddard (2007:128) suggests a phonetic basis for this sound change, he highlights the existence of phonetic environments with seeming 'opposite effects' in a range of languages. These cases, he suggests, strengthen "the case for recognizing a strong sociolinguistic component in sound change from its inception…".

*-b/-d/-g > *-m/-n/-ŋ*, proposed for Northern Batak and Berawan. Though Blust argues that there is no intermediate step that would be likely to result in a natural progression of voiced stops to final nasals, Blevins shows that in Mwotlap, an Oceanic language, a synchronic shift of syllable-final ^{m}b, ^{n}d → *m, n*/ _. has taken place. If prenasalized allophones of final voiced stops existed in Northern Batak and Berawan at an earlier stage, one need only posit the same lack of velic raising seen in Mwotlap in syllable-final position to reach the final nasal stage.

In this paper I take a close look at another example of sound change which appears to lack phonetic motivation. This is the purported case of stressed vowel syncope in Mussau (Blust 1984, 2001, 2007a). This sound change is interesting for several reasons. First, it is one of the few proposed cases of stressed vowel syncope in the literature; regular syncopes typically target unstressed vowels. Second, it highlights the importance of reconstructing, not just segmental features, but prosodic ones as well. Finally, if the arguments below are accepted, it shows how a fairly small detail in the history of a small Oceanic language, when well understood, provides strong support for the original Neogrammarian dynamic duo: phonetically-based sound change and analogy.

2. The specific problem

In a series of publications Blust (1984, 2001, 2007a) describes aspects of stress, syncope and geminate evolution in Mussau, an Oceanic language of the St. Matthias archipelago north of New Ireland.[4] In this language, like many others detailed in Blust (2007a), vowels between identical consonants are lost historically (1a–c), while those between non-identical consonants are maintained (1d–f).

(1) Mussau vowel loss between identical consonants only (lost vowels in bold)

	Proto-Oceanic	Pre-Mussau	Mussau	gloss
a.	*tulu(s)	*t**u**-tulu	ttulu	“post, housepost”
b.	*papa	*pa-p**a**pa	pappa	“carry on shoulder, shoulder”
c.		*vat**a**ta[5]	vatta	“rocky shore”
d.	*taliŋa	*taliŋa	taliŋa	“ear”
e.	*jalan	*salana	salana	“path, road”
f.	*dapan	*lapa-lapa	lapalapa	“palm, sole”

4. Mussau belongs to the St. Matthias family, which may be a first-order subgroup of Oceanic, or form a first-order subgroup together with the Admiralties Family (Ross 1988:315–16, 331, Ross 2002:148). I am grateful to Bob Blust and Malcolm Ross for discussion of the Mussau data.

5. This proto-form is from Brownie & Brownie (2007:16).

Blust (2001) argues for teleological over purely phonetic explanations of this historical development. The starting point for his argument is that stress in this language falls regularly on the penultimate mora of words. He continues with the three observations in (2).

(2) Arguments for teleology in sound change from Blust (2001:149)
   i. Identical consonant constraint: In pairs like *tutulu: ttulu* "housepost", where an unstressed vowel deletes between like consonants, a phonetic explanation cannot account for the fact that unstressed vowels do not delete between unlike consonants, as in *biliki* "skin", *karasa* "whet, grind a blade", or *kuluki* "strip off bark, decorticate".
   ii. Syncope of stressed vowels: In pairs like *miroro : mirro* "fish sp." Or *mumumu : mummu* "to suck", a phonetic explanation cannot account for the fact that syncope targets a stressed vowel.
   iii. Disyllabic output constraint: In forms such as *keke* "foot, leg", *susu* "breast" or *toto* "grasshopper", a phonetic explanation cannot account for the fact that syncope does not occur.

However, more recent work proposes phonetic and structural explanations for (2i) and (2iii) above. An articulatory account of the identical consonant condition is proposed by Blevins (2005:225–227), and further supported by Blust (2007a:28–30). Most languages with this pattern are those in which consonant clusters are historically absent. Gestural scores for these languages involve a rigid pattern where each consonantal feature complex is released into a following vowel. This gestural score, like other regular sound patterns, is self-reinforcing over time (Wedel 2007, Blust 2007a). As a consequence, weakening and loss of vowels takes place, but only where the general C-to-V transition pattern is maintained. This simple articulatory constraint explains the output pattern in (2i): syncope results in prevocalic geminates, but not other clusters, in Mussau because these output sound patterns conform to the requirement that a consonant gesture be released into a vowel.[6]

