Chapter 3

*b > -*k*-: A Berawan sound change for the ages

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Berawan, an Austronesian language spoken in northern Sarawak, Malaysian Borneo, is one of several languages in central and western Borneo that have unusually innovative phonologies. Not only are these phonologies rich in number of changes, and the effect they sometimes have on concealing cognation (e.g., Malay *bəruaŋ* and Long Terawan Berawan *kəbiŋ* 'the Malayan sun bear: *Ursus malayanus*' are cognate), but the search for theoretically-supported motivations for some changes leads nowhere. One of these changes in all dialects of Berawan is *b > *k* in intervocalic position, a change that is abundantly attested, and therefore not in question as a valid transition from an earlier to a later state of the language. A basic question is whether this was a one-step change, or a telescoping of several phonetically more 'natural' changes, and while it can be resolved into a two-step change, this hardly relieves our sense of theoretical angst, since so far as the evidence allows us to infer, these changes were *b > *g* in intervocalic position, followed by intervocalic devoicing of *g* from two historically distinct sources. Attempts so far to show that this change involved other intermediate steps have yet to be successful.

1 Introduction

Bizarre sound change is not a topic that is well-suited to congenial dinner chat. Before they know it, the conversationalists are apt to snatch up fork and knife, and face off across the table in a confrontational mood, ready for battle. The defender of theoretical orthodoxy demands: "How do you *know* that this unexpected transition was a single change, and not the telescoping of multiple smaller and (of course) more expected sound changes?", to which the other, ignoring his

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eggplant, responds with equal passion: "How do *you* know that there were 16 baby steps between *x and /y/ if there is no direct evidence of them?" In the end, those who are unwary enough to be dragged into this kind of conversation are more likely to experience indigestion than enlightenment.

That is the risk I take here in introducing to the world of linguists a piece of the phonological history of Berawan, a cluster of four closely-related Austronesian languages or divergent dialects of a single language spoken in the basin of the Baram river in northern Sarawak, Malaysian Borneo. The Berawan languages (Long Teru, Long Jegan, Batu Belah and Long Terawan) belong to the North Sarawak subgroup, which comprises four primary branches:

1. Dayic (Lun Dayeh/Lun Bawang, Kelabit, Sa'ban, Tring, etc.).
2. Kenyah (many communities in central Borneo).
3. Berawan-Lower Baram (the Berawan languages and others in the lower course of the Baram river, such as Kiput, Narum, and Miri).[1]
4. Bintulu.

The Berawan group itself breaks down into two primary branches:

1. Northern Berawan (Long Terawan).
2. Southern Berawan (Long Teru, Batu Belah, Long Jegan).

Gluttons for punishment can find further details in Blust (2010).

2 Sound change and reflex

Any historical linguist worth his salt knows the difference between a sound change and a reflex. Nonetheless, when he attempts to express the mapping between the phonological shape of a language at earlier and later states in the most neutral terms possible, well-meaning critics feel little restraint in peppering him

[1]The Berawan-speaking communities are Long Terawan, on the Tutoh branch of the Baram river, Long Teru and Long Jegan, on the Tinjar branch of the Baram, and Batu Belah, on the Apoh branch of the Baram. Place names in Sarawak often are based on a reflex of *əluŋ 'confluence, place where two rivers meet' (hence 'Long Teru' is at the confluence of the small Teru river with the larger Tinjar). Batu Belah, by contrast, means 'split rock', and shows up in more than one part of the Austronesian world as a place name based on a topographical feature.

with questions of the form "Have you thought about intermediate steps x, y and z?" To some extent, this is because the term 'sound change' is often used loosely either for a single phonetic transition from one state to another, as in the title of this chapter, or for a reflex, which may encode an accumulated history of changes (but would you want to read a chapter titled '*b > *-k-*: A Berawan reflex for the ages'?).

However, more generally, this insistence on breaking down phonetically puzzling reflexes into smaller, phonetically motivated steps is due to an ideological stance that adheres consciously or unconsciously to the proposition "Most sound changes are phonetically motivated; *therefore* all sound changes are phonetically motivated." We need not comment on the groans coming out of Aristotle's grave when we dare to state something so outrageous to basic principles of logic, but it is hard not to infer this presupposition when theoretical purists insist that a change such as Proto-Polynesian *l > Rennellese /g/ ([ŋg]), or *w > Sundanese *c-, -nc- must* have involved intermediate steps (Blust 2005).

Science in all its manifestations is obviously more than a collection of observations about the real world. What organizes these observations into a network of mutually-supportive data is the framework of theoretical constructs that show *why* these observations take the form they do as observable consequences of an unobservable reality. One can think of this as triangulation: at the base of the triangle are two or more (possibly many more) observations about the world that may or may not be causally connected, and at the top is a theoretical construct that cannot be observed, but is justified by its ability to show that various superficially dissimilar observations are the expected consequences of a single underlying reality. Although we daily place our trust in its existence, no one has ever seen gravity, yet we accept it because of a wide range of sensory impressions that tell us it must exist. A proto-language is a theoretical construct that occupies the top of a theoretical triangle much like gravity does, and it is justified only to the extent that it serves to explain diverse observations about languages that follow as expected consequences of its existence. In the rest of this chapter, I will adhere to that basic principle of good science called "Occam's razor", meaning that I will assume only what is necessary to explain the primary observations that make up a scientific corpus as the expected consequences of an underlying reality that has been independently justified through prior reference to a wider range of other observations.

3 Before Berawan

As already noted, the Berawan languages form part of a Berawan-Lower Baram subgroup that itself is one of four primary branches of the North Sarawak subgroup of Austronesian languages. Suffice it to say that there are various proto-languages to which the sound changes in Berawan could refer. In the interest of citing forms that are well-known to a relatively large number of people (at least those familiar with Austronesian historical linguistics), one might refer to Proto-Malayo-Polynesian (PMP), the hypothetical ancestor of the non-Formosan Austronesian languages. However, because Proto-North Sarawak (PNS) had already undergone several important sound changes that are relevant to discussing the phonological history of Berawan, I will generally use PNS reconstructions, and only resort to higher-level (and hence more widely-known) reconstructions if this sheds additional light on the problem at hand.

