THE JEN LANGUAGE CLUSTER: A COMPARATIVE ANALYSIS OF WORDLISTS

Russell Norton

Theological College of Northern Nigeria and SIL International
russell_norton@sil.org

Nlabephee Othaniel

Theological College of Northern Nigeria and Initiative for the Translation
and Development of African Languages (ITDAL)
othaniel_nlabephee@linguamail.org

Abstract: A lexicostatistical analysis divides the Jen language cluster into two primary branches Burak-Loo-Maghdi-Mak and Kyak-Moo-Leelau-Tha-Doso-Dza. This is also supported by extensive isoglosses, replacing the older Bikwin-Jen division at least for purposes of genetic classification. For vowels, a 9-vowel system is reconstructed, but its 3-way height contrasts appear unstable in some languages, either in the central vowels or in the front and back vowels. Front and back vowels also vary widely with diphthongs. Prosodic features of nasalisation, tone, and breathiness are reconstructed, with nasalisation developing in more roots in the second primary branch. For consonants, the large inventory includes particularly unstable coronals, and development of voiceless approximants in Doso-Dza. The comparative evidence is conflicting as to whether labialised and palatalised structures are secondary modifications or onset sequences, suggesting the need for a variationist approach. Overall, riverine Jen varieties Tha, Doso, Dza show unusually extensive sound change, in contrast to the more phonologically stable Bikwin varieties. Applications to orthography development include the need to represent implosives and /r/ in languages other than Dza, where they have been lost, and the need to represent vowel nasalisation and /h/ in languages of the second branch only. Initial stem consonant alternations seen in both nouns and verbs need more investigation in Jen languages.

Key words: Jen, language cluster, Bikwin, lexicostatistics, reconstruction, orthography

1. Introduction

The Jen language cluster conventionally consists of the ten Adamawa language varieties listed in Table 1, that are considered immediately genetically related as well as geographically adjacent (Eberhard et al. 2019). Hyphenated names in the literature, Burak-Jen (Bennett 1983) or Bikwin-Jen (Kleinewillinghöfer 1996), refer to the same cluster.¹

Table 1

**Jen varieties with ISO639-3 identifier codes
and elicited autonyms**

[bys]	Burak	[b̥ū:ràk]
[ldo]	Loo (Shungo Galdemaru, Shungo Waamura, Tadam)	[ʃùŋɔ́]; [lō] ‘head’
[gmd]	Maghdi (Tala)	[màkdi], [mâɣdi]
[pbl]	Mak (Lee Mak) of Panya and Zoo	[màk], [lè màk] ‘they (of) Mak’
[bka]	Kyak (Bambuka)	[kjǎk]
[gwg]	Moo (Gomu)	[mɔ́]
[ldk]	Leelau (Munga Leelau)	[lê lə̀ù] ‘road (to) Lau’
[mko]	Munga Doso	[mĩŋgã dɔsɔ] ‘river original’
[jen]	Dza of Jen and Joole	[i-ɖzə] (ɖzə ‘reed plant sp.’)
[thy]	Tha (Joole Manga)	[ðə̀], [ɲwá ɖá] (ɲwá ‘mouth’)

¹ Hammarström et al. (2019) add Baa (that is, Kwa [kwb]) as an “unclassified Bikwin-Jen language”, citing Kleinewillinghöfer (1996). This seems an optimistic reading of Kleinewillinghöfer, however, who reports only that Kwa is typologically similar to Bikwin-Jen in its pluralisation strategy (1996: 98), and that Kwa lexicon resembles Adamawa languages in general (1996: 99), neither of which is evidence of a Bikwin-Jen affiliation.

Figure 1. Map of the Jen language cluster (Othaniel 2017)

Recurrent elements in the variety names include *Munga* /mɨŋ-gǎ/ ‘river’ (*lit.* ‘big water’) used by two adjacent riverine communities, one of which asserts they are original (*Doso*) to the area, and the other is on the road to Lau (*Leelau*). The ancestral name *Mak* [māk] is also present in *Maghdi* [màkdi], [mâydi], the latter with postvocalic allophonic variant [y] as also observed in the Maghdi word list, [wə̀ymə̀i] ‘shoe’, [gbáyà] ‘scratch’.

The varieties are spoken between the Benue river and the Gombe/Taraba State border to the north (Figure 1). The Jen language cluster is in an area of high linguistic diversity, next to other Adamawa languages spoken in the east (Dadiya, Bangwinji, Tso, Kwa), West Chadic languages in the north and west (Tangale, Pero, Kushi, Kholok, Nyam), a Jarawan Bantoid language in the south-west (Kulung), Jukunoid languages (Shoo-Minda-Nye, Jiba) in the south, and a Central Sudanic language (Laka) in the south. The Central Chadic language Bachama is spoken to the east, but some of its speakers are settled in villages in the Jen language cluster area. The Atlantic language Fulfulde

is spoken by herders throughout the area. Hausa is present throughout the area as a language of wider communication, and English is present in schools and other formal settings.

In their morphological type, the Jen languages lack the noun class suffixes found in other Adamawa languages. Instead, pluralisation is expressed by the use of a 3_{PL} pronoun before the noun. In Dza, where nouns begin with either a consonant or *i*, the noun may cliticise to the pronoun *è* causing removal of the noun's initial vowel, producing an incipient *í/è* alternation on *i*-initial nouns as shown in (1).