The absence of syncope in disyllabic words like those in (2iii) can be explained with reference to inherited features of the lexicon (Blust 2007a). Over 90% of Proto-Austronesian lexical bases were disyllabic, and this pattern was inherited by most subgroups. Like the gestural score mentioned above, the disyllabic canon is self-reinforcing over time. As a consequence, weakening and loss of vowels takes

6. A reviewer asks why sound change preserves general CV phonotactics, but not durational properties of consonants. In many Austronesian languages, a phonetic length contrast is already present, where post-tonic consonants are longer than others. More generally, structure preservation appears to be associated with certain kinds of phonetically motivated sound change, and not others. See Blevins (2004:153–155, 247–248, 297–299) for further discussion.

place, but only where it yields a disyllabic output. Mussau is just one of more than a dozen Austronesian languages which show a disyllabic output canon for syncopes between identical consonants; and Blust (2007a) demonstrates the effects of this canon for other types of sound change as well. In short, Blust argues, syncope does not apply to words like those in (2iii) because this would result in monosyllables.

The problem which remains is (2ii) above: apparent syncope of *stressed* vowels in the history of Mussau. Syncope of stressed vowels is rare or unattested crosslinguistically.[7] Stressed vowels are typically longer and louder than other vowels. This makes them more resistant to articulatory reduction, and less likely to go unheard. In contrast, unstressed vowels, which are shorter and less prominent, are common syncope targets (Blevins 2005). In conformity with these general patterns, most vowel syncopes between identical consonants in the Austronesian family target unstressed vowels (Blust 2007a). Mussau stands out as an exception, within Austronesian and crosslinguistically.

Since Blust's (2001) paper outlining the problems above, two important works on Mussau have appeared: Ross (2002) and Brownie & Brownie (2007).[8] Though Ross (2002) is a sketch grammar, it contains important notes on stress which illuminate Mussau prehistory. Brownie & Brownie (2007) confirms these stress patterns, and provides a wealth of new data on vowel/zero alternations, and phonology-morphology interactions. With this new data in hand, it seems possible to explain the apparent loss of stressed vowels without compromising phonetic explanation in sound change. Here I maintain that regular loss of vowels between identical consonants in Mussau targeted unstressed vowels. Subsequent stress shifts and analogical change have muddied the pure phonetic waters, but a close inspection of the language as a whole supports these independent changes.

3. Unstressed vowel syncope

Our starting point are Blust's (1984, 2001, 2007a) descriptions. Blust's original (2001) paper outlining the problems above was based on approximately six contact hours with one Mussau speaker born around 1930. Blust views Mussau vowel loss between identical consonants as a change in progress. At the time of Blust's fieldwork on the language in 1975, his informant showed regular vowel loss in

7. Plaster (2007) proposes a thoughtful reanalysis of purported stressed vowel syncope in Tocharian B.

8. Ross's description of stress is based primarily on work with two speakers around 1980 in Goroka. Brownie & Brownie (2007) is based on extensive fieldwork on the Southern Mussau dialect of Lomakunauru village from 1995 to the present.

the contexts he describes, while elders (according to this informant) maintained historical vowels.

Generationally distinct forms of Mussau words from Blust's publications are shown in (3) below, along with relevant comparative data.[9] As in many other cases discussed in Blust (2007a), the vowels in (3) which occur between identical consonants are the result of historical CV- reduplications. Since primary stress is generally on the penultimate mora or vowel, reduplicated vowels of the CV- prefix are typically unstressed.[10] Historical syncope in these forms, then, appears to be restricted to unstressed vowels in pretonic positions. This indeed appears to be the central description of parallel sound changes in a range of Austronesian languages, as detailed in Blust (2007a).