Proto-North Sarawak had a simple four-vowel system (*i, *u, *a and the schwa *ə), and the consonant system shown in Table 1. Canonical shape of base morphemes was CVCVC, or less commonly CVNCVC, where N was a nasal homorganic with the following obstruent.

Table 1: The Proto-North Sarawak consonant system

	bilabial	dental/alveolar	palatal	velar	uvular	glottal
voiceless plosive	p	t		k		ʔ
voiced plosive	b	d	j	g		
voiced aspirated plosive	b^h	d^h	j^h	g^h		
voiceless sibilant	s					
nasal	m	n	ñ	ŋ		
lateral liquid	l					
flap	r					
trill					ʀ	
glides	w		y			

The voiceless obstruents require little discussion. So far as their reflexes permit us to infer, they were unaspirated. Plosives *p, *t, and *k could occur in any position, but *ʔ was contrastive only medially and finally, not morpheme-initially.

The voiced obstruents *b, *d, *g were the voiced equivalents of *p, *t, *k, except that *t was postdental, and other consonants in column 2 were alveolar. In PNS, the palatal affricate *j lacked a voiceless counterpart, which either merged with *s before PNS came into being, or merged with *s recurrently after the split-up of PNS, leaving no trace of its former presence.

As noted in a number of previous publications (Blust 1969, 1974, 1993, 2005, 2006, 2016, the segments written b^h, d^h, j^h, g^h meet Ladefoged's (1971: 9) definition of true voiced aspirates (phonologically unitary segments that begin voiced and end voiceless, with optional delayed VOT on the following vowel), although throughout his career he continued to deny this for reasons that were never clear to me personally (e.g. Ladefoged & Maddieson 1996: 80).

The only other segment that requires special comment is *R, which is reflected as /r/ or /l/ in many Austronesian languages, but as /g/ or /h/ in others (for a full discussion of the variety of reflexes of this rhotic see Blust 2013: 595–596).

Appendix A provides minimal evidence supporting this reconstructed system in intervocalic position, which is the position that most concerns us in this chapter. Insufficient evidence is available for reconstructing PNS *-ñ- and *-r-, although at least *ñ is reconstructable as a word onset. *r is more problematic throughout Austronesian, but is supported as distinct from *R in a handful of forms in Kenyah languages. These gaps have no effect on the argument to follow.

4 What happened to Berawan?

The four Berawan dialects/languages naturally share some phonological innovations apart from other North Sarawak languages, but they also each have individual peculiarities that set them apart from their subgroup-mates. The sound change I address here applies to all four Berawan speech communities, but in the interest of coherence, I will consider mainly the Batu Belah dialect (hereafter BBB), for which I recorded the largest number of relevant forms, with passing remarks on the others where I feel this might be helpful.

Since my concern is with the development of intervocalic *b in the Berawan languages, it will be well to start by observing the reflex of PNS *abu 'ash' in Appendix 1. In Kelabit this is *abuh*, the only change being the historically secondary *-h* that was added here and in a number of other forms. The Long Anap dialect of Kenyah lacks a cognate, although other Kenyah dialects have one (e.g. Long Atip *avoʔ* 'ashes, hearth'), and the Bintulu form is *avəw*. In each of these languages, we see a readily recognizable sound change in which a voiced bilabial stop has been either retained or lenited to a labiodental fricative. But what happened to Berawan? BBB *akkuh* sticks out like the proverbial sore thumb. Is it related at all? One's first guess is "probably not", but the only way to test decisions of cognation is by *recurrence*, which is, and always has been, the key to determining cognation. This is a point that is often misunderstood by scholars in sister disciplines, such as cultural anthropology, and even by some linguists who have had

little experience in dealing with historical questions. So, the next question must be: "What happened to intervocalic *b in other reconstructed forms?"

Table 2 lists all other BBB reflexes of PNS forms with medial *b for which I have data.

Table 2: Reflexes of PNS *-b- in Batu Belah Berawan

PNS	BBB	
*abu	akkuh	'ash'
*babuy	bikuy	'pig; wild boar'
*bəlabaw	bəlilkiw	'rat'
*bubu	bukkuh	'conical bamboo fish/eel trap'
*bubuŋ	bukuŋ	'ridgepole of house'
*kabiŋ	kakiŋ	'left side'
*lubaŋ	lukiŋ	'hole in the ground'
*mabuk	makuk	'drunk'
*nibuŋ	nikuŋ	'nibong palm, *Oncosperma* spp.'
*Rabun	gikuŋ	'cloud'
*Ribu	gikkuh	'thousand'
*tuba	tukkih	'fish poison, *Derris elliptica*'
*ubi	ukkih	'yam'

All thirteen of these etymologies are completely straightforward: the reconstructions are well-established not only in PNS, but in higher-level proto-languages, as cognates that contain a medial voiced bilabial stop or some phonetically transparent lenition of it are found in scores or even hundreds of other languages, depending on the form. They are completely straightforward, and they are completely crazy – how does a language change *b to /k/, and undergo this change only in intervocalic position?

The next step, then, is to show that PNS *b > Berawan *-k-* was conditioned. This is already clear from the four *b-initial words in Table 2, but to show that PNS developed along fundamentally different lines in word-initial, medial and final positions, a fuller set of data is given in Table 3, leaving aside the forms already mentioned.

Although only two examples of *b > *-m* could be found in my fieldnotes, the nasalization of word-final voiced stops in Berawan is supported by more numerous examples of *d > *-n/ŋ*:

(1) PNS *alud > *aloŋ* ‘boat’, *kuyad > *kuyan* ‘gray langur’, *likud > *likoŋ* ‘back (anat.)’, *pusəd > *pusən* ‘navel’, *tumid > *tumin* ‘heel’, and *uləd > *uləŋ* ‘maggot, worm’, where word-final *d normally became *ŋ* after rounded vowels, and *n* elsewhere.

One other thing to show is that PNS *p did not undergo labial backing in intervocalic position, which enables us to infer that this change in the data of Table 2 must have preceded intervocalic devoicing (hereafter IVD), since otherwise PNS *p and *b would have merged as /k/ intervocalically. This should be clear from Table 4.

