5 Structure-preserving sound change: a look at unstressed vowel syncope in Austronesian

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1 21st century landscapes[1]

Over the course of the past several hundred years, advances in our understanding of sound change along with 20th century advances in phonetic science and phonological typology have given rise to a new landscape of sound patterns. A particular sound change in a particular language forms part of a population of similar sound changes with similar phonetic bases. Looking at this population, we can explore evidence for phonetic and non-phonetic factors in shaping the topography. Are particular sound changes rarer or more frequent than expected on purely phonetic grounds? And, if so, are they limited to languages or language families with particular structural features? While there has been much progress in explaining the phonetic bases of regular sound change, and simulating change in the laboratory (e.g. Ohala 1974, 1981, 1990; Guion 1998; Hardcastle and Hewitt 1999; Myers and Hanson 2005, 2007), a remaining challenge for any comprehensive theory of sound change is to identify more precisely language-specific structural pressures which may play a role, and to test hypotheses with real language data.

The Austronesian language family is fertile testing ground for the interaction of phonetic and structural conditions on sound change due to its size, its well established structural features, and the numerous recurrent sound changes documented. The great majority of regular sound changes within the family have clear phonetic motivations in misperception, coarticulation, aerodynamics, and/or articulatory weakening and

[1] It is an honor and pleasure to dedicate this paper to Bob Blust, a dear friend and colleague, whose work continues to challenge and inspire me. The leading idea in this paper was first presented in 2003, at a meeting of the Austronesian Circle in Honolulu, where Bob was present. Seeking expertise on a range of issues, I suggested we co-author a paper on Austronesian syncope, and a manuscript, Blevins and Blust (2003), came into existence. However, in the end, the work split seamlessly into two distinct studies: Bob's scholarly and insightful paper on vowel loss between identical consonants (Blust 2007), and this preliminary account of potential asymmetries in the distribution of medial unstressed vowel syncope across Austronesian languages.

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strengthening and are common outside the family (Blust to appear, *pace* Blust 2005; Blevins 2004a; Blevins 2006). Others, like final consonant-loss, appear to have primary structural motivations, and are rare outside of Austronesian (Blevins 2004b). A third class of recurrent sound changes in Austronesian have clear phonetic and structural conditioning. The most striking structural conditioning factor discovered to date is the disyllabic output constraint proposed in Blust (2007). As Blust shows, three independent and recurrent sound changes (initial vowel epenthesis, laryngeal loss, and unstressed vowel loss between identical consonants) occur precisely when their output is disyllabic. This distribution is attributed to a structural feature of the lexicon: over 90% of all reconstructed lexical bases in Proto Austronesian and other early Austronesian protolanguages were disyllables. In the course of language acquisition, high frequency disyllables act as 'attractors' drawing phonetically ambiguous tokens their way. When this current is multiplied over speakers and generations, sound changes appear to conspire to disyllabic outputs.

The existence of language-specific structural pressures has been hypothesized for some time. Within the historical literature, recurrent, or parallel changes in related languages which can not be attributed to chance, universals or diffusion, have been categorized as instances of 'drift' (Sapir 1921; Blust 1978; Blust 1990; Anderson 1990). Under drift, languages which are no longer in contact are believed to move in similar directions due to the continued, independent operation of inherited structural pressures. Though many sound changes can be viewed as having a basis in 'the tendency to increased ease of articulation' or 'the cumulative result of faulty perception', the operation of such forces cannot explain why 'one language encourages a phonetic drift that another does everything to fight' (Sapir 1921:196). Language-specific priming effects have also figured prominently in phonological analyses (e.g. De Chene and Anderson 1979; Kiparsky 1995). Though this type of priming has been looked at from many different perspectives over the 20th century, experimental paradigms of the 21st century provide new empirical support for the existence of language-specific structural pressures.

In a range of experiments, it has been shown that native language biases in speech perception emerge at an early age (e.g. Werker and Tees 2002; Best and McRoberts 2003). Additional studies demonstrate that infants as young as 6 months show sensitivity to distributional information in sound patterns based on previous exposure (e.g. Maye et al. 2002; Saffron and Thiessen 2003). At the same time, agent-based simulations using a production-perception feedback loop demonstrate 'attractor' effects, and are able to model emergent regularities over the lexicon (Wedel 2006, 2007). Blust's discovery of disyllabic attractors in Austronesian sound change noted above, can now be firmly grounded in models of acquisition where infants exposed to a biased lexicon will showed biased perceptions from an early age, and where biases in part of the lexicon will tend to be regularized over time.

2 Structure preserving sound change

Within this new landscape, a general structural principle has been suggested by Blevins (2004a:154) to account for the strong tendency of specific types of sound changes to be structure-preserving. The principle, referred to as 'Structural Analogy', is stated in (1).

