A Hypothesis on the Origin of Preglottalized Sonorants in Kra-Dai

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0. Introduction

- A distinction between plain and preglottalized initial voiced stops is reconstructible within all primary branches of the Kra-Dai phylum at three places of articulation.
- This distinction may be hypothesized to be a secondary development within Kra-Dai, where the diachronic trajectories of what were originally medial voiced stops depended on whether or not the preceding vowel was schwa on analogy with a similar development in Proto-North Sarawak (Blust 2006, Norquest 2016).
- While this plain versus glottalized opposition in the voiced obstruent series is quite robust within Kra-Dai, the same is not true for the sonorants, which in many languages show only a two-way contrast between voiced and voiceless.
- However, the Kam-Sui branch of Kra-Dai is particularly conservative in this regard, and a four-way phonation opposition (preaspirated, voiceless, voiced and preglottalized) can be reconstructed for all sonorants with the exception of the lateral.
- The Hlai branch of Kra-Dai can now also be postulated as having retained evidence for a series of preglottalized sonorants.
- While it has generally been assumed that these phonation differences reflect the different glottal states of the initial consonants of sesquisyllabic words before the presyllable was lost, the suggestion is put forward here that the preglottalized series of sonorants is not the result of conditioning by the presyllable initial.
- Rather, on analogy with the voiced stops, it occurs in an environment following schwa in which gemination occurred, followed by debuccalization of the first half of the geminate.

Figure 1: The distribution of the Kra-Dai phylum. The Kra-Dai family is composed of four major branches: (1) Kra, (2) Kam-Sui, (3) Hlai, and (4) Tai (3 branches); the smaller Be group is also shown. Lakkja and Biao are not shown, but are located to the east of the Tai group towards the Pearl River Delta.