(1) Plural pronoun cliticisation in Dza

<i>íḞ</i>	‘person’	<i>è íḞ</i>	~	<i>èḞ</i>	‘people’
<i>ímwḁ</i>	‘child’	<i>è ímwḁ</i>	~	<i>èmwḁ</i>	‘children’
<i>íbwì</i>	‘male’	<i>è íbwì</i>	~	<i>èbwì</i>	‘males’
<i>íhè</i>	‘female’	<i>è íhè</i>	~	<i>èhè</i>	‘females’

Across the Jen language cluster, various plural roots *e*, *le*, *ye*, *yá*, *yila*, or *nó* are used in this construction as shown in (2), often with vowel lengthening before the following noun, and/or initial vowel elision in the following noun.²

² The form *le* is also seen in Table 1, *Lee Mak*. Problematic in this respect is the name *Leelau*, as *le* is not used for the associative plural in *Leelau* in (2), nor do we have it in our *Leelau* wordlist for ‘they’, but Kleinewillinghöfer (1996: 96) provides the meaning of *Leelau* as ‘road (to) Lau’ (see **le* ‘road’ in our Appendix). Across the Jen language cluster, pronominal *le* is found either in the plural construction in (2) or for ‘they’ in our word list in Maghdi, Mak, Doso and Dza, widespread enough to support reconstruction of **le* 3_{PL}, although it is unattested in *Kyak-Moo-Leelau*. Likewise, *ye* appears either in the plural construction or in the word list in *Moo*, *Maghdi*, *Mak*, and very similar *e* in *Dza*, supporting the reconstruction of **ye* 3_{PL} as well in alternation with **le*. Another 3_{PL} root **ní* or similar appears in our word lists, but is not used in the plural construction (unless *Tha nó* is somehow derived from *ní*).

(2) Pluralisation of ‘man’ in Jen varieties (Kleinewillinghöfer 1995/2015)

Dza	<i>ibùù / ee ibwì</i>	
Doso	<i>yɪbui / lé-bui</i>	
Tha	<i>nimbi / nó nimbi</i>	
Kyak	<i>yibé / yáá yibe</i>	
Moo	<i>yibé / yá yibe</i>	
Leelau	<i>yibéí / yáá-bei</i>	
Mak	<i>libei / lee labeí</i>	(but <i>yuluj / yee yuluj</i> ‘bird / birds’)
Maghdi	<i>libei / lee labeí</i>	(but <i>yuluj / yee yuluj</i> ‘bird / birds’)
Loo	<i>lua libe / yila liba</i>	
Burak	<i>libe / yelaa libe</i>	

The present work is a study of sound correspondences between Jen language varieties, based on a comparative 300 wordlist collected by the second author for his BA thesis (Othaniel 2017). Our goal is to identify sound changes in the cluster and provide proto-Jen reconstructions for the items in our word list. The purpose of this study is to contribute to knowledge of the history of Adamawa languages, and also to gain insights from sound correspondences that can support efficient development of orthographies for the Jen languages (Norton & Othaniel 2018). A past-ward orientation in historical linguistics leads back to reconstruction, and a present-ward orientation leads forward to the speech forms used today, and to how these can be represented in writing. The latter is an implementation of the idea in Lewis and Stalder (2010) that language clusters can undergo co-ordinated development based on their linguistic similarity. Dza (or Jenjo³) has been written since 2000 through the Jenjo Language Development Project, and the phonemes are analysed in detail in Othaniel (2016). Hence, sound changes that differentiate Dza from the other varieties

³ Jenjo is the Fulfulde word for a Dza speaker, consisting of the town name Jen and the Fulfulde person suffix *-jo*.

reveal how the Dza orthography would need to be adapted in order to write other languages of the Jen cluster in a phonemic orthography. A related question is how many other language units are candidates for development among the varieties listed for the Jen language cluster, as some varieties are actually extremely similar (Kleinewillinghöfer 2017). We consider this point using a preliminary lexicostatistical assessment prior to the analysis of sound correspondences.

We begin with a lexicostatistical assessment of the language cluster in §2, using a comparative Swadesh 100 wordlist for the Jen varieties available online (Kleinewillinghöfer 1995/2015). In §3 and §4, vowels and consonants are compared over our own 300 wordlist, followed by a conclusion in §5. and a list of reconstructed items in the Appendix.

2. Lexicon

2.1. Lexicostatistics

Lexical similarity values between the varieties were generated using the WORDSURV7 program by entering cognate judgements over available Swadesh 100 wordlists for all ten varieties including two sub-varieties each of Loo, of Mak and of Dza (Kleinewillinghöfer 1995/2015). This produced the results shown in Table 2. This is a preliminary exercise in lexicostatistics (Starostin 2013), where sound correspondences and etymological structure are judged by inspection without a mature understanding of the languages. The analysis nevertheless enables us to evaluate three basic issues: status as a language cluster in terms of overall lexical cohesion, status of extremely similar varieties as dialect clusters, and intermediate relationships between different parts of the language cluster. We assume the divergences in lexicon occurred by the universal process of lexical replacement, but we do not seek to explain the replacements further as a result of word taboos, as Kleinewillinghöfer (1995) has proposed for other cultures of the Muri Mountains.