(3) Mussau unstressed vowel syncope between identical consonants

	Elders/New generation	gloss	Comparanda
a.	ai ɣaɣali/ai ɣɣali	"razor"	< *ɣa-ɣáli (cf. PWoc *qa(r,R)iŋ "obsidian, razor", Kove *ali-ali* "obsidian" [LPO1:93])
b.	kikiau/kkiau	"megapode"	< *ki-kiau (cf. PAN *kiaw "pulling sound of a bird", Ifugao *kiaw* "moor hen", Arosi *kiokio* "large kingfisher" [Blust 1995])
c.	papasa/ppasa	"outrigger poles"	< * pa-pása (cf. POc *patar "platform of any kind, including that erected over hull and outrigger framework", Seimat *paca* "canoe platform", Suau *pata-patari* "canoe platform of poles stretching across the booms" [LPO1:190])
d.	rarana/rrana	"mangrove sp."	< *ra-ráno (cf. POc *[dr,r]ano "lake, swamp", 'Are'are *ro-rono* "mangrove swamp")
e.	raraŋa/rraŋa	"sea urchin"	< *ra-ráŋa (cf. PMP, POc *raŋa "the spider conch, *Lambis lambis*", Arosi *raŋa* "spider shell, with long Spines")
f.	tutulu/ttulu	"housepost"	< *tu-túlu (cf. POc *turu(s) "post", Lihir *tultul* "doorpost" [LPO1:55])

However, Blust (2001, 2007a) suggests that Mussau syncope is more unusual. Assuming a regular penultimate stress pattern, certain surface geminates must be the result of *stressed* vowel loss, because the vowels in question are historically

9. As far as I am aware, most of these comparisons are new. Comparanda suggest stem etymologies, as well as cognate reduplicated forms.

10. In words with final long vowels or diphthongs, the final syllable containing the penultimate mora is stressed. Source abbreviations are LP01 for Ross et al. (1998) and LP02 for Ross et al. (2003).

penultimate. Recall from (2ii) above that in pairs like *miroro : mirro* "fish sp." or *mumumu : mummu* "to suck", a penultimate vowel is lost. Blust (2001) considers a straightforward solution to this problem: that the penultimate syllables in these words were historically *not* stressed:

> In contemporary Mussau, primary stress falls consistently on the penultimate mora, which invariably corresponds to the penultimate syllable. At some point after the breakup of Proto-Oceanic, Mussau added echo vowels as in POc *maqasin > *masini* "salty", *onom > *(o)nomo* "six", or *pulan > *ulana* "moon, month". If Proto-Oceanic had penultimate stress, Mussau words that added an echo vowel would have been stressed on the antepenult. Under such an interpretation, a form *mumum would have become pre-Mussau *múmumu*, while *susu would have been *súsu*. The way would have been paved for pre-Mussau *múmumu*, but not *súsu*, to undergo syncope, producing medial geminates from the deletion of unstressed vowels. (Blust 2001:145)

Additional examples of final vowel copy are shown in (4) with historical copy-vowels in bold. Where reconstructions differ from those in Blust (1984), updated references to Blust (1995) and Ross et al. (1998, 2003) are provided.

(4) Some Mussau final copy-vowels in Proto-Oceanic C-final words

	Mussau	**gloss**	***-C#**	**Proto-Oceanic**
a.	katamana	"entrance to house, doorway"	n	*kataman [LPO1:52]
b.	lamana[11]	"deep"	n	*laman "deep sea beyond the reef" [LPO2:90]
c.	salana	"path, road"	n	*jalan [LPO1:61]
d.	samana	"outrigger float"	n	*saman [LPO1:191]
e.	utana	"garden"	n	*qutan "bushland, hinterland" [LPO1:118]
f.	masini	"salty"	n	*maqasin [Blust 1984]
g.	imu/imutu	"moss, algae"	t	*limut [Blust 1984]
h.	ueta (< *uata)	"vein"	t	*uRat [Blust 1984]
i.	mamaata/na	"heavy"	t	*mamat [LPO2:214]
j.	mataut**u**	"afraid"	t	*matakut [Blust 1984]
k.	asaŋe (< *asaŋa-i)	"gills"	ŋ	*asaŋ "gills" [Blust 1984]
l.	ŋusuŋu	"nose"	ŋ	*ŋujuŋ "beak, snout"
m.	kukuku	"dove sp."	k	*kukuk "to coo, murmur" [Blust 1984]
n.	iema	"knife"	m	*kiRam "axe, adze" [LPO1:88]

11. Compare *elamana* "sea, shore" and *malamana* "shallow water with white sand bottom" from Brownie & Brownie (2007).

If, prior to the accretion of a historical copy vowel, stress was penultimate (Ross 1998), then it is possible that words of this form would have antepenultimate instead of penultimate stress.

While Blust (op cit.) considers this a "seductive narrative" he rejects it on the basis of two factors. First, there is disagreement over Proto-Oceanic stress patterns. While Ross (1998) suggests primary stress on penultimate syllables, Lynch (2000) argues for penultimate mora stress, yielding stress on final heavy/closed syllables. This argument is not particularly strong. First, in a situation where two experts disagree, the strengths and weaknesses of each proposal should be considered in light of the Mussau facts. Facts like those of Mussau might play an important role in deciding between reconstructions of Proto-Oceanic stress, or shifts in these patterns within the St. Matthias family. This is especially true since "Mussau is a strikingly conservative Oceanic language" (Ross 2002:148), and member of a first-order Oceanic subgroup.