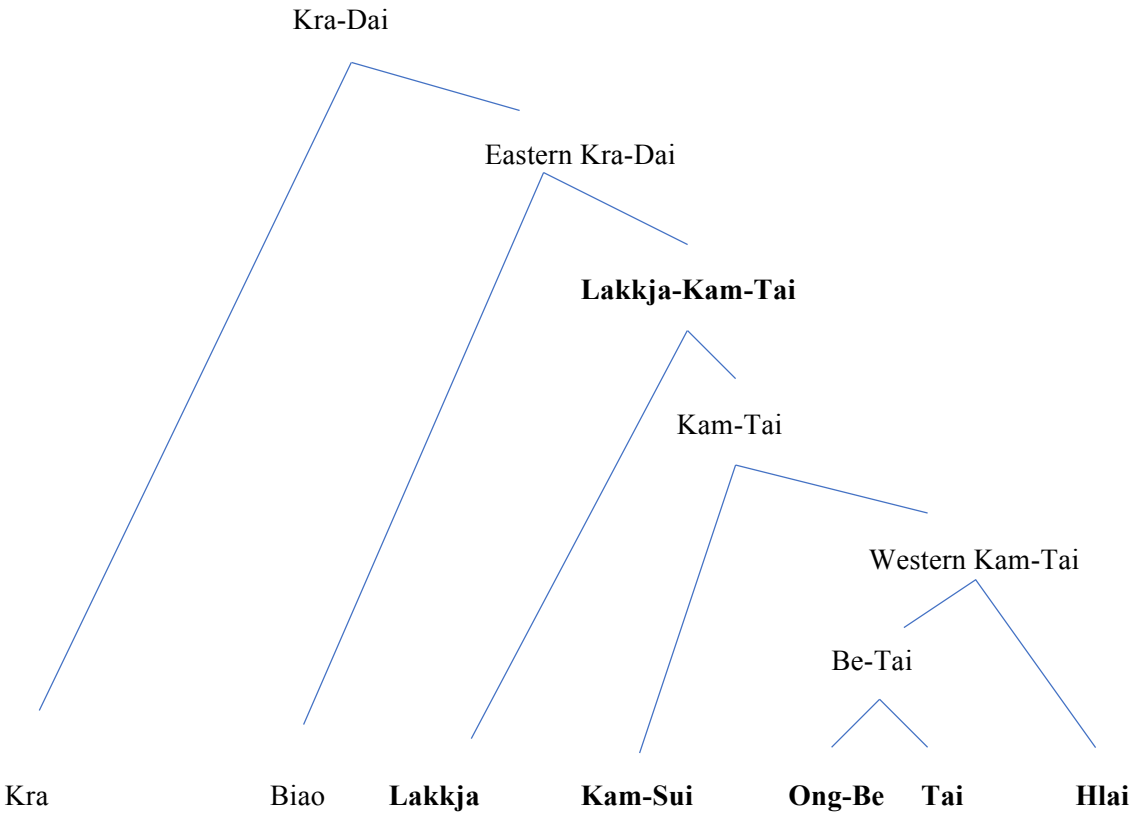

Figure 2: **The Kra-Dai Phylogenetic Tree** (Norquest 2015)

1. Background: Initial Voiced Stops in Kra-Dai

A distinction between plain and preglottalized initial voiced stops is reconstructible within the Kra-Dai phylum at three places of articulation, with a fourth (retroflex) occurring in the latter series:

Table 1: The plain ~ preglottalized contrast in Kra-Dai initial voiced stops

Plain	Preglottalized
*b, *d, *ɟ	*ʔb, *ʔd, *ʔɖ, *ʔɟ

However, words with plain voiced obstruent initials appear to be largely if not completely secondary – many of them can be shown to be loanwords from either Middle Chinese or one of the Austroasiatic families:

Table 2: Reflexes of plain initial voiced stops after non-schwa vowels in Lakkja-Kam-Tai

*Kra-Dai ?	*Lakkja	*Kam-Sui	*Ong-Be	*Tai	*Hlai
*b	*b	*b	*v	*b	*ɓ
*d	*d	*d	*ɦ	*d	*ɗ
*ɟ	*d	*zj	*ʒ	*ɟ	*tɕ

(1)	M. Chinese[1]	*Lakkja	*Kam-Sui	*Ong-Be	*Tai	*Hlai
‘goose’	---	---	---	*vuːn X	*bɯnh	*ɓunɦ
‘copper’	銅 *dəwŋ	*doŋ	*dɔŋ	*ɦoːŋ	*doːŋ	*ɗuːŋ
‘money’	錢 *dzjen	*diːn	*zjen	*ʒeːn	*ɟeːn	*tɕiːn

Norquest (2013) demonstrated, based on the evidence of an older layer of Austronesian/Kra-Dai cognates, that the original Kra-Dai voiced stops in initial position had devoiced before register splits occurred in the individual Kra-Dai families, allowing the voiced stops to merge with the original voiceless stops:

Table 3: Reflexes of plain initial voiced stops after non-schwa vowels in Kra-Dai

Pre-Kra-Dai	*Lakkja	*Kam-Sui	*Ong-Be	*Tai	*Hlai
*b	*p	*p	*p	*p	*p^h
*d	*t	*t	*t	*t	*t^h
*ɟ	*ts	*c	(*ts)	*c	*$tɕ^h$

(2)	*RAn	*Lakkja	*Kam-Sui	*Ong-Be	*Tai	*Hlai
‘grandparent’	*apu	---	---	---	*puː	*$p^huːʔ$
‘mouth’	*baqbaq	---	*paːk	*paːk	*paːk	---
‘to fall’	*-tuq	---	*tɔk	*tɔk	*tok	*t^hok
‘chest, liver’	*dəbdəb	*tap	*tap	*t[a]p	*tap	---
‘sharp’	*ʈaɟəm[2]	---	---	---	---	*$tɕ^h$əːm

2. Background: Medial Voiced Stops in Kra-Dai

Norquest (2016) argues that initials which were formerly medials of sesquisyllabic forms were conditioned depending on whether the preceding vowel had been schwa (Table 5) or not (Table 4). This was true particularly in Proto-Tai and Proto-Hlai, where preglottalized and implosive voiced stops were conditioned by a preceding schwa:

Table 4: Reflexes of medial voiced stops after non-schwa vowels in Kra-Dai

*Kra-Dai	*Lakkja	*Kam-Sui	*Ong-Be	*Tai	*Hlai
*C-b	*w̥	*C-b	*ʔb	*C-b	*ʋ
*C-d	*l̥	*C-ʔɖ	*r̥	*C-d	*ɾ
*C-ɖ	*j̊ (< *r̥)	*C-ʔɖ	*r̥	*C-ɖ	*ɾ
*C-ɟ	*l̥	*ʔj	*j̊	*ʔj	*hj

[1] Middle Chinese data are taken from Baxter & Sagart (2014).
[2] It is assumed that the first syllable of this form was lost (*ʈaɟəm > *ɟəm) before intervocalic lenition could occur.