Table 3: Reflexes of PNS *b- and *-b in Batu Belah Berawan

PNS	BBB	
*b- > *b*		
*bahu	biʔoh	‘stench, odor’
*balu	billoh	‘widow(er)’
*baRa	bikkeh	‘shoulder’
*baRiw	bikiw	‘wind’
*batu	bittoh	‘stone’
*batuk	bitok	‘nape; neck’
*bawaŋ	biwaŋ	‘expanse of water; lake’
*bədʰuk	bəcuk	‘monkey sp.’
*bəkən	bəkən	‘other, different’
*bəRas	bəkiʔ	‘husked rice’
*buaya	bijjih	‘crocodile’
*buku	bukkuh	‘node, joint’
*bulan	bulin	‘moon’
*bulu	bulluh	‘body hair; feather’
*-b > *m*		
*eleb	lu-ləm[a]	‘knee’
	ŋ-uam	‘to yawn

[a]Cf. Long Jegan, Long Teru *ləm* ‘knee’. For the likely explanation of the first syllable in the BBB form, cf. Malay *lutut* and similar forms for ‘knee’ in other languages < PMP *qulu tuhud ‘head of the knee’ (= knee cap).

Table 4: Reflexes of PNS *-p- in Batu Belah Berawan

PNS	BBB	
*anipa	lippah	'snake sp.'
*apuR	apon	'lime (for betel)'
*apuy	apoy	'fire'
*kapal	kapan	'thick (as a plank)'
*lipen	dipan	'tooth'
*lupi	luppeh	'dream'
*sepaq	supa	'betel quid'
*tapan	tapan	'winnowing basket'

Several of these Batu Belah forms show irregularities in the development of a single vowel or single consonant, but all appear to be native, and together with data from other Berawan dialects they leave no question that PNS *p remained unchanged, in stark contrast to the development of intervocalic *b.

The last thing to mention in this section is that *b is not the only PNS phoneme that has undergone IVD. As noted following Table 1, PNS *R (and its predecessor in earlier proto-languages back to Proto-Austronesian (PAn)) apparently was either an alveolar trill that became uvular in many daughter languages before undergoing further change, or a uvular trill that became alveolar. Some of the best-known languages in the Austronesian family reflect it as /r/ (e.g., Malay). Others reflect it as /g/ (e.g., Tagalog). Still others reflect it as /h/ (Ngaju Dayak in southeast Borneo), zero (Javanese), /d/ (Inati/Inete), /l/ (Bunun), a voiceless lateral distinct from /l/ and /r/ (Thao), a retroflex flap (Saisiyat), /n/ (Mekeo), /s/, /x/ or /y/. Given the direction of front-back movement for trills in better-known languages, it seems likely that *R was an alveolar trill that was backed to uvular position in many daughter languages. Berawan evidently is one of the latter languages. Although it is the only language in the North Sarawak group to do so, it reflects *R as *g* in initial position. Intervocalically it is usually reflected as *k*, which is what interests us here, and word-finally it disappeared. Examples of these changes are shown in Table 5.

Comparing the reflexes of PNS *b and *R in BBB then, we see wide divergence in initial and final position, but identity (and hence merger) word-medially, as shown in Table 6.

Table 5: Reflexes of PNS *R in Batu Belah Berawan

PNS	BBB	
*R- > *g*		
*Rabun	gikuŋ	‘cloud’
*Ramut	gimok	‘root’
*Ratas	gitaʔ	‘milk’
*Ratus	gitoh	‘hundred’
*Ribu	gikkuh	‘thousand’
*Rusuk	gusok	‘chest’
*-R- > *k*		
*aRəm	akəm	‘pangolin’
*baRa	bikkeh	‘shoulder’
*baRiw	bikiw	‘wind’
*bəRas	bəkiʔ	‘husked rice’
*bəRat	pəkit	‘heavy’
*duRi	dukkih	‘thorn’
*kaRaw	kikiw	‘to scratch (an itch)’
*paRa	pakkeh	‘storage rack’
*suRat	sukit	‘wound’
*təgəRaŋ	takiŋ	‘ribs’
*təRəp	təkəp	‘k.o. breadfruit’
*uRat	ukit	‘vein; tendon’
*-R > zero		
*alaR	aka	‘vine, creeper’
*ikuR	iko	‘tail’
*ipaR	l-ipa	‘opposite bank or side’
*tuduR	turo	‘to sleep’

Table 6: Reflexes of PNS *b and *R in Batu Belah Berawan

PNS	BBB		
	initial	medial	final
*b	b	k	m
*R	g	k	∅

Since the simplest way to account for the difference between word-initial and medial reflexes of *R is to assume *R > *g* as syllable onset, followed by intervocalic devoicing, it seems clear that intervocalic devoicing also accounts for *b > -*k*- as a two-step change that began as *b > -*g*-.

5 Ockham and me

The stage has now been set: PNS (and earlier) *b did not change word-initially, became a voiceless velar stop intervocalically, and became the homorganic nasal word-finally, the latter as part of a more general process in which voiced stop codas were nasalized as an alternative to final devoicing (Blust 2018). Since PNS *p shows no change in intervocalic position, we can rule out the possibility that IVD preceded labial backing, and since PNS *R also shows IVD, the simplest way to account for this range of observations is that (1) *b backed to *g in intervocalic position, and (2) *g from both *b and *R devoiced intervocalically.

Where does this leave us as practitioners of the kind of science that is governed by Occam's razor?[2] Although I *could* begin to speculate about possible intermediate steps that would allow these puzzling observations to be seen as outcomes of natural sound change, it is unnecessary, since the two assumptions made in the previous paragraph are sufficient to account for the observations. The only thing that might prevent us from stopping here is that the explanation is inconvenient for the theoretical assumption (and it is no more than that) that because *most* sound change is phonetically motivated, *all* sound change must be phonetically motivated.

This is where we return to the dinner table, fork and knife in hand.

[2]William of Ockham is usually cited as such, but his famous "razor" is more often called "Occam's razor" (although "Ockham's razor" also appears). I let the inconsistency stand here, as it makes me consistent with (at least) tens of thousands of references in the scientific literature.