As to overall lexical cohesion, all lexical similarity values are at least 45%, a level at which linguistic relationship will be evident to

Table 2

Lexical similarity values in dialect clusters united at 95% and at 85%

	Burak	Loo(G)	Loo(W)	Maghdi	Mak(P)	Mak(Z)	Kyak	Moo	Leclau	Tha	Doso	Dza(Je)	Dza(Jo)
Burak	100	92	88	79	71	72	52	52	50	53	48	46	45
Loo(G)	92	100	95	76	72	71	52	49	48	52	48	47	47
Loo(W)	88	95	100	76	71	71	53	51	50	51	48	50	50
Maghdi	79	76	76	100	83	83	61	58	57	56	46	47	46
Mak(P)	71	72	71	83	100	97	66	61	64	59	52	55	51
Mak(Z)	72	71	71	83	97	100	66	62	65	60	52	55	51
Kyak	52	52	53	61	66	66	100	92	93	65	68	68	65
Moo	52	49	51	58	61	62	92	100	88	62	62	63	61
Leclau	50	48	50	57	64	65	93	88	100	65	66	67	63
Tha	53	52	51	56	59	60	65	62	65	100	73	70	69
Doso	48	48	48	46	52	52	68	62	66	73	100	90	91
Dza(Je)	46	47	50	47	55	55	68	63	67	70	90	100	98
Dza(Jo)	45	47	50	46	51	51	65	61	63	69	91	98	100

both linguists and speakers alike (Gell-Mann, Peiros & Starostin 2009: 14). This sufficient lexical cohesion, combined with their geographical contiguity, supports the description “language cluster”.

As to dialect clustering, there is extremely high similarity between the two sub-varieties of Loo, of Mak and of Dza (at least 95%). But there is also very high similarity between Burak and Loo, between Kyak, Moo and Leelau, and between Doso and Dza. In each of these groupings, all lexical similarity values are above the threshold of 85% indicated in Eberhard et al. (2019) for dialecthood. However, this threshold should be considered together with other criteria for dialect status, and ultimately the issue can only be settled by the communities themselves. Here, we can only make preliminary observations. Geographically, Burak-Loo and Kyak-Moo form adjacent groupings so that they are able to function as larger speech communities, but the political separation of Burak and Loo by the Gombe/Taraba state boundary, and the geographical non-contiguity of Leelau with Kyak-Moo, partly compromise their respective cohesion. For Doso and Dza, extensive phonological differences make them noticeably less cohesive in their lexicon, despite their many cognates.

As to intermediate relationships, the varieties combine into successively larger subclusters according to lexical similarity, as represented by boxes in Table 3. At 80% similarity, the varieties form five clear groups, Burak-Loo, Maghi-Mak, Kyak-Moo-Leelau, Tha, and Doso-Dza. At 70% similarity, Burak-Moo combines with Maghdi-Mak, and Tha combines with Doso-Dza. At the 60% stage, the remaining subgroup Kyak-Moo-Leelau clusters with Tha-Doso-Dza to the right rather than with Burak-Loo-Maghdi-Mak to the left, as it consistently scores at 60%+ similarity with Tha-Doso-Dza. The lexicostatistical analysis therefore departs from the previous view distinguishing a Bikwin group consisting of the first seven varieties (Kleinewillinghöfer 1996: 92–94). Scores between Kyak-Moo-Leelau and Burak-Loo-Maghdi-Mak are much more variable, peaking at 66% between Kyak and Mak, but as low as 48% between Leelau and Loo, which is no higher than the base level of the whole language cluster. Hence,

Table 3

Lexical similarity values with sub-groups united at 80%, 70%, 60%

	Burak	Loo(G)	Loo(W)	Maghdi	Mak(P)	Mak(Z)	Kyak	Moo	Leelau	Tha	Doso	Dza(Je)	Dza(Jo)
Burak	100	92	88	79	71	72	52	52	50	53	48	46	45
Loo(G)	92	100	95	76	72	71	52	49	48	52	48	47	47
Loo(W)	88	95	100	76	71	71	53	51	50	51	48	50	50
Maghdi	79	76	76	100	83	83	61	58	57	56	46	47	46
Mak(P)	71	72	71	83	100	97	66	61	64	59	52	55	51
Mak(Z)	72	71	71	83	97	100	66	62	65	60	52	55	51
Kyak	52	52	53	61	66	66	100	92	93	65	68	68	65
Moo	52	49	51	58	61	62	92	100	88	62	62	63	61
Leelau	50	48	50	57	64	65	93	88	100	65	66	67	63
Tha	53	52	51	56	59	60	65	62	65	100	73	70	69
Doso	48	48	48	46	52	52	68	62	66	73	100	90	91
Dza(Je)	46	47	50	47	55	55	68	63	67	70	90	100	98
Dza(Jo)	45	47	50	46	51	51	65	61	63	69	91	98	100

although Bikwin varieties can be grouped together geographically (those communities away from the Benue river in the western Muri Mountains) and culturally (*bi kwin* ‘we (are) one’), they are not a genetic group. The genetic unity of Kyak-Moo-Leelau with Tha-Doso-Dza implies a migration by the ancestors of Kyak-Moo-Leelau away from the riverine Jen area towards the settlements of Mak, Maghdi, Loo and Burak. After this, Mak must have increased in similarity to Kyak-Moo-Leelau due to contact. While the data in the rest of this paper and in the comparative word list in the Appendix frequently divides Burak-Loo-Maghdi-Mak and Kyak-Moo-Leelau-Tha-Doso-Dza, there are also quite a few examples where Mak patterns with the last six varieties.⁴

The lexicostatistical analysis is presented in tree format in Figure 2, annotated with branch-average percentage values for three dialect clusters and for the Jen language cluster as a whole. All sub-branches in this tree are supported by sound changes presented within the rest of this paper.