(1) Structural Analogy (Blevins 2004a:154)

> In the course of language acquisition, the existence of a (non-ambiguous) phonological contrast between A and B will result in more instances of sound change involving shifts of *ambiguous elements* to A or B than if no contrast between A and B existed.

This principle is relatively simple. If two (or more) phonological segments or prosodic categories are learned quickly due to their unambiguous categorial status, then the existence of those categories in the evolving grammar will attract incoming ambiguous tokens to the pre-established categories. The overall consequence of (1) on historical grammars is 'structure-preserving sound change': the output of a sound change is a category or structure which existed prior to the sound change itself.

Strong typological evidence for structure-preserving sound change is found in surveys of compensatory lengthening (de Chene and Anderson 1979, Kavitskaya 2002) and metathesis (Blevins and Garrett 1998, 2004; Hume 2004). Kavitskaya (2002) argues that compensatory lengthening sound changes result from phonologization of pre-existing differences in phonetic vowel duration. Phonetic factors leading to longer vowel durations include longer V–C transitions, longer vowels before particular consonants, and open-syllable lengthening. In her survey of 80 languages with historical compensatory lengthening sound changes, 72 or 90% occur in languages with pre-existing long/short vowel contrasts, while only 8 or 10% are found in languages without a pre-existing vowel length contrast. The principle in (1) accounts for this tendency by mapping vowels of ambiguous length more often to a long vowel category when this category is independently established by non-ambiguous short vs. long vowel contrasts inherited from a protolanguage. In metathesis, the inversion of segment order has a strong tendency to result in phonotactics which pre-exist in the language at large. For example, 23 of 24 cases of perceptual metathesis, where a long-domain feature is reinterpreted in a non-historical position, involve cases where the output of metathesis yields a pre-existing phonotactic (Blevins and Garrett 1998; 2004). A similar generalization appears to hold of regular CC metathesis; all 11 cases of regular sibilant-stop metathesis surveyed in Blevins and Garrett (2004) and Blevins (2004c), and all four regular cases of CC metathesis in Hume (2004) result in consonant clusters which are characteristic of the pre-sound change stage of the language.

In this study, I would like to explore predictions of Structural Analogy (1) where unstressed vowel syncope is involved. By unstressed vowel syncope, I mean the historical loss of an unstressed vowel in the environment shown in (2), where superscripted 'V' is an unstressed vowel, and periods mark syllable boundaries. (Unstressed vowel syncope can also result in V.CCV and, rarely, VCC.V syllabifications, though these will not be discussed in this paper.)

(2) Unstressed vowel syncope as sound change

$VC^{V}CV > VC.CV$

The phonetic basis of unstressed vowel syncope is relatively uncontroversial. A historically short unstressed vowel when hypoarticulated may be reduced to a point where its vocalic status is ambiguous. The language learner is faced with an analytical problem: is the fleeting vowel a true phonological vowel, or a phonetic transition between neighboring consonants? If a learner decides there is no medial vowel, a syncopating sound change has occurred at the level of the individual. Intrinsic properties of the medial vowel in $VC^{V}CV$ which facilitate syncope are shorter duration and predictable quality. The shorter the vowel is, the shorter it will be under gestural reduction and compression which may accompany hypoarticulation. Short unstressed vowels are the canonical targets of syncope because, generally, unstressed vowels are shorter than stressed vowels, and short unstressed vowels are shorter than long unstressed vowels. Cross-linguistic studies of intrinsic vowel duration show that high vowels are typically shorter than low vowels (Lehiste 1970), so it is not surprising that in some languages, a high vowel is the sole target of syncope. In other languages a central vowel like [ə] may be shorter than others (Gordon 1999), and a unique target of syncope. Another contributing factor to syncopating sound change is the extent to which vowel quality is predictable from local context. When vowel quality is predictable, it can be attributed by the language learner to the phonetics, and need not be lexically represented. This can occur when the unstressed short vowel has a consistent quality, or when the vowel varies according to context, but variation is predictable. In this second case, variable vowel quality may be a consequence of phonetic coarticulation, phonological vowel-copy, or even morphological patterns, like reduplication (Blevins 2005).

The question addressed here is whether, in addition to phonetic factors, language-specific structural properties can inhibit or facilitate syncopating sound change. Structural Analogy (1) predicts that they should. In particular, languages with an unambiguous contrast between closed and open syllables will have a stronger tendency to undergo historical syncope than languages with only open syllables. This prediction appears to hold for many well described cases of historical syncope in the literature (e.g. Old Irish (Thurneysen 1980); Yupik (Jacobson 1984); Chamorro (Blust 2000)). However, the prediction has yet to be evaluated in any systematic way. In the remainder of this paper, I explore the predictions of (1) for unstressed vowel syncope in the Austronesian language family. As will be seen, Structural Analogy is supported by a clear empirical generalization: the most significant structural feature in predicting the occurrence of syncope as sound change in Austronesian languages is the pre-existence of closed syllables.