6 Inside the purist's lab

There are two major publications that have dealt with some of the oddities of Berawan historical phonology since my data was collected in 1971. The first is Burkhardt (2014), a doctoral dissertation done at Goethe University in Frankfurt, Germany, in 2014. As its title suggests, it aims at a comprehensive account of the phonology of Proto-Berawan, and its development in the modern languages through a bottom-up reconstruction. Of the two publications that I cite here, it is the more data-oriented, less theory-focused of the two. The other is Beguš (2018), a dissertation defended at Harvard University. It focuses on a wide crosslinguistic sample of problematic phonological phenomena, in each case seeking to find a solution that is phonetically "natural". One of the changes that it addresses is *b > *-k-* in Berawan. I will return to Burkhardt (2014) shortly, but for the moment let me try to summarize the approach that Beguš (2018) takes to the problem at hand.

Beguš (2018: 122–130) proposes something he calls the "Blurring chain hypothesis" (BCH), which involves the following steps in order to get from *b to *k* only in intervocalic position, entirely through phonetically-natural changes:

(2) Step 1: The voiced stops *b/d/g developed voiced fricative allophones intervocalically, hence:
-b- → *-β-*
-d- → *-ð-*
-g- → *-ɣ-*

This is considered a natural change, since intervocalic lenition of voiced stops is common in the world's languages.

(3) Step 2: The non-coronal voiced fricatives devoiced.
-β- → *-ɸ-*
-ð- → *-r-*
-ɣ- → *-x-*

This step is justified by an abundant phonetics literature which states or implies that voiced fricatives are unstable, and hence show a strong tendency to devoice.

(4) Step 3: Labial fricatives were backed to velars
-ɸ- → *-x-*
-r- → *-r-*
-x- → *-x-*

This step is based on the claim that the change from labial to velar position is more likely with fricatives than with stops.

(5) Step 4: Fricatives return to stops.
-x- → *-k-*
-r- → *-r-*
-x- → *-k-*

Beguš sums up the BCH in the following formula, which is to be interpreted as:

(1) stops become fricatives intervocalically;

(2) voiced fricatives devoice;

(3) (after backing) fricatives return to stops.

(6) D → Z / V_V
Z → S / V_V
S → T / V_V

He illustrates this with the following example (correcting errors in his reconstruction, and the phonemic representation of Berawan):

(7) *babuy > *biβuy > *biɸuy > *bixuy > *bikuy* 'pig'

By all accounts we should be happy – we now have an explanation for a truly puzzling sound change that shows it to be the outcome of a series of intermediate steps, each of which purportedly can be motivated by reference to general phonological processes in human languages as a whole. Book closed?

7 Reality strikes back

The first thing likely to trouble anyone who thinks seriously about the BCH is its violation of Occam's razor. We start with voiced stops that are visible from their reflexes in numerous languages outside the Berawan group (reflexes of PAn *qabu 'ashes', *babuy 'pig', etc.). Then, in the history of Berawan, these segments go out of sight and become fricatives, only to re-emerge as voiceless stops with different place features in the daughter languages when they are visible again (*akkuh, bikuy*, etc.). When a stop is reflected as a stop, with no direct evidence of any intermediate stage in which it was a fricative, standard scientific method

would not support the claim that it became something different, and then reverted to its original state once it became possible to see it again. To scholars in many scientific disciplines, this would hardly be considered a sound scientific procedure. So, how is this claim justified?

First, to account for IVD, Beguš (2018: 127) draws attention to the phonetics literature where it is commonly accepted that "Voicing in fricatives is highly dispreferred and articulatorily difficult to maintain … Because voiced fricatives at this stage surface only intervocalically, the result is an apparent intervocalic devoicing." This provides a potential explanation for IVD, provided that an independent line of evidence supports the claim that stops became fricatives before becoming stops again. To date, no such independent line of evidence has been forthcoming.

Second, to account for the backing of labials to velars, Beguš refers to the study of consonant changes by Kümmel (2007), which focuses on Indo-European, Semitic and Uralic languages. In his sample of 294 languages, Kümmel found no cases of labial backing for stops, but he reportedly found two cases for fricatives. For reasons that many statisticians will surely find puzzling, Beguš (2018: 128) uses this observation to state that "The sound change [ɸ] > [x] or [β] > [ɣ] (if it happened prior to devoicing) is *much more common* than [p] > [k] or [b] > [g]" (italics added). In fact, two cases to none makes the backing of labial fricatives to their velar counterparts *infinitely* more common than the similar change for stops, but what can this mean in such a tiny sample?

I maintain a close watch on a language family with over 1,200 members, and I have seen *no* examples of labial fricatives backing to their velar counterparts anywhere in this family. If it happens in any language on the planet it must be very rare, and to claim that even two occurrences makes it "much more common" than the backing of labial stops to their velar counterparts is essentially meaningless. Of course, *f > *h* is a common sound change, but that is part of the universal lenition sequence *p > *f* > *h* > zero in many of the world's languages, and is irrelevant to this discussion.

To summarize, the first objection to the BCH is that it violates Occam's razor by positing hypothetical intermediate stages in a sound change that are not needed to account for the facts. Some might see this objection as more esthetic than substantive, although that is certainly debatable. More seriously, however, a central prediction of the BCH is contraindicated by the data, a fact that Beguš never mentions, and, I assume, was unaware of.

As seen above, his steps 1 and 2 introduce a voiced bilabial fricative that then devoices before backing and returning to its original state as a stop. However, as Burkhardt (2014: 166) makes clear, Proto-Berawan (PB) had a voiced bilabial

Table 7: Proto-Berawan voiced fricatives and their reflexes in the modern languages

PNS	PB	LTB	BBB	LJB	
*bəRuaŋ	*bəguβiŋ	kəbiŋ	kuβiŋ	kuβiŋ	'Malayan sun bear'
*dua	*duβa	ləbih	duβeh	duβyəy	'two'
*bituʔən	*təkun[a]	təkəbin	təkuβən	təkuβən	'star'
*kuay	*kuβe	kəbe	guβi	guβiæ	'Argus pheasant'
*puʔan	*puβan	pəban	puβan	poβan	'squirrel'

[a]For reasons that are unclear, Burkhardt (2014: 166) has PB *kətuβən, based on a form of this shape only in BBB, as against *təkuβən* in all other Berawan languages. My own fieldnotes for BBB have *təkuβən*, showing agreement in all four dialects, hence the reconstruction given here.

fricative derived by glide fortition from automatic transitional glides, and this occurs in some very common words, as shown in Table 7 (LTB is Long Terawan Berawan; LJB is Long Jegan Berawan).