⁴ An observation that we pass over in our hierarchical cluster analysis of the lexical similarities is that Kyak-Moo-Leelau is much more distant from the Burak-Loo portion of the first branch (48–53%) and noticeably closer to the Maghdi-Mak portion (57–66%). A reviewer points out that the latter numbers are similar to Kyak-Moo-Leelau’s closeness to Tha-Doso-Dza (61–68%), that determines the final division between the first four varieties and the last six varieties. Although Kyak-Moo-Leelau cannot be hierarchically grouped with Maghdi-Mak because Maghdi-Mak is much closer to Burak-Loo, the data can nevertheless support a chain analysis linking one dialect cluster to the next (Burak-Loo = Maghdi-Mak = Kyak-Moo-Leelau = Tha-Doso-Dza). This has the very plausible implication that effects of contact between adjacent Jen varieties extends into the past to the proto-varieties that produced the present dialect clusters, which is just what we should expect in a language cluster environment. Nevertheless, the isoglosses and correspondences in the rest of the paper follow the divisions made in the hierarchical analysis. Thus, although we acknowledge that the chain interpretation provides additional historical insight, we also consider that the hierarchical interpretation still stands. The hierarchical interpretation provides a model of the successive formation of more and more Jen speech communities as traced in their diverging lexical choices, whereas under the chain interpretation the formation of these communities is assumed rather than explained.

Figure 2. Jen language cluster tree

2.2. Isoglosses for the two primary branches

The proposed primary branching between the first four varieties and the last six varieties, revising the earlier Bikwin-Jen division, can be defended by evidence from various isoglosses. Some of the items considered here were already used at an earlier stage of research as evidence of a close connection between Bikwin and riverine Jen (Tha, Doso and Dza) because the links were especially evident between Tha-Doso-Dza and Kyak-Moo-Leelau (Klenewillinghöfer 1996: 96). Table 4 presents lexical isoglosses for the two revised branches.⁵

Table 5 presents items that show two phonological isoglosses that distinguish the second branch, nasalised vowels and [h]. Exceptionally, nasalised vowels occur in some roots in Mak of the first branch as well ('suck', 'many'). This can be attributed to borrowing, however, which is already invoked in §2.1 to explain the inflated lexical similarity of Mak to Kyak-Moo-Leelau.

Table 6 presents verbs with a different initial consonant in the two branches. The consonants *j/w*, *j/z*, *w/z*, *n/z* are phonetically dissimilar and thus represent verbal stem alternations of unknown function. The item 'split' even attests alternation between *s* and zero.

Table 7 presents roots with a recurring difference **-e/*-iŋ* (or **-we/*-iŋ*) in their rhymes between the two branches, again of unknown function. This assumes that **e* is sometimes realised by a diphthong *ai* or similar (§3.2), and that **i* becomes *u* after a labial consonant in Kyak-Moo-Leelau.

⁵ Here and in all our collected data, the IPA symbol [j] is transcribed for the palatal approximant.

Table 4

Lexical isoglosses for the two branches

gloss	Burak	Loo	Maghdi	Mak	Kyak	Moo	Leelau	Tha	Doso	Dza
'belly'	fū	fú	fū	fú	wá	wá	wá	uá	uá	uá
'grass'	kā	kā	ká	kā	gūk	gūk	gúk	gù	vù	hū
'take'	pí	pí	pí	pí	lē	lē	lài	jì	dī	dī
'see'	nāŋ	nāŋ	nāŋ	lāŋ	bí	bí	bjà	bì	bà	bà
'seed'	lāk	lāk	lāk	lók	bē	bjà	bé	jà	bjà	pjà
'sour'	nwí	nwí	nwí	nwí	ám	ám	àmí	nèŋəi	àm	ŋá
'Guinea com'	jǎ	jā	ǵà	jétā	mìn	mìn	mìn	mù	mùm	mwí
'sibling'	nínmì	nín	nín	nín	jwəŋ	ɲəŋəm	uəŋəm	uə	uĩ	uĩ
'count'	dàbà	dàbà	dábā	dàbá	zēn	zēn	ðən	hò	zəm	sà
'finish'	fánó	fānē	fánē	fání	ðimnáŋ	zəmátŋ	ðəmátŋ	cē	tŋ	tŋ

Table 5

/h/ and nasalised vowels in the second branch

gloss	Burak	Loo	Maghdi	Mak	Kyak	Moo	Leclau	Tha	Doso	Dza
‘swell’	fú(rì)	fúm	lɔk	fəm	hár	fám	hár	jē	hài	hé
‘breathe’	ú-mé	ú-má	ù-mà-lè	ηá-má	ηó	ηó	ηwə̀-nì	hũ	hú	hú
‘shoe’	wə̀η-mī	wə̀η-mì	wə̀η-mə̀i	wáη-mú	ś	ś	ə̀i	hũ	(bəm)	hú
‘big’	(kámùr)	(mút)	gòη	gwə̀η	gǝ̀zǝ̀i	āηgǝ̀	áηgǝ̀	nágò	áηgǝ̀	àkǎ
‘bite’ ₁		pəl	ɥí	ɥí	tswǝ̀	ɲǝ̀	cwǝ̀		tswǝ̀	tswǝ̀
‘bite’ ₂	lúm							dũ		
‘scratch’		kṙá-ká	ḡbá-yà		kwǎ					kwǎ
‘suck’		ai		ǝ́ú	ɔ̀η	ɔ̀η	ɔ̀η	ηə̀i	ù	ú
‘many’				lì-kṙǎ-lì	kṙǎ-lǝ̀	kṙǎ	kṙǎ-díη		kṙǎ-lǝ̀	