Second, Blust notes that even if Ross (1998) is correct in reconstructing penultimate syllable stress in Proto-Oceanic, there are the Mussau facts themselves to deal with. Blust's single informant produced *múmmu* "to suck" and *mírro* "fish sp.", with syncope. Forms like *miróro, mumúmu,* with penultimate stress, were provided by this same speaker as pronunciations used by older speakers. More data is clearly needed. It could be that Blust's informant had a regular penultimate stress rule, while older speakers did not. It could be that the dialect of Mussau Blust encountered had regularized more ancient stress patterns. In short, before taking this limited evidence as an argument for consistent penultimate stress in the history of Mussau, all potential data bearing on the phonology of words with historical copy vowels should be examined.

4. More unstressed vowel syncope: Words with historical final copy vowels

Somewhat surprisingly, the stress facts reported by Ross (2002) directly support the "seductive narrative" offered by Blust.[12] Ross (2002) agrees that most words in Mussau have penultimate stress, but recognizes that stress must be lexically specified for some words:

> In some words … primary stress falls on the antepenultimate vowel. When the history of these words is examined, it turns out that they ended in a consonant

12. Brownie & Brownie (2007:21) agree with Ross's description of the stress patterns.

> in POc and … that an echo vowel has been added, repeating the vowel before the erstwhile final consonant. (Ross 2002:150)[13]

Examples from Ross (2002) are shown in (5), with historical copy vowels in bold. Antepenultimate stress is marked, and etymologies include basic lexemes unlikely to be borrowed. On this basis, it seems that prior to final vowel copy, stress was penultimate in these forms in the ancestor language.

Given historical antepenultimate stress in this set of words, unstressed vowel loss between identical consonants is expected to occur if the unaffixed form just happened to have identical consonants as the onsets of the final and penultimate syllables. Though Blust (2001:145, fn. 2) notes that "no etymology is actually known for Mussau *mumumu* or any of the similar forms that developed a medial geminate", at least one clear etymology (6a) was presented in Blust (1984). To this, I add the suggested etymologies in (6b,c).

(5) Antepenultimate stress in Mussau reflexes of Proto-Oceanic C-final words (Ross 2002)

	Mussau	**gloss**	***-C#**	**Proto-Oceanic**
a.	áranna[14]	"k.o. pandanus"	n	*padran
b.	úlana[15]	"moon, month"	n	*pulan
c.	ánasa[16]	"hot"	s	*panas
d.	káur**u**	"bamboo"	r (<*R)	*kauR
e.	ɣa-ónom**o**	"six"	m	*onom
f.	rárum (< *rárum**u**[17])	"liquid"	m	*ranum

13. Other exceptions to penultimate mora stress are the following: (i) If the stressed vowel is immediately preceded by a vowel of equal or higher sonority, stress shifts optionally to that vowel; (ii) if the vowel preceding the stressed mora is /a/, then stress shifts optionally to /a/ even if a consonant intervenes (Ross 2002:150).

14. Blust (1984, 1995) has *arana*. The singleton is the expected historical reflex.

15. Ross (2002) writes *úlena*, but all other sources show penultimate /a/.

16. Blust (1984) and Brownie & Brownie (2007) write /aanasa/. Vowel length is historically anomalous, and may reflect the antepenultimate stress recorded by Ross.

17. Final *…mu > m (Ross 2002:150, Brownie & Brownie 2007:15).

(6) Penultimate unstressed vowel syncope in Mussau reflexes of C-final proto-forms

	Mussau	gloss	Comparanda
a.	kukuku, kukku	"dove sp."	< *kukuk (cf. POc *kukuk "to coo, murmur" [Blust 1984])
b.	vatata, vatta	"rocky shore"	< *vatat (Sika *vata-n* "shore"; Bobot, Bonfia *bata* "earth, land"; Minyafuin *batbat* "earth, land".)
c.	katoto, katto	"star"	< *katot (cf. Lou (South-East Admiralties) *kaltut* "dark", Seimat (Western Admiralities) *kohot* "star", Tanga (New Ireland) *keltot* "star".)