This is not a large number of forms, but it is sufficient to test the adequacy of steps 1 and 2 in the BCH. Moreover, the historical reality of automatic transitional glide fortition is further illustrated by a similar change for the palatal glide in forms such as PNS *ia, PB *jəh, LTB *jəh*, BBB *jah*, LJB *jiæ* '3sg., s/he', PNS *lia, PB *ləjəh, LTB *ləjəh*, BBB *ləjeh*, LJB *ləjiæ* 'ginger', PNS *duRian, PB *dugəjin, LTB *kəjin*, BBB *kəjin*, LJB *kəjin* 'durian', etc.[3]

What matters here is that PB shows a voiced bilabial fricative identical to what Beguš posits in Step 1 of the BCH, as in PNS *lubaŋ > *lubiŋ (> hypothetical *luβiŋ > *luɸiŋ) > *lukiŋ* 'hole in the ground'. However, unlike the hypothetical fricative in the BCH, the empirically-grounded (i.e., "real") fricative did not 1) devoice, 2) back to a velar, or 3) revert to a stop. Since all science is ultimately observation-based, there is only one scientifically-responsible way to explain this difference, namely that the hypothetical voiced bilabial fricative in the BCH *did not exist*, since if it did, it should have remained unchanged like the examples in Table 7. It is obvious that his conclusion is fatal to the BCH – without an unobservable intermediate stage in which *-b- became a fricative before devoicing and reverting to a stop, the entire structure of Beguš's theory collapses, and we are back to a theory that is more responsive to Occam's razor.

[3]To avoid confusion, the reader should keep in mind that while the phonetic symbol [j] refers to a palatal glide in accordance with IPA conventions, the phonemic symbol /j/ refers to a voiced palatal affricate in accordance with conventions common to the spelling of languages throughout Indonesia and Malaysia.

This is the most serious problem with Beguš's treatment of Berawan historical phonology. However, it is not the only problem with his treatment of the history of this language.

8 Post mortem

Before I say anything else, let me make it clear that I believe Gašper Beguš is a fine scholar. His 'Blurring chain hypothesis' is an ingenious theoretical construct that required considerable skill and knowledge to propose. It has failed for one simple reason: its claims do not match the data of the real world. In many ways I feel that people like Beguš are victims of their foundational assumptions, in particular the commonly-held but rarely-expressed assumption that I have expressed earlier as: "Most sound changes are phonetically motivated; therefore *all* sound changes are phonetically motivated." What this belief commonly triggers is an argument chain that I would characterize as follows:

(8) mindset >> freewheeling treatment of data >> careless treatment of data >> erroneous conclusions

What I mean by this is that if one begins with an unshakeable mindset that all sound changes, no matter how phonetically challenging, *must* be products of the telescoping of a larger number of smaller changes that are themselves natural, the temptation becomes irresistible to force the data by any means possible to conform to theoretical expectation. This leads to a freewheeling treatment of the primary data, as with Beguš's willingness to assume that *b became a voiced bilabial fricative before undergoing further changes to emerge as /k/, hence going from STOP to FRICATIVE to STOP, with no direct evidence, or even indirect supporting evidence, that the intermediate stage ever existed as part of this sound change. The need for intervocalic fricatives rather than stops to provide a reason for labial backing is also based on the flimsiest of evidence (two cases to none). Yet, consistent with the freewheeling treatment of data, the reader is told that labial backing to velars is *much more common* with fricatives than with stops, when simple statistical tests provide no support for such hyperbole. What I mean by 'freewheeling', then, is that the argument may still be anchored in an accurate factual basis, but the leap from observation to inference begins to take on the appearance of an elaborate contrivance – there is pressure to find a way to show how an odd phonetic transition in the history of a language *must* have been the product of smaller, phonetically more natural steps, so a full arsenal of speculative proposals is brought to bear on the question.

Once this habit of "reaching" for a way to explain away theoretically non-conforming data begins to gain momentum, it is hard to stop, and may easily lead to careless treatment of the data itself – something we might call 'data-boggling'. In the case at hand, although the BCH was Beguš's own creation, and the responsbility for its failure therefore falls squarely on his shoulders, some other serious factual errors in his treatment of Berawan historical phonology are products of an over-reliance on Burkhardt (2014), when other sources going back to at least Blust (1992) were available. In short, it appears that Beguš's analysis fell victim to both of his foundational assumptions and his dependence on a primary source that itself contains serious flaws.

Let me begin with errors that are related to *b > -*k*- as a historical change, but are not fatal to the BCH, and then mention others that are separate from this issue, but which involve serious misrepresentations of the data.

Keeping in mind that he cites Burkhardt's PB *b and *g, rather than my PNS *b, *g and *R, Beguš (2018: 123) says the following with reference to the development of voiced stops in word-initial position:

> In contrast to intervocalic position, *b and *g remain unchanged in initial position. There are 46 reconstructed words with initial *b in Pre-Berawan. In all but one word the initial *b remains unchanged. A similar distribution holds for the velar voiced stop in initial position … In the one exception, devoicing occurs initially in all four dialects: *bəlippiəŋ > *pəlipiŋ* (['butterfly', RAB]). According to Burkhardt (2014: 144), this development is sporadic in a word that already exhibits another sporadic development: degemination of *-pp-*. There is only one other example in which devoicing initially occurs only in Long Terawan: *buraq > [purăh] (Burkhardt 2014).

Unfortunately, it is demonstrably not true that *b and *g "remain unchanged in initial position" with only a single exception each. Although Burkhardt (2014: 150ff) notes that *b- is sometimes reflected as *p-* if it was intervocalic as a result of prefixation, he does not point out that it is also reflected as *k-* in the same languages under the same condition (or consistently reflected as *k-* in LTB), and Beguš simply failed to see examples such as those in Table 8.