Table 6

Initial consonant alternations in verb stems

gloss	Burak	Loo	Maghdi	Mak	Kyak	Moo	Leclau	Tha	Doso	Dza
‘come’	jí	jí	jí	já	wè	wá	wè	wà	wè	wú
‘dig’	jǎ	jā	jà	já	zà	zà	ǎà	ǎà	hà	hà
‘walk’	wē-lé	wē-lé	wé-lè	wō	zō	zò	ǎà	ǎǎ	hò	hō
‘kill’	wòb	wəb	wòp	wəb	zəp	zəp	ǎp	ə	jə	jə
‘red’	nūn	nēnē	nēnē	nūn	zēn	zēn	ǎ	ǎǎ	jě	jě
‘split’	əŋ	əŋ			səŋ	səŋ	əŋ			

Table 7

Items with alternating rhyme in the two branches

gloss	Burak	Loo	Maghdi	Mak	Kyak	Moo	Leclau	Tha	Doso	Dza
‘water’	mē	mē	māi	māi	mū	múŋ	mūŋ	māŋ	māŋ	māŋ
‘tomorrow’	vē	vē	vəi	vəi	būŋ	būŋ	būŋ	bāŋ	bāŋ	bāŋ
‘faeces’	būjē	bwaí	boi	boi	búŋ	búŋ	búŋ	wi	būŋ	būŋ
‘fish’	fjijē	tjē	sai	sai	θūŋ	sūŋ	θūŋ	θūŋ	uŋ	jūŋ

The sound correspondences in the rest of the paper show many other instances where a difference occurs between the first four varieties and the last six varieties.⁶

3. Vowels

We reconstruct a 9-vowel system *i, *e, *ɛ, *ɨ, *ə, *a, *ɔ, *o, *u. This means the Jen language cluster is of the three central vowels type, also seen in Central Chadic languages of the Bata group to the east of the Jen cluster (Ornan 2016; Gravina 2014: 147; Boyd 2002). More problematic are the non-high front and back vowels *e, *o, *ɛ, *ɔ. We deal with the other more stable vowels first.

Table 8

Proto-Jen vowels			
	front	central	back
high	*i	*ɨ	*u
mid	*e	*ə	*o
low	*ɛ	*a	*ɔ

3.1. Stable vowels

Stable vowels in the Jen language cluster are *i, *u, *a, *ə, *ɨ as shown in Table 9. Stable examples are shown for *i, *u, *a in open syllables. An example of *ɨ is also given which is unstable in Kyak

⁶ Set against the ample evidence for this branching are certain lexical items that distinguish the first seven Bikwin varieties from the last three riverine Jen varieties, notably ‘one’, ‘two’, ‘head’, ‘neck’, ‘tooth’ (Kleinewillinghöfer 1996: 95–96). However, none of these establish Bikwin as a genetic group, either because the root is actually cognate in the last three varieties but with comprehensive changes (*kwin* > *tɕiŋ* ‘one’, *dul* > *d̥ɕwi* ‘neck’, *le* > *d̥i* ‘tooth’), or because the root is found in other Adamawa languages as well (*kwin* ‘one’, *rab* ‘two’, *lo* ‘head’), and so are not unique to Bikwin.

Table 9

Stable vowels

	Burak	Loo	Maghdi	Mak	Kyak	Moo	Leelau	Tha	Doso	Dza
*i	i	i	i	i	i	i	i	i	i	i
‘breast’	mî	mî	mî	mî	mî	mî	mî	mî	mî	mî
‘liver’	nî	nî	nî	nî	nî	nî	nî	nî	nî	nî
*u	u	u	u	u	u	u	u	u	u	u
‘new’	fū	fū	fū	fū	fū	fū	fū	fū	fū	fū
*a	a	a	a	a	a	a	a	a	a	a
‘shoot’	tá	tá	tá	tá	tá	tá	tá	tá	tá	tá
‘hole’	bwā	bwā	bwā	bwā	bwā	bwā	bwā	bwā	bwā	bwā
*i	i	i	i	i	i	i	i	i	i	i
‘crocodile’	ǰíp	ǰíp	ǰíp	ǰíp	swám	síp	ǰíp	sì	sì	ǰí
*ə/ ɪ	ə	ə	ə	ə	ə	ə	ə	ə	ə	ə
‘eat’	tán	tán	tán	tán	tán	tán	tán	tán	tán	tán
‘drum/dance’	dàn	dàn	dàn	dàn	dàn	dàn	dàn	dàn	dàn	dàn
‘leaf’	ǰən	ǰən	ǰən	ǰən	ǰən	ǰən	ǰən	ǰən	ǰən	ǰən
*ə/ #	ə	ə	ə	ə	ə	ə	ə	ə	ə	ə
‘what?’	bē	bā	bā	bā	(bējā)	má	bā	(bā)	bā	bādē
‘give’	(fǰ-lé)	fá	(ē)	à	dē	(dē)	dà	dē	dà	tà
‘stab’	(bèt)	(bēt)	bà	bà	bē	(bjē)	(bē)	bà	(bā)	pà
‘come’	(ǰí)	(ǰí)	(ǰí)	ǰá	wè	(wā)	wà	wà	wà	(wú)
‘go’				(tá)	té	tá	tà	tà	tà	tá