A small number of words have likely undergone developments similar to those shown in (6), though for these, no comparative data is presently available: *yoruru, yorru* "edible green seaweed"; *miroro, mirro* "fish species"; *kabitoto, kabitto* "nit". Note that for all of these words, the final vowel is a copy of the penultimate vowel, and the last consonant in the word is one of those attested with final vowel copy in (4) and (5). If the histories of these words are indeed parallel to those in (6), then none are counterexamples to the deletion of unstressed vowels between identical consonants. Rather, speakers like Blust's informant, who stress full forms of these words on the penult, have, apparently, regularized the stress pattern in more recent times.

5. More unstressed vowel syncope: Triplication of monosyllabic CV stems

A second class of words, superficially similar to (6a), also show penultimate vowel loss. However, in these cases, illustrated in (7), what unites the forms are triplication of a CV pattern. Though rare, monosyllabic verb stems exist in Mussau and include *bi* "push", *me* "urinate", and *ma* "yawn" (Ross 2002:160–161, Brownie & Brownie 2007:107). As single prosodic words, these monosyllables are expected to have primary stress. Imperfectives of verbs are formed by reduplication. The one CV-CV reduplicated form reported by Ross (2002:161), has stress on the final syllable: *me* "urinate", *memé* (imperfective). If, over time, the prevalent disyllabic word canon results in reanalysis of reduplicated disyllables as simple stems, subsequent CV- reduplication produces a context where unstressed penultimate vowels satisfy the conditions of historical unstressed vowel syncope. The proposed developments are shown in (8).

(7) Penultimate unstressed vowel syncope in Mussau reduplicated vowel-final stems

	Mussau	gloss	Stem	Comparanda
a.	ɣaɣaɣa, ɣaɣɣa	"tidal wave"	/ɣa/	cf. ɣaa-ɣa "breaking wave"
b.	mamama, mamma	"yawn"	/ma/	cf. maa-ma "yawn. Imperfective"[Ross 2002:161]

(8) Unstressed penultimate vowel loss in triplicated CV stems

	Base	Reduplicant	Unstressed V-loss
Stage I	má	mamá	(Not applicable: too short)
Stage II	mamá	ma-mamá	mamma

An analogical alternative to (8) is proposed in §6, and includes additional forms with disyllable $C_iV_jC_iV_j$ bases.

6. Analogy not syncope: CV- reduplication of geminate-initial stems

An alternative to the purely phonetic account of forms in (7) is one based on analogy. Due to the historical syncopes illustrated in (3), a productive pattern of reduplication in Mussau is to prefix CV- to historically CV-initial forms which have undergone syncope. In fact, the only stems which appear to regularly take CV- reduplication in the modern language are those which begin with geminates, as in imperfective: *ka-kkala* "sweep", *ke-kkele* "walk off the path", *ma-mmate* "dry out", *po-ppoa* "speak" (Brownie & Brownie 2007:23). On the basis of these forms, other words with apparent CV- reduplicative prefixes could be reformed as prefixes to geminate-initial bases. This analogical account of the forms in (7) does not require any stage where the penultimate syllable is unstressed. Rather, it suggests speaker recognition of a reduplicated CV- prefix in these forms, and sound patterns associated with such prefixes in verb paradigms. Furthermore, it allows one to include the forms in (9) together with those in (7) as instances of analogical change. In all cases, a singleton initial based is reformed as geminate initial on the basis of apparent CV- reduplication, as illustrated in (10).[18]

18. The analogical shift towards monosyllabic bases like /nna/ does not violate the tendency for words to be minimally disyllabic, since full word forms /nanana/, /nanna/ are disyllabic.

(9) More penultimate unstressed vowel syncope in reduplicated vowel-final stems
   a. mumumu, mummu "suck" cf. PMP *mulmul "hold in the mouth and suck" (Blust 1995), POc *mumuC (cf. Saliba *mumusi* "suck", Neve'i *mumum*, SE Ambrym *mumuni*, Namakir *mumuh* [ABVD])
   b. nanana, nanna "think" cf. PMP *nemnem, POc *nenem,
   c. papapa , pappa "shoulder" cf. POc *papa "carry on the back, shoulder"

(10) From singleton to geminate-initial stems by analogy

	Stage I	**Stage II**
Base	kakala	kkala
Reduplicate	ka-kakala	ka-kkala
Base	nana	**nna**
Reduplicate	na-nana	na-nna

7. Vowel syncope with *-*na*

The discussion above does not exhaust Blust's cases of claimed stressed vowel syncope. However, the remainder include the final sequence /…na/. As I show below, in all cases, the sequence represents the third person singular *-na (< Proto-Oceanic *-ña), which triggered syncope of unstressed vowels as expected. This pattern appears to be analogically extended to novel forms with /-na/.