Before turning to the Austronesian facts, it is important to highlight ways that syncope may differ from two other types of unstressed vowel loss that are common within Austronesian, and especially within Oceanic: final voiceless vowel loss; and *mu > m sound changes (Blevins 2004a:162–164). In these cases, a working hypothesis is that vowels are lost because the language learner typically fails to perceive them. An input string with final …CV̥ presents no ambiguity, since it is (mis)perceived as C-final (cf. Myers and Hanson 2007). No canonical ambiguity is involved, and Structural Analogy is not implicated. If this working hypothesis turns out to be correct, it highlights the importance of distinguishing sound changes based primarily in misperception from others due to ambiguous cue-localization, or ambiguity due to articulatory variability. Certain types of sound change may be greatly influenced by ambient sound patterns, and show strong structure-preservation effects, while others may not.

3 Unstressed vowel syncope in Austronesian

The Austronesian language family is one of the biggest in the world, including over 1000 distinct languages, and covering a vast geographical region from the Indian Ocean to the eastern Pacific. Despite the size of this family, and the diversity among subgroups, there is perhaps no language family, apart from Indo-European, whose comparative phonology is better studied, and an extensive PAn vocabulary has been reconstructed

(Blust 1995; to appear). All of these features make the Austronesian language fertile testing ground for the interaction of phonetic and structural conditions on sound change.

There are several general features of Proto Austronesian (PAn) sound patterns which are relevant to the discussion which follows. First, the vowel system of Proto Austronesian contained three short vowels /i a u/ and one extra-short vowel /ə/ (often written as *e* in PAn reconstructions). Since the extra-short vowel was shorter than the other vowels, it is not surprising that reflexes of Proto Austronesian *ə are targets of syncope in many daughter languages.

Another property of Proto Austronesian relevant to syncope are the syllable types reconstructed. (Here and throughout, reconstructions are from Blust 1995 unless noted otherwise). PAn syllables can be open (*qu.lu 'head', *su.su 'breast') or closed (*nəm.nəm 'think', *səpsəp 'suck'). Closed syllables occur word-finally and in reduplicated monosyllables, and syllable codas include oral stops, fricatives, nasals liquids and glides (*likud 'back', *bukəS 'hair', *bulan 'moon', *balbal 'hit, beat', *Sapuy 'fire'). Stress, of course, is also relevant. However, few protoforms are reconstructed with stress, though most believe it was lexically distinctive.

Finally, it is worth noting that, though the majority of lexemes in Proto Austronesian were disyllabic (Blust 2007), affixed words were often longer, and trisyllables did occur, e.g. *bituqən 'star', *qabaRa 'shoulder', *Cinaqi 'guts', *CaliNa 'ear'. Given the unstressed, reduced nature of PAn *ə, the Proto Austronesian words in table 1 are more likely to undergo unstressed vowel syncope (2) in daughter languages than words with full vowels in same positions. Indeed, there is evidence for syncope of these unstressed medial vowels in many Austronesian languages, as discussed below.

Table 1: Proto Austronesian unstressed /ə/ in potential syncope environments

a.	*baqəRuh 'new'		f.	*qaNəliC	'smell of burnt rice, burning hair, etc.'
b.	*qiCəluR 'egg'		g.	*binəSiq	'seed rice'
c.	*qaləjaw 'day'		h.	*qatiməla	'flea'
d.	*timəRaq 'tin'		i.	*paləCuk	'shoot'
e.	*tuqəlaN 'bone'		j.	*bagəqaŋ	'molar, tooth'

3.2 Formosan languages

The Formosan languages form at least nine primary subgroups within Austronesian (Blust 1999). While data from some of these subgroups is scanty, there is evidence from at least seven subgroups for unstressed vowel syncope. Some representative developments are shown in Table 2, with numbered subgroups corresponding to those in Blust (1999:45). In this and subsequent tables of this type, the final column illustrates maintenance of PAn final consonants. Wherever possible, examples have been used in which the derived coda under syncope is an exact or near segmental match to a pre-existing coda consonant. However, within the proposed model no such exact matching is assumed; in principle, any closed syllable can serve as a potential matching target for an ambiguous …VC^{V}CV… string.