and Leelau. The schwa $*ə$ is shown to be stable before $*ŋ$, but this fails to provide contrast with $*a$, for which there are no stable examples before $*ŋ$ in our wordlist. However, examples in open syllables confirm a contrastive schwa $*ə$ in most varieties except Burak-Loo and Kyak, with a regular shift to $[ɛ]$ in Kyak.

Table 10 illustrates that $*i$, $*u$ are centralised to $[i]$ in closed syllable roots in several varieties of the second branch. This seems to be conditioned by the following consonant in opposite ways in Kyak and Moo. The restriction to closed syllables is confirmed by the failure of centralisation in roots where the final consonant is lost in Tha, Doso and Dza. Centralisation co-exists with contrary processes where $*i$ becomes $[ə]$ or $[i]$ (Table 9) or $[u]$ after a labial consonant (Table 7) in Kyak-Moo-Leelau, increasing the probability that contrast between $[i]$ and neighbouring sounds has been lost in Kyak-Moo-Leelau.

Table 11 shows that the high back vowel undergoes diphthongisation $*u > wi$ in open syllables after an alveolar consonant, particularly in Doso-Dza, but that $*u$ is also renewed in Doso-Dza by mid vowel raising $*o > u$ in open syllables (also in §3.2).

3.2. Non-high front and back vowels

Non-high front and back vowels are problematic for two reasons. The first problem is the lack of stable correspondences contrasting $*e$ - $*ɛ$ and $*o$ - $*ɔ$ consistently across the language cluster. The second problem is that these vowels frequently occur in irregular correspondences with diphthongs.

ATR contrast in mid vowels is reported in Dza, with incompatibility between +ATR / e o / and -ATR / $ɛ$ $ɔ$ / in the same root (Othaniel 2016), but this is not straightforwardly replicated across the language cluster by stable correspondences. The distinction can be reconstructed in open syllable roots, but is subject to many sound changes. There is also comparative evidence for a phonological distinction of height as an alternative to ATR, as / $ɛɔ$ / pattern with the low central vowel / $ɑ$ / in

Table 10

Centralisation

	Burak	Loo	Maghdi	Mak	Kyak	Moo	Leelau	Tha	Doso	Dza
*i	i	i	i	i	i	i	wi > u	wi > u	i	i
‘one’	kwín	kwín	swín	cwín	kwín	kwín	kún	cùngà	tsín	tsín
*u	u	u	u	u	u	u	u	i	i	i
‘pull up’	lúb	lúb	lúb	lúb	lúb	lúb	lúb	lù	đù	đzwù
‘pull’	gúb	gúb	gúb	gúb	gúb	gúb	gúb	gù		
‘eye’	nú	nún	nún	nún	nún	nún	nún	nú	nún	nún
‘thing’	nún	nún	nún	nún	nún	nún	nún	nún	nún	nún

Table 11

Renewal of [u] in Doso-Dza

	Burak	Loo	Maghdi	Mak	Kyak	Moo	Leelau	Tha	Doso	Dza
*u	u	u	u	u	u	u	u	u	wi	wi
‘bury’	tú	tǔ	tú	tǔ	sú	sú	sú	tù	tswí	tswí
‘nose’	lúrí	lúrǐ	lwílí	đúrǎ	đúr	đúr	đúr	đǔ	đwí	đzwí
‘far’	(gbēnē)	túrǎ	túlà	tú	tfǔ	tfǔ	tú	cwē	tfwí	tswí
*o	o	o	o	o	o	o	o	o	u	u
‘leg’	vō	vō	vò	bō	bō	bō	bò	bò	bù	pū

some data (Tables 11 and 12).⁷ The contrasts are most visible in Burak-Loo on the left of the table (also in Kleinewillinghöfer 1995/2015), becoming unstable to the right of Burak-Loo, and with nearly all instances of these vowels changing in Doso-Dza. It is surprising, then, to find these contrasts repeated in Dza. Hence, although from a comparative perspective, the contrast is compromised by sound changes outside Burak-Loo, it would be worthwhile for research in any Jen variety to check carefully whether the contrast is lost or still present.

The non-high front and back vowels also frequently appear in irregular correspondences with various diphthongs. Table 12 shows correspondence with off-gliding diphthongs [əi] and [əu] in open syllables, although in some varieties the vowels *ɛ and *ɔ have the low central vowel in reflexes instead of the schwa, ɔ:aw ('bow') and ɛ:a/_C ('left').