In any language with a regular stress pattern, clitics may fail to form part of the stress domain at an early stage in their evolution, and later, as full-blown affixes, enter the stress domain. A recent development of this sort seems to be in evidence in Mussau. In the variety of southern Mussau described by Brownie & Brownie (2007:21), the imperfective clitic /=la/, which is final in the verb phrase, is not included in the stress domain. As a consequence, words with this clitic may be stressed on the antepenult. Compare *a.tá.ra* "I see", *a.ta.rái.a* "I see him" and *a.ta.rái.e.la* "I saw him" (op cit. 22). However, in Ross's (2002) description, the imperfective is shown to form part of the stress domain: *máte* "die", *matéla* "die=PF". This is perhaps the most recent example of a shift in the prosodic word-domain in Mussau, but the morphophonology of the language suggests a much more ancient shift of this kind involving the third person singular possessive suffix /-na/.

Mussau has direct and indirect possessive constructions. In the direct construction, the possessive suffix is added directly to the noun stem, while in indirect constructions is it added to a possessive classifier. Directly possessed nouns include inalienables, which must occur with a possessive suffix, and inalienables,

which need not.[19] The third person singular possessive /-na/ like other suffixes triggers a stress shift to the penultimate syllable: *táma* "father (term of address)", *tamá-na* "his father". However, for all relevant inalienable …nV-final stems in the language, there is an unexpected synchronic alternation, illustrated in (11).

(11) Morphophonemic syncope: historical antepenultimate stress with /-na/ 3sPOSS

	Kinship term	Expected 3sgPoss	Attested	From
a.	taitani "wife"	taitaní-na	taitánna	< *taitáni=na
b.	vauseni "husband"	vausení-na	vausénna	< *vauséni=na
c.	kina "mother"	kiná-na	kínna	< *kína=na

The morphophonemic alternations in these forms do not appear to be a consequence of historical *stressed* vowel syncope. If this were the case, then it would be difficult to explain why nouns with suffixed /-na/ have undergone the sound change, but not other suffixed nouns (e.g. /ɣa-lu-lu/ "two:class 4 prenominal", or other unsuffixed nouns (e.g. *inana* "food" < Proto-Oceanic *p-in-aŋan "food, ceremonial food" Blust 1995). Under Blust's original account, vowel syncope is a sound change in progress and should occur between identical consonants within a trisyllabic word, whether the vowel is stressed or not. Under the account proposed here, the regular phonetically motivated sound change applies only to historically unstressed vowels.

In the available data, the third person singular /-na/ always triggers syncope between identical consonants. The indirect possessive construction is described by Brownie & Brownie (2007, 3.7.2). This construction is formed by adding a possessive pronominal suffix to a possessive classifier which occurs before the possessed noun. Possessive classifiers appear to be a closed class, with at least 14 different classifiers identified. Of these classifiers, four show unexpected syncope when followed by third person singluar /-na/. The relevant alternations are shown in (12), from Brownie & Brownie (2007:77).

(12) More morphophonemic syncope with /-na/ 3sPOSS

	Base form of classifier	Expected 3sgPoss	Attested	From
a.	ane- "food"	ané-na	anna	< *áne=na
b.	une- "general things"	uné-na	unna	< *úne=na
c.	ɣolu- "juicy foods"	ɣolú-na	ɣonna	< *ɣónu=na
d.	kalu- "abstract personal items"	kalú-na	kanna	< *kánu=na

19. The exception is that kinship terms, which are inalienable, may occur unsuffixed when used as terms of address (Brownie & Brownie 2007:72–73).

Recall that, synchronically, /-na/ is part of the stress domain: *níu* "coconut", *niúna* "its coconut" (Blust 1984:173), *rá.e* "blood", *ra.é.na* "its blood" (Ross 2002:150), etc. In order to account for the alternations in (12), like those in (11), one must assume an earlier stress pattern where /-na/ was enclitic, with penultimate stress maintained on the base. Note that in (12c,d) one must assume historical assimilation of *l > n / _Vn prior to syncope.