Table 2: Syncope and closed syllables in some Formosan languages

Subgroup	Language	Syncope	PAn final *C maintained
2	Amis	*baqəRuh 'new' > *faʔloh*	*baRaq 'lung' > *falaʔ*
3	Puyuma	*paleCuk 'shoot' > *palTuk*	*biRbiR 'lips'> *birbir*
4	Kavalan	*baŋeliS 'tusk' > *baŋris*	*biraŋ 'to count' > *bilaŋ*
6	Tsou	*qatiməla 'flea' > *timro*	*enem 'six' > *nomə*
7	Bunun	*baqəRuh 'new' > *baqlu*	*baRaq 'lung' > *bahaq*
8	Thao	*baqəRuh 'new' > *faqlu*	*aN-aNak 'child' > *al-alak*
9	Saisiyat	*binəSiq 'seed rice' > *binSiʔ*	*SimaR 'grease' > *ʃimaɾ*

In Tsouic languages (Tsou, Kanakanavu, and Saaroa), where reflexes of PAn final consonants are followed by historically excrescent vowels, Proto Tsouic lacks these final vowels, but does show evidence of medial unstressed vowel syncope, as in PAn *LiSepis 'thin', Proto Tsouic *Lipis, Tsou *hipsi*. This syncope rule is distinct from later unstressed vowel loss, where pre- and post-tonic vowels are lost (Tsuchida 1976:210–211). Note that there is no possibility that these instances of syncope are inherited, since PAn is reconstructed with the syncopating vowel intact. While these facts might seem unremarkable, they are consistent with the predictions of (1): syncope is associated with the pre-existence of unambiguous closed syllables in all Formosan subgroups where it is in evidence.

3.3 Western-Malayo-Polynesian languages

There is great debate as to how the hundreds of Western-Malayo-Polynesian languages subgroup. Here I focus on points of agreement, and demonstrate that there is evidence for parallel independent sound changes of unstressed vowel syncope where PAn final consonants are maintained. The general picture is outlined in Table 3: of the fourteen subgroups of Western Malayo-Polynesian, all of which inherited WMP final consonants, there is evidence for syncope in all but five groups: Batak, Sangiric, South Sulawesi, West Flores, and in Palauan. In at least two of these groups, South Sulawesi and Sangiric, inherited final consonants are highly limited (Sneddon 1984, 1993) further supporting an association between syncope and unambiguous closed syllables. Within all other groups, historical syncope is attested in either all languages, or in some languages, but not others, suggesting independent parallel developments. Note that many Philippine languages like Tagalog show syncope of suffixed forms of **qatəp* 'roof; thatch' (*atíp* 'roof', *aptán* 'thatch a roof), while others, like Bikol, do not (*atóp* 'roof', *atopán* 'to roof, to thatch'). This shows either that syncope followed the breakup of Proto Philippines, and many of its descendant protolanguages, or that vowels have been restored by analogy with unsuffixed forms.

Table 3: Historical syncope in Western Malayo-Polynesian languages

Subgroup/language	Syncope?	PAn final *C maintained
1. Central Cordilleran	yes	yes
2. Central Philippines	yes	yes
3. Manobo	yes/no**	yes
4. Samalan	yes/no**	yes
5. Chamorro	yes	yes
6. Palauan	no	yes
7. North Sarawak	yes	yes
8. Malayo-Chamic	yes	yes
9. Barito	some languages	yes
10. Batak	no	yes
11. Sangiric	no	rarely
12. South Sulawesi	no	rarely
13. West Flores	no	yes
14. Watubela	yes	yes

**Contradictory evidence: some reflexes of *…VCəCV… show syncope while others do not

For particular cognate sets, it is difficult to find Western Malayo-Polynesian languages which maintain reflexes of initial and final CV in PAn *CVCəCV but do not show regular syncope of the medial vowel. For example, for **baqəRuh* 'new', of the 47 WMP languages listed in Blust (1995) and the 43 minor Philippine languages surveyed in Reid (1971), only two show unambiguous trisyllabic cognates without syncope: Sundanese *bahayu* 'recently', and Samal *bahaqu* 'new'. Blust (1995) also shows Malay variants *baharu, bahru, baru* 'new; fresh; now at last', with two variants reflecting syncope. Table 4 gives a representative subset of WMP languages where syncope and maintenance of PAn final consonants are both in evidence.

Table 4: Syncope and closed syllables in some WMP languages

Language	Syncope	PAn final *C maintained
Ilokano	*qaləjaw 'day' > *aldaw*	*biRbiR 'lips' > *birbir* 'rim'
Isneg	*qaləjaw 'day' > *alxaw*	*bituqen 'star' > *bittuwan*
Bikol	* qaləjaw 'day' > *aldaw*	*sakal 'muzzle, yoke' > *sakal*
Chamorro	*qaləjaw 'day' > *atdaw* 'sun'	*qipil 'ko tree, *Intsia bijuga*' > *ifet*

3.4 Central Malayo-Polynesian languages

Blust (1993) demonstrates that PAn final consonants are retained in Proto Central Eastern Malayo-Polynesian and in Proto Central Malayo-Polynesian (PCMP). Reconstructions in Table 5 from Blust (1993) show that word-medial consonant clusters were simplified to single consonants (5i), while word-final consonants were typically maintained (5i-ii). (Two exceptions to this are regular loss of PAn final **h* (**talih* > *tali*) and irregular loss of final **k* in **qabu* 'dust' < **qabuk*.)