Table 13 shows roots in which all four vowels have different outcomes in the second branch. The conditioning behind these changes in the second branch is unclear. Nevertheless, the data adds support for the contrasts *e-ɛ and *o-ɔ. The *o-ɔ contrast, preserved here in the Maghdi data, is strikingly confirmed by correspondence to different diphthongs [we] and [wa] respectively in the second branch. The front vowel *ɛ shows a parallel correspondence to [ja] in the second branch, hence the lower vowels *ɛ, *ɔ pattern with the low central vowel in diphthongisation to [wa] and [ja]. There is, however, an apparent neutralisation *ɛ→e in Maghdi-Mak (compare Tables 12 and 14). The fourth vowel *e shows a different change by raising to [i], where reconstruction of the mid vowel *e rather than the high vowel is also supported by its role a split in *p in Table 24.

Table 14 shows how all four vowels raise to high vowels *o,ɔ>u, *e,ɛ>i in Doso-Dza in more open syllable roots. These series also attest changes smaller changes with apparent neutralisations of contrast in Maghdi, Mak, Leelau, and Tha (compare Tables 11 and 12) as well as Doso-Dza.

⁷ Alternatively, the distinction may be between +ATR /e ə o/ and -ATR /ɛ ɔ ɔ/.

Table 12

Mid vowels in open syllables

	Burak	Loo	Maghdi	Mak	Kyak	Moo	Leelau	Tha	Doso	Dza
*o	o, əu	o, əu	əu	əu	o	o	o	o, əu	o	o
‘fall’	wō	wǒ	jə̀	jáw	ō	ō	ò	ʔò	ò	ō
‘cook’	jǒ	jō	jə̀wē	jə̀	jō	jǒ	jò	jə̀	(qì)	(qì)
‘lie (down)’	lə́	lə́	lə́	lā́	ló	lǒ	ló	lə́	(lwèl)	(lwé)
*ɔ	əu	əu	əu	əu	ɔ	ɔ	əu	əu	aw	
‘bow’	tə̀	tə̀	tə̀	tə̀	tǐ	tǐ	tə̀	tə̀	tə̀	(twə̀ŋ)
*e	e	əi	əi	əi	ε	ε	əi	e	e	e
‘tooth’	lē	lə́	lə́	lə̀	lē	lē	lə́	(dī)	(dī)	(dǐ)
*ɛ	ε	ε, əi	e, əi	e, əi	ε	e	əi	əi	e	e
‘calabash’	dē	dē	də́	də́	dē	dē	də̀	lə̀	(lì)	(dǐ)
‘wife’	lí-fē	lí-fə́	fē	lí-sǐjē	(ì-sí)	(sí)	(fám)	(fì)	hē	hē
‘left’	mē	má-rə̀	màlè	mə́	mē	mē	mə̀	mù	(mì)	(mì)

Table 13

Changes in the second branch

gloss	Burak	Loo	Maghdi	Mak	Kyak	Moo	Leelau	Tha	Doso	Dza
*o/we	o	o	o	ɔ	we	(w)e	we	(w)ja	we	we
‘snail’			fó	sò	swè	fê	swē	ɲfjà	ɥē	ɥè
*ɔ/wa	ɔ	ɔ	ɔ	ɔ	wa	wa	wa		wa	wa
‘drink’	ɲɔ	ɲwá	ɲɔ		ɲwà	ɲwà	ɲwà	ɲwà	ɲwà	ɲwá
*ɛ/ya	ɛ	ɛ	e	e	ja	ja	ja	ja	ja	(j)a
‘mosquito’	bé	bé	bē	bē	bjà	bjá	bjà	jà	djà	džá
*e	e	e	e	e	i	i	i	i	i	i
‘sand’	džwē	zwē	zwà	zwē	zwī	zī	zwí	vī	ɥì	ɥì
‘spit’	twē	(twí)	fwífwē	súswe	tswítswí	tfwífwí	tùtwí	twítwí	tfwí	tfwí
‘dry’	kwē	kwál	kwál	kwál	kwí	kwí	cwí	ɥìjē	tfwí	tfwí
‘blood’	wē		ɥē	ɥē	zwí	zī	zī	vì	ɲɥì	ɥì
nail ‘(v.)’			pē		pì	pí	pí		pī	pí

Table 14

Mid vowel raising

	Burak	Loo	Maghdi	Mak	Kyak	Moo	Leelau	Tha	Doso	Dza
*o	o	o	o	o	o	o	o	o	u	u
‘leg’	võ	võ	vò	bõ	bõ	bõ	bò	bò	bù	pū
*ɔ	au	au	əu	əu	ɔ	ɔ	ɔ	əu	u	u
‘suck’	au	au	əu	əu	ɔ	ɔ	ɔ	əu	ù	ú
*e	e	e	əi	əi	ɛ	ɛ	e	i	i	i
‘stand’	dɛ	dɛ	dəi	dəi	dɛ	dɛ	dē	dɛ	dɛ	tɛ
‘tooth’	lɛ	lɛ	ləi	ləi	lɛ	lɛ	ləi	lɛ	dɛ	dɛ
*ɛ	ɛ	ɛ	əi	əi	ɛ	e	əi	əi	i	i
‘calabash’	dɛ	dɛ	dəi	dəi	dɛ	dɛ	dəi	ləi	lɛ	dɛ
‘cloud’				tɛ	tɛ	tɛ	təi	tɛ	tɛ	tɛ
*ɛ	ɛ	a	a	əi	ɛ	ɛ	əi	əi	i	i
‘left’	mɛ	má-rò	mà-lè	məi	mɛ	mɛ	məi	mù	mì	mì

Table 15 shows other open syllable roots with a different process of back vowel diphthongisation **u > wi*, **o > we* in Doso-Dza. These are all after an alveolar consonant, therefore **o > we* bleeds **o > u* which is not found after alveolar consonants, unlike **e, ε > i* which are found after alveolar consonants (Table 14). Back vowel diphthongisation is also implicated in an apparent derivation ‘head’ → ‘on’ in Burak-Loo.