(3)	*Kra-Dai	*Lakkja	*Kam-Sui	*Ong-Be	*Tai	*Hlai
'thin'	*C-báːŋ	*m̥aːŋ	*C-baːŋ	*ʔbjaŋ	*C-baːŋ	---
'bone'	*Cudə́ːk	---	*C-ʔɖaːk	*r̥ɯk	*C-dwoːk	*Cuɾɯːk
'boat'	*Cuɖáː	*j̊waː	*C-ʔɖr̥waː	*rwaː	*C-ɖwaː	*Cuɾaː
'borrow'	*C-ɟáːm	*l̥aːm	*ʔjaːm	---	*ʔjɯːm	---

Table 5: Reflexes of medial voiced stops after schwa in Kra-Dai

*Kra-Dai	*Lakkja	*Kam-Sui	*Ong-Be	*Tai	*Hlai
*Cəʔƀ	*ʔb	*ʔb	*ʔb	*ʔb	*ɓ
*Cəʔɗ	*l̥	*ʔd	*r̥	*ʔd	*ɗ
*Cəʔɖ	*l̥	*ʔɖ	*r̥	*ʔd	*ɗ
*Cəʔʄ	*j̊	*ʔʄ	*j̊	*ʔʄ	*tɕ

(4)	*Kra-Dai	*Lakkja	*Kam-Sui	*Ong-Be	*Tai	*Hlai
'village'	*Cəʔbáːnʔ	*ʔbaːnʔ	*ʔbaːnʔ	---	*ʔbaːnʔ	---
'winnow basket'	*Cəʔdóŋʔ	*l̥oŋʔ	*ʔdɔŋʔ	*r̥oːŋ X	*ʔdoŋʔ	*ɗoŋʔ
'to stand'	*CəʔʄúnX	*j̊uːn	*ʔʄun	*j̊un	*ʔʄɯn	*tɕuːn

3. Proto-North Sarawak Voiced Stop Fortition after Schwa

- Blust (2006) reconstructs a series of voiced aspirates in Proto-North Sarawak (PNS), based on a distinction in the daughter languages between plain/lenited voiced stops and phonetically 'complex' reflexes such as voiced aspirates, implosives and fricates.
- However, only Kelabit evinces actual voiced aspirates, whereas other languages show other reflexes including implosives, voiceless stops, and voiceless fricatives.
- Blust (p.c.) suggests that the voiced aspirates have arisen secondarily from consonant gemination resulting from lengthening of consonants after either (a) word-internal or (b) epenthetic initial schwa (which satisfies the requirement for a bisyllabic template).

To illustrate the phenomenon of post-schwa lengthening, examples of PNS plain medial voiced stops are shown in (5a), and geminate voiced stops following schwa in (5b). All forms are derived from Proto-Malayo-Polynesian (PMP), the Austronesian parent of PNS:

(5) (a)

Gloss	PMP[3]	PNS
ash	*qa**b**u	*a**b**uh
3pl	*(si-)i**d**a	*i**d**ah
rain	*qu**ɟ**an	*u**ɟ**an
digging stick	*tu**ɢ**al	*tu**g**al

(b)

Gloss	PMP	PNS
sugarcane	*tə**b**uh	*tə**bː**uh
faint	*mə**d**an	*mə**dː**an
blink	*kə**ɟ**əp	*kə**ɟː**əp
sleep	---	*mə**gː**əl

[3] Please note that traditional PMP phonemes are interpreted in the following way: *j = [ɖ], *z = [ʄ], *g = [ɢ], *R = [ʀ], *y = [j], and *e = [ə].