Table 5: PAn coda consonants lost medially, retained finally in CEMP (Blust 1993)

	PMP	PCEMP	PCMP	Gloss
i.	*baqbaq	*babaq	*babaq	'mouth'
	*sepsep	*səsəp		'suck'
	*gurgur	*gugur	*gugur	'thunder'
	*tektek	*tətək	*tətək	'cut wood'
ii.	*qatep	*qatəp	*qatəp	'thatch'
	*kulit	*kulit	*kulit	'skin'
	*taŋis	*taŋis	*taŋis	'cry'
	*inum	*inum	* inum	'drink'

Given the suggested correlation between pre-existing closed syllables and unstressed vowel syncope, syncope is expected in CMP languages prior to subsequent developments involving final consonant loss and/or final vowel accretion. However, this hypothesis is very difficult to evaluate in many CMP languages due to independent sound changes. For example, the loss of prepenultimate *{h,q}Vs (Blust 1993:263–264) eliminates certain trisyllables (e.g. continuations of 3b,c,f,h) which might otherwise be subject to syncope. For example, reflexes of PAn **qateluR* 'egg' are disyllabic: Bima *dolu*; Manggarai, Ngadha, Lio, Sika *telo*; Lamaholot *telu-k*; Kedan *tolor*; Kambera *tilu*; Savu *delu*; Roti *tolo*; Tetun *tollu-n*; Kemak *telo*; Mambai *telo-n*; Kisar *keru-nne*; Leti *ternu* (< **terunu*); Selaru *tesu*; Ujir *tuli*; Ngaibor *tulir*; Kei *tolur*, Elat *tulur*; Geser *tolu*; Bonfia *toli-n*; Nuaulu *tou-ne*; Paulohi *terur*; Buru *telu-n*; Soboyo *tolu*. As disyllables, these words are no longer targets of the sound change in (2), whose input is trisyllabic. However, in at least one CMP language Watubela, a change of **q* > *k* appears to have saved the initial syllable, with subsequent syncope giving rise to *katlu* 'egg'.

Another irregular sound change applies to **bəqəRu* 'new' (Blust 1993:266). Perhaps due to the sequence of schwas, there is irregular coalescence of the first two syllables, bleeding syncope: PAn *baqeRu 'new'; PCEMP **bəqəRu*; Bima *ʔbou*; Manggarai *weru*; Sika *weru-ŋ*; Roti *beu-k*; Atoni *feʔu*; Tetun *foo-n*; Mambai *heu*; Kisar *woru-woru*. It appears then that in the majority of CMP languages, *…VCəCV strings have been simplified to disyllabic strings by independent sound changes, eliminating many potential targets of syncope. Where trisyllabic strings like PAn **qateluR* 'egg' have not been reduced to disyllables by other means, syncope is in evidence, as in Watubela *katlu*.

3.5 South-Halmahera-West New Guinea languages

The South Halmahera-West New Guinea group includes about 40–50 languages. Blust (1993) provides comparative data for Buli and Numfor which make it clear that Proto SHWNG also maintained inherited final consonants: compare PCEMP *laman 'deep', Buli *m-laman*, Numfor *ramen*; PCEMP *malip 'laugh', Buli *a-mlif*, Numfor *mbrif*, etc. Blust (1978) reports on one of the distinctive sound changes evidenced in many SHWNG languages: post-nasal syncope giving rise to word-initial NC… sequences. For example, in the Waikyon dialect of Taba (Bowden 2001:50), we find *mto* 'eye' < PSH **mta* < PAn **maCa*. The same syncope is in evidence in Buli *-mlif* and Numfor *mbrif* 'laugh' from PCEMP *malip 'laugh'. Due to this sound change as well as others, there are no cases where an inherited *…VCəCV from PAn, PMP, or PCEMP is in evidence. In some instances, as in CMP languages, *…VCəCV is reduced by other means to a disyllable. In other cases, penultimate stress (with vowel quality change) blocks vowel loss.