This is a minority pattern, but it is sufficiently well-attested that it should not have been overlooked, as it includes data from the basic vocabulary ('swollen', 'heavy', 'long', 'rotten'). What we would expect for the six LTB forms is *b-* for the first three, and *g-* for the last three, but instead we find *k-* for all six. As seen already, this is the normal reflex of PNS *b and *R in intervocalic position, and so is a clue that each of these bases was intervocalic when labial backing and IVD occurred.

Table 8: Anomalous reflexes of PNS *b-, *g-, and *R- in three Berawan dialects. (My field data for Long Teru is too limited to permit useful generalizations, and so is omitted from this chapter.)

(a) LTB

*b- > *k* (3 instances)	1. *bəsuR	kəco	'full, satiated'
	2. *buat	kəbəiʔ	'long'
	3. *buRuk	kuroʔ	'rotten'
*g- > *k* (1 instance)	4. *gatəl	kitən	'itch(y)'
*R- > *k* (2 instances)	5. *Raqən	kiʔən	'light (weight)'
	6. *Raya	kijih	'big'

(b) BBB

*b- > *k* (2 instances)	1. *baRəq	kiki	'swollen'
	2. *buat	kuvit	'heavy'
*b- > *p* (2 instances)	3. *beRat	pəkit	'long'
	4. *buRuk	purok	'rotten'
*g- > *k* (1 instance)	5. *gatəl	kitan	'itch(y)'
*R- > *k* (2 instances)	6. *Raqən	kiʔan	'light (weight)'
	7. *Raya	kijih	'big'

(c) LJB

*b- > *k* (2 instances)	1. *baRəq	kikeæ	'swollen'
	2. *buat	kuvit	'heavy'
*b- > *p* (3 instances)	3. *bəsuR	pəco	'full, satiated'
	4. *bəRat	pəkit	'long'
	5. *buRuk	puriuʔ	'rotten'
*g- > *k* (1 instance)	6. *gatəl	kætən	'itch(y)'
*R- > *k* (1 instance)	7. *Raqən	keʔan	'light (weight)'

The next thing to notice is that all of these words in every dialect are stative or adjectival, while this is true of none of the words in Table 2. Since PNS had an adjectival or stative verb prefix *mə- that is still common in Lun Bawang/Lun Dayeh (cf. *mə-baraʔ* 'swollen', *mə-bərat* 'heavy', *mə-buruk* 'rotten', *mə-gatəl*

'itchy', *mə-raan* 'light in weight', etc.), we may assume that this prefix was still in place in the Berawan languages at the time of labial backing and intervocalic devoicing, and that after these changes took place, it was lost, leaving the bare stems with the normal reflexes of intervocalic *b, *g and *R in word-initial position. The same conclusion follows from the reflexes of trisyllabic nouns that regularly lost the first CV- after IVD had already taken place, as with the word for the 'Malayan sun bear' (PNS *bəRuaŋ, PB *bəguβiŋ) in Table 7, and the word for 'durian' (PNS *duRian, PB *dugəjin) in the paragraph immediately after it, which show parallel examples of glide fortition at bilabial and palatal places of articulation and IVD before loss of the first syllable.[4]

The situation for Batu Belah and Long Jegan is somewhat more complicated. In both of these communities, some instances of *b- are reflected as *k* and others as *p*. It is important to keep the subgrouping of the Berawan languages in mind: the first split probably separated LTB from Southern Berawan, and we can see a clear difference in the pattern of anomalous reflexes of initial *b- in Table 8, where LTB is consistent in reflecting what is now a word-initial reflex of *b- as *k*, while Batu Belah and Long Jegan show variation between *k* and *p*. The most straightforward explanation for this data appears to be that labial backing preceded IVD in LTB, but that these two changes overlapped in Southern Berawan. The ordering of relevant changes, then, evidently was as follows:

(9) Long Terawan Berawan:
  (1) labial backing/V__V;
  (2) devoicing;
  (3) loss of CV-.

(10) Batu Belah Berawan:
  (1) labial backing/V__V for items 1 and 3;
  (2) devoicing;
  (3) loss of CV-, but devoicing before labial backing for items 2 and 4 (which then could not back).

(11) Long Jegan Berawan:
  (1) labial backing/V__V for items 1 and 4, but devoicing before labial backing for items 2, 3, and 5 (which then could not back).

[4]In both cases, the high vowel that triggered glide formation in the first place was centralized to schwa in LTB – a complex sound change that is also found in other languages of coastal Sarawak. The fronting and raising of *a after a voiced obstruent is also a widespread change in northern Sarawak (Blust 2000, 2020).

What can we learn from this bit of neglected data? The firmest inference appears to be that IVD and labial backing overlapped in time. This may be of general interest, but has little relevance to the BCH, since the only ordering relation that this hypothesis requires is for *b to develop a fricative allophone intervocalically before IVD and labial backing, with the relative order of the latter two changes making no difference to the outcome of the historical derivation. However, this observation raises other questions, in particular, why does the change *-b- > *p* occur across a morpheme boundary, but never within a base morpheme? It seems that labial backing had to precede IVD within a morpheme, but could occur before or after the other change across a morpheme boundary.

The second example of data-boggling in Beguš (2018) that I will discuss concerns the history of the PNS voiced aspirates, a matter of some importance, since these were also voiced stops, although voiced stops with terminal devoicing. As noted in Blust (2006), PNS developed true voiced aspirates *b^h, *d^h, *j^h, *g^h, almost certainly from earlier geminates *bb, *dd, *jj, *gg, most of which arose after a non-moraic schwa. As early as Blust (1969), this was taken as the defining innovation for the North Sarawak subgroup. To show that this change was complete by PB, one need only refer to nearly a dozen papers that have addressed this issue over the past half century, or to Appendix A. However, to provide a fuller account for the reader, the relevant data is summarized in Table 9.[5]

Against this backdrop of information, which shows that pre-PNS voiced geminates had *already* produced a distinctive series of true voiced aspirates in PNS, Beguš (2018: 126, fn. 66) says:

> Labial geminate stops arising after schwa and from consonant clusters do not undergo a change in place of articulation (unlike simple stops), e.g. *təbu > *təbbu > [təppu], *mə-bənnən > *mə-ppənnən > *ppənnən > [pənnən] (after the loss of *mə- and initial degemination) or *əbbis > *əppiq > [piʔ] (after the loss of initial schwa and initial degemination). Geminates arising via "h-accretion", however, do undergo a change in place of articulation: they develop to voiceless velar geminate stops.