With the proposed history of alternations in (11) and (12), we can return to the few remaining examples of apparent stressed vowel syncope remarked on by Blust (2001). These are adjectives suffixed with /-na/. Some adjectives with /-na/ are clearly derived from nouns and verbs: *kame* "to lie", *kamena* "false", *tuku* "piece", *tukuna* "short", etc. (Brownie & Brownie 2007:65–67). In these cases, the suffix in question appears to be a fossilized instance of the third person singular possessive suffix discussed above. Syncope alternations noted by Blust (2001) are: *koronana, koronna* "false, untrue", *muenana, muenna* "right side".[20] In sum, the synchronic generalization in this case is that /-na/ triggers vowel syncope when suffixed to a …nV- final stem.

This section provides a near minimal pair when we compare synchronic *ánna* "food-3sP" < /ane-na/, and uninflected *inána* "food" (< Proto-Oceanic *p-in-aŋan "food, ceremonial food"). Under Blust's account, where both stressed and unstressed vowels are subject to syncope, the penultimate vowel should delete in both forms. Under the proposed account, *ánna* reflects historical unstressed vowel deletion after /-na/, either directly, or by extension to all /-na/ suffixed forms. In contrast, *inána* has never undergone syncope due to historical stress on the penultimate vowel.

8. Extensions in progress

Under Blust's account, disyllables like *keke* "foot, leg", *susu* "breast" or *toto* "grasshopper" fail to undergo syncope due to a disyllabic output constraint. Under the phonetic account proposed here, penultimate stress will protect initial vowels of these words from syncope. The phonetic account, however, predicts that when possessive suffixes are added to these words syncope will be possible with the normal shift of stress that accompanies suffixation: *kéke* "leg", *kekéna* "its leg" (Ross 2002:150). The form *kekéna* "its leg" satisfies the conditions for syncope under both Blust's account, and the one proposed here. Indeed, support for syncope in this context is found in modern Mussau, as described by Brownie & Brownie (2007).

20. Brownie & Brownie (2007) show *koronna* "true".

> Blust suggests that the motivation for syncope and gemination is the pressure towards a canonical bisyllabic root, and hence words like *susu* "breast" and *keke* "leg" do not show syncope. However, both words are regularly pronounced as monosyllables with initial geminate consonants in current speech. On the other hand, both nouns, as body parts, most commonly occur in a directly possessed form … meaning that the actual word shape is two or more syllables, due to the addition of a possessive suffix. (Brownie & Brownie 2007:16).

The texts and elicited sentences provided by Brownie & Brownie (2007) include two instances of /keke/, both suffixed (13a–b), and two instances of /susu/, both suffixed. Of these four examples, three show syncope of the initial unstressed vowel.[21]

(13) Variable unstressed vowel syncope in modern Mussau (from Brownie & Brownie 2007)

a. *Nima-ne me* ***kke-na*** *sum-sum tale kalio*
hand-3SP and leg-3SP RED-wrap PREP cloth
la=sum-sum-aa mate-na atoa, me mata-ne sum-sum
3p=RED-wrap-HAB die-ADJR PL and eye-3SP RED-wrap
tale mene tuku kateva kalio.
PREP again piece one cloth
"His hands and feet were wrapped with cloth they wrap dead people in, and his face was wrapped with another piece of cloth." (p.109)

b. *A=ghe iri=la ai-naviti eteae ta* ***keke-ghi****.*
1S=PAST tie=PF INST-bind SG:II PREP leg-1SP
"I tied a binding loop to my feet." (p.150)

c. *Kinna karika righi rarum* ***e=ssu-na****, ghe nim*
mother:3SP NEG small liquid LOC=breast-3SP PAST just
toka ***su-ssu*** *poi, ghe ai=e poi rarum*
sit RED-breastfeed EMPH PAST pull=3SO EMPH liquid
e=ssu *ta kinna.*
LOC=breast PREP mother:3SP
"His mother had no milk in her breasts, and he just kept sucking, he pulled hard to get milk from his mother's breast." (pp.135–136)

d. [*Areare* ***ssu-na*** *ghe usai=la*] [*dokta ghe ue=la*
nipple breast-3SP PAST be.sore=PF doctor PAST say=PF
va, "Laa pae mene teva maamaa e=mae-mae
COMP go look.for again EXIST:I mother 3S=RED-come
ssu *aliki eteva."*]
breastfeed child SG:I

21. An additional factor in the reanalysis of /susu/ as /ssu/ may be analogy with the stem of the perfective verb form /su-ssu/ "breastfeed".