However, the synchronic phonologies of SHWNG languages for which detailed descriptions are available provide evidence for historical syncope. One of these languages is Taba (Bowden 2001). Taba, like Buli and Numfor, shows retention of inherited final consonants: *mloŋan* 'depth' < *ma* + PCEMP **laman*, -*amlih* 'laugh' < PCEMP **malip*, *mlút* 'be soft' < *ma* + PCEMP **lut*), etc. In Taba, stress is regularly penultimate (Bowden 2001:51–53). Synchronic alternations in (3) appear to reflect historical syncope of an unstressed post-tonic vowel (Bowden 2001:64–70). The syncope in (3) only occurs with applicatives -*o* and -*Vk*. The fact that regular penultimate stress is not found with applicative -*o* and -*Vk* suggests that these affixes predate the regular penultimate stress rule, and hence reflect an older stage of the language when *VC^{V}CV > *VCCV.

(3) Synchronic syncope in Taba, a SHWNG language (Bowden 2001:64–70)

Verb	Applicative verb
lékat	*lékto* 'be bad'
báliŋ	*bálŋik* 'wrap up'
búlaj	*búljak* 'twist'
téden	*tédnek* 'stack'

Another SHWNG language with limited synchronic syncope alternations is Sawai (Whisler and Whisler 1994). With the location focus suffix which may be cognate with Taba -*o*, we find alternations like: *n-Obɛn, wObn-o* 'new', *tapɛn, n-tapn-o* 'shoot'.

3.6 Oceanic subgroups with inherited final consonants

Within the Oceanic subgroup inherited final consonants are maintained only in Admiralties, Western Oceanic (North New Guinea Cluster, Papuan Tip Cluster, Meso Melanesian Cluster), New Caledonia, and Southern Vanuatu. Other subgroups (South-East Solomons, Micronesian, North Central Vanuatu and Central Pacific) are characterized by loss of inherited final consonants. Where this loss has resulted in languages with only open syllables, e.g. in Central Pacific, syncope is unexpected under the present account. However, in languages which maintain final consonants, historical syncope is expected.

Within the Oceanic group, however, additional sound changes, including shifts of stress to the penultimate syllable, have eliminated many contexts where syncope could apply. This appears to be the case, for example in the Huon Gulf languages of the North New Guinea Cluster within Western Oceanic. Huon Gulf languages maintain inherited final consonants (Table 6), though the same consonants were lost in the sister Schouten Chain group (Ross 1988:124).

Table 6: Retention of POC final consonants in Proto Huon Gulf

POC	PHG	Wampur	Hote	Mapos Buang	Gloss
*banic	*banic	*banit*	*banik*	*banis*	'wing'
*kupit	*kupic	*ubit*	*kupik*		'bark'
*manuk	*manuk		*menak*	*mank*	'bird'

However, regular penultimate stress blocks potential syncope in reflexes of PHG **tavuRi* ‘Triton shell’, PHG **åalivan* ‘centipede’, PHG **maliboŋ* ‘flying fox’, and PHG *vituåun* ‘star’. Instead, some Huon Gulf languages show reduction (or deletion) of the post-tonic or pre-tonic vowel as in, e.g. Mapos Buang, Kaiwa *mank* < **manuk*, Mapos Buang *btuåŋ* < PHG **vituåun* (Ross 1988:71), while others maintain trisyllabic CVCVCV sequences with penultimate stress, e.g. Kove *pitoho*, Tuam *pitola* < Proto Bariai **pitoRo* < POC **pitolo* ‘hungry’ (Ross 1988:176).

Within Remote Oceanic, where subgrouping is better established, and where historical phonology is better documented, we can see clear cases where languages with inherited final consonants show syncope. This is true of Southern Vanuatu languages, as detailed by Lynch (2001). In Table 7 Southern Vanuatu languages show retention of word-final Proto Oceanic consonants.

Table 7: Retention of Proto Oceanic final consonants in Southern Vanuatu languages (Lynch 2001:102)

POc	Sye	Lenakel	Anejomw	Gloss
*kurat	*no/årat*	*na/uias*	*no/uras*	*Morinda citrifolia*
*tanum	*tenəm*	*renəm*	*a/tenom*	‘bury’
*saqat	*sat*	*taat*	*has*	‘bad’
*manuk	*menuå*	*menuk*	*n/man*	‘bird’
*rarap	*n/arap*	*n/aiəv*	*n/ara*	Erythrina sp.
*quloc	*n/ilah*	*n/ilah (S)*	*n/ija*	‘maggot’
*pekas	*e/våah*	*a/vhe*		‘defecate’
*tuqur	*e/tur*	*a/lel (S)*		‘stand’
*(ŋ)awaŋ	*ovaŋ*	*owaŋ*		‘be open’

In Table 8 Southern Vanuatu languages show evidence of unstressed vowel syncope. In these examples medial pre-tonic vowels were regularly deleted. Stress in these languages is on a final CVC syllable, otherwise on the penultimate syllable.