One might respond: "Of course pre-PNS [bb] didn't undergo labial backing, as it had already become /b^h/ before the Berawan languages existed, and so was no longer a simple voiced stop, either singleton or geminate, when they began to differentiate." This was hardly a secret since, as already noted, it has been

[5]Batu Belah Berawan represents all Berawan dialects since the developments do not differ by dialect. Note also that data for *g^h is limited, and the reader is referred to Appendix A for the lone example thereof.

Table 9: Reflexes of the PNS voiced aspirates in North Sarawak Languages

(a) *bʰ

	'head hair'	'sugarcane'
PNS	*əbʰuk	*təbʰuh
Bario Kelabit	əbʰuk	təbʰuh
Long Anap Kenyah	puk	təpu
Batu Belah Berawan	puk	təpuh
Bintulu	ɓuk	təɓəw

(b) *dʰ

	'day'	'woman'
PNS	*ədʰaw	*dədʰuR
Bario Kelabit	ədʰo	dədʰur
Long Anap Kenyah	taw	ləto
Batu Belah Berawan	iciw	dicu
Bintulu	ɗaw	rəɗu

(c) *jʰ

	'one'	'notched log ladder'
PNS	*əjʰa	*Rəjʰan
Bario Kelabit	ədʰəh	ədʰan
Long Anap Kenyah	ca	can
Batu Belah Berawan	acih	acin
Bintulu	(jiʔəŋ)	k-əjan

addressed repeatedly in a literature now covering over half a century, beginning with Blust (1969).

On the other hand, Burkhardt (2014: 188) misrepresents the history of the PNS voiced aspirates in Berawan in a different way, maintaining that "PBn did not inherit the geminates *bb, *dd or *gg as they had devoiced to *pp, *tt and *kk respectively at a Pre-PBn stage." That this is false should be immediately obvious from the data in Table 9, which shows that PNS *dʰ and *jʰ merged as a new phoneme /c/ (voiceless palatal affricate) in the modern languages. In addition,

the same data in Table 9, and other examples such as PNS *əbʰaʔ > LTB, BBB *pi*, LJB *piæ* 'fresh water' show Low Vowel Raising, which only happened after voiced obstruents, confirming that at least a three-way distinction in the voiced aspirates still existed in Proto-Berawan, namely *bʰ, *jʰ, *gʰ.

These details may seem arcane, but they are critical to understanding the phonological history of the entire North Sarawak group of languages, and why both Burkhardt and Beguš would totally ignore a fairly rich literature concerned with them in favor of personal speculations that fail to account for actual observations is a mystery.

The last example of data-boggling in Beguš (2018) that I will discuss concerns the gemination of the onsets of open final syllables. As in many other AN languages of insular Southeast Asia, the schwa, which was extra-short (non-moraic) could not hold stress unless it geminated a following consonant, so allophonic gemination arose in Berawan following the reflex of an original penultimate schwa. This is of minor importance, as it remains allophonic unless one adheres to the 'once a phoneme, always a phoneme' principle, which I do not. More surprisingly, as noted in Blust (1992, 1995), the onsets of final syllables appear to have geminated if and only if they were open. At some point after this happened *-h* was added after all final vowels, possibly an areal change, as it is also found in Lower Baram languages such as Kiput, Narum, and Miri, in several dialects of Penan (Lowland Kenyah), in Sebop, Long Wat Kenyah, various Melanau dialects, several Land Dayak languages, and throughout the Dayic languages. Burkhardt (2014: 260) attempts to account for this peculiar condition as follows:

> In PWMP [Proto-Western-Malayo-Polynesian] items with an open syllable, simple consonants became PBn geminate consonants after *-h had been added at a Pre-PBn stage. The study assumes that this caused the following chain reaction: The accretion of *-h caused the vowel nucleus of the ultima, which had been phonetically long by default at the end of the word, to become phonetically short. This then caused the normal phonetic length of the penult nucleus (which was short to medium-short) to become phonetically extra-short, which then led to the gemination of the consonant that followed it (that is the onset of the ultima) to make up for the extrashortness of the penult vowel.

Beguš (2018: 124) simply accepts this hypothesis without question, but it can confidently be dismissed without elaborate argumentation. First, it is based entirely on speculation, without actual measurements of vowel length. Second, as already noted, *-h* addition is common to a number of languages of this area, and

it triggered gemination nowhere else. Third, and most crucially, Burkhardt assumes that these geminates were found in PB and were added only after final /h/ accretion, yet the latter change did not affect the Long Jegan dialect, which implies that /h/ accretion *followed* the gemination of open final syllable onsets, as explained in Blust (1992), rather than triggering it, as shown in Table 10.[6]

Table 10: -/h/ Accretion in Berawan dialects

PB	LTB	BBB	LJB	
*accu	accoh	accoh	accəw	'dog'
*bullu	bulluh	bulluh	bulləw	'body hair, feather'
*dukki	dukkih	dukkih	dukkəy	'thorn'
*kuttu	kuttoh	kuttoh	kottaw	'head louse'
*matta	mattəh	mattah	matta	'eye'
*təllu	təlloh	təlloh	təllaw	'three'
*təppu	təppuh	təppuh	təppəw	'sugarcane'
*ullu	ulloh	ulloh	ollaw	'head'

9 Alternatives to "sound change"

Undoubtedly, the question foremost in the minds of phonologists who have stayed with me this long is: "O.K., if *b > -*k*- really was *b > -*g*- followed by intervocalic devoicing in Berawan, what phonological process could have motivated either of these changes?" My answer is: "None."