> "Her nipple became sore, and the doctor said, "Go and find another mother to come and breastfeed the child." " (p.182)

This is the expected pattern under both the pure phonetic and teleological accounts, though the extension of syncopated CCV forms as in *e=ssu* "LOC=breast" in (13c) can only be handled by analogical extension of the syncopated stem. A similar type of analogical extension was suggested for reduplicated stems in §5 (10). Given the prevalence of suffixed over non-suffixed body part terms, it is not surprising that leveling is to the suffixed form of the stem. Finally, it is worth pointing out that the apparent extension of syncope to unaffixed *keke* "leg" or *susu* "breast" cannot be an instance of Blust's originally proposed sound change involving loss of stressed vowels, since it fails the disyllabic output constraint. In these instance too, it seems Blust would be forced to accept analogy as a factor in extending historically syncopated forms.

9. Concluding remarks

In this study, I maintain that the majority of vowel-zero alternations in Mussau reflect a historical syncope of unstressed vowels between identical consonants. This sound change is still in progress in the language, resulting in the variation illustrated in (13). At the same time, the synchronic alternations reflecting this sound change have been extended analogically, accounting for what appear to be cases of stressed vowel deletion. Other changes, like the apparent shift of stress from antepenult to penult in Blust's data, render the historical loss of unstressed vowels more opaque. Nevertheless, under the current analysis, phonetic motivations of regular syncopating sound change are not compromised. Syncope of unstressed vowels is natural and common, while syncope of stressed vowels is unnatural and extremely rare. Mussau provides a good example of natural developments, once the full range of data is taken into account, and also illustrates ways in which natural developments can feed unnatural ones (Blevins 2006a, 2008, to appear).

While this study may have implications for our understanding of Oceanic historical phonology, it is also meant to contribute to a general theory of sound change. Accumulated knowledge over the centuries shows more and more sound changes with clear phonetic motivations. A useful working hypothesis, inspired by the Neogrammarians, is that all regular sound change is phonetically based. Blust (2005, 2007a, 2007b) has challenged this working hypothesis, with a range of Austronesian sound changes. His basic argument is that, though these sound changes are regular and well attested, they (or intermediate stages leading to them) lack phonetic motivation. As noted in §1, phonetically motivated and attested

intermediate stages have been proposed for the claimed one-step *-w, *-y > *-p* in Drehet and Levei, and *-b/-d/-g > *-m/-n/-ŋ* in Northern Batak and Berawan. Above, I suggest an alternative to stressed vowel syncope in Mussau. In this language, a phonetically-based sound change of regular unstressed vowel syncope has been rendered opaque by subsequent changes, including analogy. Will further cases of phonetically unmotivated sound change hold up to intense scrutiny? By pooling accumulated knowledge of phonetic explanation and attested sound change, we may one day be able to answer this question.

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Résumé

Blust (2005, 2007a, 2007b) propose que plusieurs changements phonologiques ne s'expliquent pas par la phonétique. Un changement de ce genre serait la syncope des voyelles accentuées en Mussau, une langue océanique (Blust 1984, 2001, 2007a). D'habitude les syncopes vocaliques éliminent les voyelles non accentuées. Par contre, la chute de voyelles accentuées est plus difficilement explicable. Une étude approfondie de la phonologie diachronique du Mussau semble indiquer que primitivement, la syncope n'affectait que des voyelles non accentuées faibles. Des changements ultérieurs ont brouillé l'origine phonétique de ladite syncope. L'analyse proposée ici appuie le principe des néogrammairiens, selon lequel tous les changements réguliers (non-analogiques) s'expliquent en termes phonétiques.

Zusammenfassung

Blust (2005, 2007a, 2007b) behauptet, dass eine Reihe gut belegter Lautentwicklungen nicht phonetisch motiviert seien. Eine davon ist die Synkope eines betonten Vokals in der ozeanischen Sprache Mussau (Blust 1984, 2001, 2007a). ‚Normale' Synkopen zielen üblicherweise auf unbetonte Vokale. Im Gegensatz dazu ist der Ausfall eines betonten Vokals aufgrund seiner eigenen Prominenz schwer zu motivieren. Bei näherer Betrachtung der historischen Phonologie im Mussau wird klar, dass die besagte Synkope ursprünglich auf unbetonte Vokale beschränkt war und ihre phonetische Motivation erst im Zuge nachfolgender Entwicklungen obskur wurde. Aufgrund der vorgeschlagenen Analyse wird die junggrammatische These des phonetisch motivierten Lautwandels aufrechterhalten.

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