Table 8: Southern Vanuatu syncopating sound change in verbs (Lynch 2001:115–117)

Proto Oceanic	Sye	Lenakel	Anejomw	Gloss
*a-bulut-i	*amplehi*			‘stick to’
*a-paŋan-i	*avŋoni*			‘feed’
*a-panako		*əvnak*		‘steal’
*a-punuq-i			*opra*	‘long’
*a-bulut	*amplet*	*apwiit*	*apwol*	‘sticky, stick to’
*a-likos	*elki*	*əlkəs*	*ajåei*	‘hang, tie up’
*a-mataq	*emte*	*amra*	*mat*	‘raw, new’
*a-labwat		*ipwər*	*alpwas*	‘large’

In Southern Vanuatu, and the majority of Austronesian languages which have inherited closed syllables from Proto Austronesian, a sound change of unstressed vowel syncope has occurred. The same is not true of Austronesian languages which have evolved to have only open syllables, as I now demonstrate.

4 The absence of syncope in languages without closed syllables

4.1 Central Pacific

The loss of final consonants in the history of Oceanic has given rise to subgroups which, historically, lacked closed syllables altogether. This is the case for Central Pacific, which includes Rotuman, the Fijian languages, and the Polynesian languages. An interesting aspect of the sound patterns of these languages is not only that none appear to have synchronic syncope alternations, but also that in the several thousand years of independent development, none has innovated a regular (medial) syncopating sound change. (For a discussion of vowel loss in word-initial [CVC… sequences, see Blust (2007).)

At the same time, the absence of historical syncope cannot be attributed to the failure of unstressed vowels to reduce. Phonetic studies of Fijian fast speech show significant reduction of unstressed vowels (Tāmata 1994; Erickson 1996), and in the history of Rotuman, final unstressed vowels have arguably become voiceless, with subsequent loss giving rise to the so-called ‘incomplete phase’, yielding synchronic closed syllables (Blevins and Garrett 1998). An explanation for the failure of syncope as sound change then cannot be found in the phonetics of the language. The Austronesian languages that have undergone syncope, as well as those that have not, all show V.C^{V}.CV sequences, but syncopating sound change is common where closed syllables pre-exist, and rare where they do not.

4.2 Muna, a Western Malayo-Polynesian language

Other languages with only open syllables show the same general resistance to syncopating sound change. While general final C-loss is rare outside of the Oceanic languages, it has occurred in many Western Malayo-Polynesian languages of eastern and southeastern Sulawesi and neighboring islands, including Muna (Van den Berg 1989, 1991, 1996). In Muna, as in the Central Pacific languages, stem-final consonants are lost finally, but may be preserved under suffixation. Compare, for example Muna *kuli* ‘skin’ and *kulusi* ‘peel’, both from PMP **kulit* skin’. Unlike many Western Malayo-Polynesian languages which show synchronic reflexes of earlier historical syncope, there is no evidence of syncope in Muna. Compare PAn *qatəluR ‘egg’, Muna *ʀunteli*; PAn baqəRu ‘new’, Muna *buʀou*, *qapəju ‘gall’, Muna *ʀufei*: in all cases, trisyllables are maintained.

4.3 Malagasy

Malagasy is thought to be most closely related to the Southeast Barito languages of South Kalimantan (Blust to appear). While the loss of final closed syllables via final vowel paragoge is an areal feature of many Sulawesi languages, the majority of Southeast Barito languages have inherited WMP final consonants, and maintain final closed syllables. The majority of these languages also show evidence of historical unstressed vowel syncope.

However, modern Malagasy has no closed syllables at all. Medial clusters resulting from earlier syncopes have been eliminated, and all historical final consonants are either lost, or followed by an epenthetic vowel as illustrated in (4) for the Merina and Sakalava dialects.

(4) Malagasy final C-loss and V-insertion

a. *taŋan 'hand' > Merina *tánană,* Sakalava *táŋa*
b. *kulit 'skin' > Merina *húdiÔra,* Sakalava *húlitse*
c. *putiq 'white' > Merina *futsi,* Sakalava *futi*

Whether the shift to open syllables is due to contact with Bantu languages (Dahl 1988) or not, the only evidence for syncope is that which occurred in the mother language of Malagasy and Kelabit, before the sound changes in (4). An example showing this early syncope is PAn *bekelaj 'spread out, unroll', Kelabit *bera?aŋ,* Merina Malagasy *velatra*. There is no evidence for syncope in Malagasy post-dating its shift to an open-syllable-only language: Cf. **enem* 'six' Merina **é***nina*; **eseŋ* 'blow the nose', Merina **é***sina,* etc. This is true even though the sound change of *ĕ > *i* makes unstressed *i* an expected syncope target in these word types.