The reflexes of voiced geminates in languages of the four branches of PNS (Blust 2006: 321) are given in Table 6:

Table 6: Reflexes of Proto-North Sarawak voiced geminate stops

PNS	*bː	*dː	*ɟː	*gː
Bintulu	ɓ	ɗ	ɟ	g
Kenyah				
Kenyah (Long San)	ɓ	ɗ	ʄ	ɠ
Kenyah (Long Dunin)	b/ɓ	d/ɗ	s	ɠ
Kenyah (Long Wat)	b	d	ɟ	g
Kenyah (Long Anap)	p	t	c	k
Kelabitic				
Kelabit (Bario)	b^h	d^h	d^h	g^h
Kelabit (Long Napir)	f	s	s	k
Kelabit (Pa' Mada)	p	t	t	k
Kelabit (Tring)	p	c	c	k
Berawan-Lower Baram				
Berawan (Long Terawan)	p	c	c	k
Berawan (Long Jegan)	p	c	c	k
Narum	f	t	c	k
Kiput	s	s	c	k
Miri	f	s	s	k

It is apparent that at least some of these changes were areal in nature, and occurred after the break-up of PNS, since the same kinds of changes happen in languages from different branches. The languages above are regrouped below in table 2 according to the broad direction in which these changes took place:

Table 7: Reflexes of PNS geminate voiced stops by type of change

PNS	*bː	*dː	*ɟː	*gː
Shortening				
Kenyah (Long Wat)	b	d	ɟ	g
Implosion				
Kenyah (Long San)	ɓ	ɗ	ʄ	ɠ
Kenyah (Long Dunin)	ɓ/b	ɗ/d	s	ɠ
Bintulu	ɓ	ɗ	ɟ	g
Aspiration				
Kelabit (Bario)	b^h	d^h	d^h	g^h

Devoicing				
Kelabit (Pa' Mada)	p	t	t	k
Kenyah (Long Anap)	p	t	c	k
Kelabit (Tring)	p	c	c	k
Berawan (Long Terawan)	p	c	c	k
Berawan (Long Jegan)	p	c	c	k
Devoicing with Frication				
Narum	f	t	c	k
Kiput	s	s	c	k
Kelabit (Long Napir)	f	s	s	k
Miri	f	s	s	k

I agree with Blust in reconstructing original gemination as the earliest stage of these medial voiced stops in PNS, which had multiple outcomes in the daughter languages (including both voiced aspirates and implosives) on the basis that (1) if voiced aspirates were to be reconstructed, the devoicing of i.e. b^h would be predicted to result in an aspirated voiceless stop p^h, not in a plain voiceless stop *p*, and (2) it seems strange that a voiced aspirate would become an implosive, since this would require a reversal of glottal aperture from lax to constricted. I therefore predict the possible trajectories of change for an intervocalic voiced geminate (using the bilabial place of articulation as an example) to be the following:

(6) (a) -b:- > -ʔb- > -ɓ-
(b) -b:- > -bp- > -p-
(c) -b:- > -b^h-(> -p^h- > -f-)

Prentice (1974) drew attention to the bilabial split in North Sarawak and a similar distinction in two Idahan languages of Sabah: the Kadazan dialect of Coastal Dusun and the Timugon dialect of Lowland Murut. In Sabahan, there is a similar contrast in fortis and lenis reflexes of voiced stops. Focusing on Kadazan, examples of the lenis/fortis split in medial position are given below[4], in which it can be seen that the conditions of the split are the same as those for PNS. Intervocalic lenition occurs after non-schwa vowels in (7a), and gemination is hypothesized to have occurred in the forms in (7b), preventing lenition:

(7) (a)

Gloss	PMP	Kadazan	
cloud	*ʀabun	gavun	(*b > v)
housepost	*hadiʀi	to-igi	(*d > ∅)
paddy	*paɖaj	paaj	(*ɖ > ∅)
indicate	*tuɟuq	tuuʔ	(*ɟ > ∅)

(b)

Gloss	PMP	Kadazan	
stab	*təbək	tobok	(< *təbːək)
hiccough	*sədu	sodu	(< *sədːu)
sting, smart	*hapəɖəs	podos	(< *pədːəs)
pinch	*kəɟut	kodut	(< *kədːut)

[4] Kadazan data have been drawn from Prentice and various publications by Blust, and supplemented by Antonissen (1958).