This leads to battle, as any phonologist worth his salt believes that sound change must involve some type of phonological process as typically understood in feature-based phonology. However, there have long been indications that this is not true. While the great majority of sound changes clearly *are* phonetically or phonologically motivated, there is no logical principle that says: "*Most* X are Y, therefore *all* X are Y". Conscious manipulation of language for social reasons is well-known in phonology, lexical semantics and morphosyntax (Conklin 1956, Li 1980, 1982, 2004, Hale 1971, Blust 1980, Thomason 2007). A particularly striking example is seen in the use of what Tagalog speakers call *baliktád*, or 'backward speech'.[7]

[6]The LJB reflex of PB *-u was recorded as -*əw* ~ -*aw* in free variation.

[7]It should be noted however that Tagalog *baliktad* means 'backwards' in general, not just of speech.

In a brief but dense description of this secret language, used mainly by teenagers at the time to disguise the content of messages from their elders, Conklin (1956) lays out the workings of a system of deliberate language manipulation that makes English 'Pig Latin' look jejune by comparison. He identifies eight types of structural rearrangement or affixation used to form *baliktád* words, including:

1. Complete reversal of the phonemic shape of the base (*salá:mat* > *tamá:las* 'thanks').
2. Partial reversal of the phonemic shape of the base (*dí:to* > *dó:ti* 'here').
3. Complete reversal of the syllable shape of the base (*pá:ŋit* > *ŋitpá* 'ugly').
4. Partial reversal of the syllable shape of the base (*ma-gandá* > *damagán* 'beautiful').
5. Insertion of the Actor Voice infix *-um-* (bolded) according to the usual pattern in productive verb morphology (*tiná:pay* > *t-**um**-iná:pay* 'bread', *na* > *n-**um**-a* 'already').
6. Infixation of a separate -VC- infix after all syllable-initial consonants (*sí:lo?* > *s-**ig**-í:-l-**o:g**-ó?* 'snare trap' *salá:mat pó?* > *s-**ag**-a:l-**ag**-á:m-**ag**-át p-**og**-ó?* 'Thank you, sir').
7. Double infixation with -VC- followed by -VCVC-, a shape that does not occur in ordinary language (*hindí?* > *h-**um**-ind-**imí:p**-i?* 'no, not', *puntá* > *p-**um**-ú:nt-**amá:p**-á* 'goes').
8. Complete reversal of the base and double infixation (*hindí?* > *d-**im**-í:h-**in**-ín* 'no, not', *sa?án* > *?**um**-a:ns-**am**-á 'where?'*).

A similar system, called *cakap balek* (which, like *baliktád* means 'backward speech') was recorded very briefly for Malay by Evans (1923), suggesting that such systems of speech disguise may be more general in insular Southeast Asia than is commonly appreciated.

Given the purpose of *baliktád*, it is clear that it cannot remain constant over time, or its function would be lost (at least for those adults who might recall their own earlier use of the system). One can legitimately object that this type of word-play could never give rise to a permanent sound change, given both its specialized function, and its inherent lability. However, what is *does* show is that

speakers are capable of creating deliberate changes in their language for special purposes, and the suggestion that conscious manipulation might lie behind a sound change like *b > -g- or intervocalic devoicing is not inherently unlikely.

10 Conclusion

It should be obvious that the issue of the obligatory naturalness of sound change is one that is going to divide the community of linguists into opposing camps, probably as much as any other issue in the field. Until studies of language change in progress are able to capture an example of a sound change that is both abrupt and phonetically "unnatural", we will have no way to determine by direct observation whether a change like *b > -*g*- in Berawan has actually occurred in any language. My own guess is that there have been many such changes, and my recommendation to all scholars, regardless of which side they take in this debate, is that they respect the integrity of the scientific process by adhering to Occam's razor, and limiting questionable inferences by demanding converging lines of independent evidence, rather than resorting to freewheeling speculation because they "know" in advance that their position is correct, when in fact its correctness is exactly what is at issue.

Appendix A Sample evidence supporting the PNS consonants in intervocalic position in Bario Kelabit, Long Anap Kenyah (LA Kenyah), Batu Belah Berawan (BB Berawan), and Bintulu

PNS	*apuy 'fire'	*batu 'stone'	*ikuR 'tail'	*daʔun 'leaf'
Bario Kelabit	apuy	batuh	iur	daʔun
LA Kenyah	(lutən)	batu	iko	(tuŋ kayu)
BB Berawan	apoy	bitoh	iko	dioŋ
Bintulu	(jarəʔ)	batəw	ikoy	raʔun

PNS	*abu 'ash'	*ŋadan 'name'	*ujan 'rain'	*təgəRaŋ 'ribcage'
Bario Kelabit	abuh	ŋadan	udan	—
LA Kenyah	(lisəŋ)	ŋadan	ujan	təgaaŋ
BB Berawan	akuh	ŋaran	usin	takiŋ
Bintulu	avəw	ñaran	ujan	—

PNS	*əb^{h}uk 'head hair'	*əd^{h}aw 'day'	*əj^{h}a 'one'	*məg^{h}əl 'sleep'
Bario Kelabit	əb^{h}uk	əd^{h}o	əd^{h}əh	məg^{h}əl[8]
LA Kenyah	puk	taw	ca	məkən[9]
BB Berawan	puk	iciw	acih	(turo)
Bintulu	ɓuk	ɗaw	(jiʔəŋ)	məgən

PNS	*kuman 'eat'	*tanəʔ 'earth, soil'	*-ñ-[10]	*taŋih 'to weep, cry'
Bario Kelabit	kuman	tanaʔ		taŋe
LA Kenyah	uman	tanaʔ		taŋe
BB Berawan	kuman	tana		taŋeʔ
Bintulu	kuman	tanəʔ		(məŋit)

PNS	*asu 'dog'	*təlu 'three'	*-r-[11]	*bəRat 'heavy'
Bario Kelabit	(ukuʔ)	təluh		bərat
LA Kenyah	asu	təlu		baat
BB Berawan	acoh	təloh		pəkit
Bintulu	asəw	ləw		vat

[8] 'stay with a small child to make him sleep'.
[9] 'to rest, to lie down'.
[10] There are no good candidates for PNS *ñ in medial position.
[11] There are no good candidates for PNS *r in medial position.

PNS	*tawa 'to laugh'	*kayu 'wood, tree'
Bario Kelabit	(riruh)	kayuh
LA Kenyah	pə-tawa	kayu
BB Berawan	tavah	kajuh
Bintulu	bə-taba	kayəw

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