4.4 Early vs Late Micronesian developments

Proto Micronesian lost inherited Proto Oceanic final consonants. As in other Oceanic languages, these consonants were maintained in suffixed forms, including transitive verbs and possessed nouns. After loss of these final consonants, Proto Micronesian shows only open CV syllables. Consistent with (1), there is no evidence of regular syncope in Micronesian languages until closed syllables re-evolve by a later sound change involving loss of word-final voiceless vowels (Rehg 1991). Within Micronesian, syncope is evident at this later stage for several languages, including Mokilese (MOK): PCEMP **saku layaR* 'sailfish, swordfish > MOK *daklar*; POC **qapaRa* 'shoulder' MOK *aprO* 'his shoulder'; POC **takuRu* 'back' > MOK *jarkin* 'his back'; MOK *pwalik/pwOlkO* 'foot/3sg'. Note that MOK *pwirej* 'dirt' < **pwire-/jV* < PMP **budiN* 'charcoal, carbon, soot' supports the loss of final Vs before syncope, though the etymology differs from Harrison (1984), who suggests MOK *pwije* 'excrement' from POC *mpu(dr)i(t), and *pwirej* 'dirt' < *mpu(dr)i(t)-V.

4.5 A Polynesian exception that proves the rule?

The account above associates the absence of syncopating sound changes in Central Pacific with the open-syllable template of these languages. The absence of ambient closed syllables means that language learners are less likely to reinterpret $VC^{V}CV$ as VC.CV; where closed syllables have already been experienced and categorized as such, they can serve as templates to which ambiguous $VC^{V}CV$ strings can be matched. Among the Central Pacific languages, there are few exceptions to this association. However, at least one Polynesian Outlier, Mele-Fila of Vanuatu, is described with medial vowel syncope (Elbert 1965). Of particular interest is that this language has borrowed a substantial proportion of its vocabulary from neighboring Efate dialects, which do have closed syllables and consonant clusters. Consonant clusters in borrowed words include /tl, np, nt, nf, ns, nm, nl, nr, rp, rk, rs, lt, ls, lm, st, sm, ft, fk, fm, mk, kt, km/, while those resulting from syncope include /tp, tf, tn, t**l**, tm, tv, sk, fr, pl/. In this case, contact-induced change has increased the phonotactic complexity of Mele-Fila, endowing it with consonant clusters and closed syllables. This change, in turn, appears to be the trigger of subsequent syncope.

5 Discussion

While the facts surveyed above are generally consistent with Structural Analogy (1), and might be used to support non-phonetic structural influences on sound change, alternative explanations for syncope resistance clearly exist. Languages with only open syllables may be 'syllable-timed', with less vowel reduction than 'stressed-timed' languages (see Dauer 1983 for refinement and decomposition of these terms). With less vowel reduction, syncope may be less likely for purely phonetic reasons. An additional factor concerns the positioning of stress: perhaps vowels that syncopate in one language are stressed in another, due to stress shift. In the most comprehensive discussion of Proto Oceanic stress to date, Lynch (2000) documents shifts from the Proto Oceanic system which stressed final closed syllables, otherwise penult. In all cases, medial unstressed vowels are present once affixed forms are taken into account. Though it is true that languages with regular penultimate stress should only show syncope (2) in words of four or more syllables, words of this type are attested in the Oceanic languages under study, but do not show syncope.

An interesting question is whether the type of structural priming argued for in this study can be demonstrated in the laboratory. Experimental paradigms for testing phonological priming exist, though to date, they have been used primarily to explore the nature of phonemic categories. Mielke (2003) demonstrates the role of language-specific knowledge in the perception of /h/, including distributional properties, while Halle and Best (2007) demonstrate significant language-specific phonotactic effects on the perception of coronal-lateral consonant clusters. Cutler et al. (2005) summarize a range of work on phonemic category plasticity: when listeners are exposed to phonetically shifted categories in lexical decision tasks (e.g. /f/s shifted phonetically towards /s/, or vice versa), subsequent categorization tasks show that (i) subjects have more inclusive phonemic categories depending on the shifts they are exposed to; and (ii) they extend this shift to other words. Could experience with open-syllable-only words induce listeners to categorize $VC^{V}CV$ sequences as VCVCV, while others, exposed only to VCCV shift $VC^{V}CV$ tokens to instances of VCCV? It is hoped that this brief survey of unstressed vowel syncope in Austronesian will stimulate experiments of this sort, as well as further cross-linguistic studies of syncopating sound change. Does unstressed vowel syncope occur significantly more often in languages with pre-existing closed syllables, as the principle of Structural Analogy suggests? For Austronesian languages, the answer appears to be yes. However, closer examination of these cases along with broader cross-linguistic surveys are clearly necessary before one can answer this question with any degree of certainty.

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