4. Proto-North Sarawak Sonorants after Schwa

In contrast with the voiced stops, PNS voiceless obstruents don't undergo lengthening after schwa:

(8)		Gloss	PMP	PNS
	(a)	fathom	*dəpa	*dəpa
		four	*əpat	*əpat
		blowpipe	*səput	*səput
	(b)	design, tattoo	*bətik	*bətik
		bamboo sp.	*bətuŋ	*bətuŋ
		fart	*qətut	*ətut
	(c)	stick, adhere to	*dəkət	*dəkət
		bracelet	*ləku	*ləkuʔ
	(d)	full, satiated	*bəsuʀ	*bəsuʀ
		flesh, muscle	*həsi	*əsi
		rice mortar	*əsuŋ	*əsuŋ

Neither do sonorants:

(9)		Gloss	PMP	PNS
	(a)	fat, grease	*ləmu	*ləmu
		weak	*ləmaq	*ləmaʔ
		sweet	*əmis	*əmis
	(b)	correct	*kəna	*kəna
		six	*ənəm	*ənəm
		full (container)	*pənuq	*pənuʔ
	(c)	sea turtle	*pəɲu	*pəɲu
		to swallow	*təɲəl	*təɲəl
		fat, grease	*məɲak	*məɲak
	(d)	ankle	*bəŋil	*bəŋil
		deaf	*dəŋəl	*dəŋəl
	(e)	vulva, vagina	*təli	*təli
		three	*təlu	*təlu
		buy	*bəli	*bəlih
	(f)	husked rice	*bəʀas	*bəʀas
		core of tree	*təʀas	*təʀas
		k.o. tree	*təʀəp	*təʀəp

- Question: is it possible to extend the PNS intervocalic voiced stop preglottalization paradigm to other phoneme classes?

5. Preglottalized Sonorants in Kra-Dai

While the plain versus preglottalized opposition in the voiced obstruent series is quite robust within Kra-Dai, the same is not true for the sonorants. However, the Kam-Sui branch of Kra-Dai is particularly conservative in this regard, and a four-way phonation opposition can be reconstructed for all sonorants, with the single exception of a preglottalized lateral (which has merged with the voiceless lateral):

Table 8: The four-way phonation distinction in Kra-Dai sonorants

Preaspirated	Voiceless	Plain	Preglottalized
*hm, *hn, *hn̥, *hŋ	*m̥, *n̥, *ǹ̥, *ŋ̊	*m, *n, *ń̥, *ŋ	*ʔm, *ʔn, *ʔń̥, *ʔŋ
*hl, *hr, *hʀ	*l̥, *r̥, *ʀ̥	*l, *r, *ʀ	*ʔl, *ʔr, *ʔʀ
*hw, *hj	*w̥, *j̊	*w, *j	*ʔw, *ʔj

The modern Sui phonetic reflexes have been examined in some detail (Edmondson et al 2004). These are given below using the bilabial nasal series as an example. All Kam-Sui languages are tonal and distinguish between high (^{H}) and low (^{L}) registers, the former correlating with original voiceless initials and the latter with original voiced initials, as shown below using the bilabial series again as an example:

Table 9: Phonation and register

Preaspirated	Voiceless	Plain	Preglottalized
*hm > m̥^{H}	*m̥ > m^{H}	*m > m^{L}	*ʔm > ʔm^{H}

It has generally been assumed that these phonation differences reflect the different glottal states of the initial consonants of sesquisyllabic words before the presyllable was lost. For example, an initial aspirated stop or fricative (with spread glottis) would result in a preaspirated sonorant, an initial voiceless initial would result in a voiceless sonorant, and an initial voiced initial would result in a voiced sonorant. However, this fails to explain the origin of the preglottalized series of sonorants, as no word-initial consonants with glottal constriction can be reconstructed:

(10) (a) *t^{h}-m > *hm
(b) *t-m > *m̥
(c) *d-m > *m
(d) ??? > *ʔm

The hypothesis is put forward here that this final preglottalized series of sonorants, in contrast with the other three series, is not the result of conditioning by the presyllable initial. Rather, on analogy with the voiced stops, it occurs in an environment following schwa in which gemination occurred, followed by debuccalization of the first half of the geminate. Under this hypothesis, (10d) above may be revised as the following:

(11) *Cəm- > *Cə̆mː- > *Cə̆ʔm- > *ʔm-

Examples of all four phonation types are given below:

(12)	*Kra-Dai	*Lakkja	*Kam-Sui	*Ong-Be	*Tai	*Hlai
'dog'	*k^{h}[u]máː	*k^{h}-mwaː	*k-hmaː	*m̥aː	*m̥aː	*hmaː
'ditch'	*[t]-m̥^{ʏ}áːŋ	---	*T-m̥jaːŋ	*m̥aŋ	*m̥ɯəŋ	---
'ant'	*r-móʈ	*mot	*r-mət	*muːʔ	*moc	*hmuʈ
'bear'	*kəʔm^{ʏ}új	*k-Nuːj	*ʔmjeː	---	*m̥wiː	*ʔmuj

Since other branches of Kra-Dai generally fail to preserve preglottalized sonorants, and since the Kam-Sui preglottalized sonorants usually correspond with voiceless sonorants in those branches, it can be posited that Proto-Kam-Sui is archaic in this aspect of its phonological inventory. This distinction was lost permanently in some branches (Lakkja, Ong-Be, Tai) as the original preglottalized sonorants series merged with the voiceless sonorant series. It was, on the other hand, preserved indirectly in the Hlai branch, where the voiceless series of sonorants merged with the preaspirated series, leaving the preglottalized series to fill the vacancy that was created in what became a chain shift:

(13) (a) Kra-Dai *hm, *m̥, *m > Proto-Hlai *hm
(b) Kra-Dai *ʔm > Proto-Hlai *m̥

Table 10: Reflexes of medial sonorants after schwa in Kra-Dai

*Kra-Dai	*Lakkja	*Kam-Sui	*Ong-Be	*Tai	*Hlai
*Cəm	*m̥	*ʔm	*m̥	*m̥	*ʔm
*Cən	*n̥	*ʔn	*n̥	*n̥	*ʔn
*Cən̥	*n̥̊	*ʔn̥	*n̥̊	*n̥̊	*ʔn̥
*Cəŋ	*ŋ̊	*ʔŋ	*ŋ̊	*ŋ̊	*ʔŋ
*Cəl	*l̥	*l̥	*l̥	*l̥	*ʔl
*Cər	*j̊ (< *r̥)	*ʔr	*ʃ	*Cr	*hr
*CəʀR	(*j̊)	*ʔʀ	(*ʃ)	(*ʀ̥)	(*hr)
*Cəw	*w̥	*ʔw	*w̥	*ʔw	(*ʔw)
*Cəj	*j̊	*ʔj	*j̊	*ʔj	(*ʔj)

Some examples are given below:

(14)	*Kra-Dai	*Lakkja	*Kam-Sui	*Ong-Be	*Tai	*Hlai
'thick'	*tsəʔnáː	*ts-Naː	*ʔn̥aː	*n̥aː	*n̥aː	*ʔnaː
'cold'	*kəʔn̥ít	*k-Niːt	*ʔn̥it	*n̥iːt	*n̥it	---
'stupid'	*Cəʔŋáːŋh	*ʔŋaːŋh	*ʔŋaːŋh	*ŋ̊əːŋ X	---	---
'gills'	*Cəʔŋʸáːk	---	*ʔn̥aːk	*ŋaːk	*ŋ̊ɯək	*ʔŋaːk
'taro'	*pəʔrʸáːk	*j̊aːk (< *r̥aːk)	*ʔrjaːk	*ʃaːk	*prɯək	*hraːk
'moan'	*gəʔráːŋ	*j̊aːŋ (< *r̥aːŋ)	*ʔraːŋ	---	*graːŋ	**---**
'hungry'	*məʔjáːk	---	*m-ʔjaːk	*j̊ak	*ʔjaːk	---
'stupid'	*Cəʔwáːʔ	---	*ʔwaːʔ	---	*ʔwaːʔ	---

6. Conclusion

There may be good phonetic motivations for the development of post-schwa geminate consonants (including sonorants) and their subsequent debuccalization in Pre-Kra-Dai:

- Iambic prosody: encouraged lengthening and fortition in post-schwa medial environment
- Reduction of schwa duration: favored the ultimate deletion of schwa itself
- Glottal stop acted as a final syllabic nucleus place-holder before ultimate deletion of the presyllable
- Glottal stop was therefore a phonetic default which then became phonologized:

(15) *tsənáː > *tsə̆nːáː > *tsə̆ʔnáː > *tsn̥ʔnáː > *ʔnáː

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