Table 16 shows non-high front or back vowels in closed syllable roots. There are examples with **ɔ* raising to [o] in Tha-Doso-Dza, but others are in widespread irregular correspondence with an on-gliding diphthong [wə]. Some similar variation occurs between [ɛ], [e] and [jə] in the last six varieties of the second branch. Reconstruction of the on-gliding diphthong **wə* is favoured by its wider distribution than [ɔ], by its apparent contrast with **ɔ* in ‘push’ and ‘basket’, and because the reconstruction of **wə* after more consonants than **yə* matches the finding that many **Cw* structures are reconstructible whereas **Cy* structures are rare (§4.3).

3.2. Nasalised vowels

As already noted in 2.2, nasalised vowels are largely confined to the second branch. Table 17 shows roots with nasalised vowels grouped as to whether they can be reconstructed or are innovations. In the first group (‘bite₁’, ‘scratch’), nasalised vowels correspond to oral vowels in the first branch, providing limited evidence of original nasalised vowels **ĩ*, **ã* whose nasalisation has been lost in the first branch. This also raises the possibility that lexical isoglosses of the second branch with nasalised vowels like *kṗã* ‘many’ may also be original. In the second group of roots, however, nasalised vowels found in the second branch (or in Mak) are innovated, because they correlate with the loss of a following nasal consonant. This process is lexically gradual, where the oldest example (‘big’) is inherited by all six varieties of the second branch, and the youngest examples have been innovated in varieties of today, although some are of uncertain date due to lack of attestation of the root in our wordlists for other varieties.

Table 15

Back vowel diphthongisation

	Burak	Loo	Maghdi	Mak	Kyak	Moo	Leelau	Tha	Doso	Dza
*u	u	u	u	u	u	u	u	u, wɪ	wɪ	wɪ
‘bury’	tú	tǔ	tú	tǔ	sú	sú	sú	tù	tswɪ	tswɪ
‘nose’	lúrí	lúrí	lwílí	dúrǎ	dúr	dúr	dúr	dù	dwì	dǔwí
‘neck’	dòl	dùl	dùl	dùl	dùl	dùl	dwùl	ɸwí	dǔwìm	tǔwǐ
‘far’		túrǎ	túlà	tú	tǔ	tǔ	tù (h)	cwē	tǔwí	tswí
*o	o	o	o	o	o	o	o	o	wei	we
‘lie (down)’	lǎú	lǎú	lǎú	lǎū	ló	lǒ	ló	lǎú	lweì	lwé
‘do’				tó	tó	tǔ	tó		tsweì	tswé
*o	o → we	o → we	o	o	o	o	o			
‘head’	lô	lô	lô	lǎū	lò	lô	lô			
‘on’	lwē	lwē	lǒ	lǎú	lô	lô	lò			

Table 16

Mid vowels in closed syllables

	Burak	Loo	Maghdi	Mak	Kyak	Moo	Leeclau	Tha	Doso	Dza
*ɔ	ɔ	ɔ	ɔ	ɔ	ɔ	ɔ	ɔ	o	o	o
‘push’	tɔk	tɔk	tɔk	tɔk	tɔk	tɔk	tɔk	lɔ	tsò	tó
‘basket’	dɔk	dɔk	dɔk	dɔk	dɔk	dɔk	dɔk	laú	lô	lò
*wə	ɔ	ɔ,wə	ɔ	ɔ,wə	wə	ɔ,wə	ɔ	wə	wə	wə
‘bark’	kɔklɛ	kɔlɛ	kɔŋ	kwəŋ	pwəm	pəŋ	kwəŋ	kwəŋ	pwá	pwà
‘tortoise’	kɔŋ	kɔŋ	kɔŋ	kɔŋ	kwóŋ	kwáŋ	kɔŋ	kwəŋ	kwàŋ	kwáŋ
‘ten’	fɔb	fɔb	fúwób	swəb	swəb	swəb	səp			
‘spear’	mòm	mwəm	móm		mwəm	mwəm				
(*yə)										
‘feather’				bjəŋ	bjəŋ	bjəŋ	bjəŋ	ʃɛ̃	dzám	tsá
‘seed’				bɛ̃	bɛ̃	bjə	bé	ʃà	bjà	pjà
‘tongue’				lɛ̃n	kīm		ljén	láj	lɛ̃jɛm	lá

Nasalised vowels have also developed from the loss of a preceding nasal. Table 18 shows nasalised vowel development in Doso-Dza accompanying change to root-initial palatal nasals. In the Dza form $j\check{\jmath}$ ‘meat’, it looks as if nasalisation could be due to the loss of the final nasal as before, but the cognate Doso form $y\check{\jmath}m$ (or $j\check{\jmath}m$ ‘animal’) which preserves the final nasal reveals that this is not so. Rather, the root-initial palatal nasal has changed to a new palatal consonant in Doso-Dza. Since this new consonant is voiceless, it cannot be produced with nasality, but the nasality is preserved on the following vowel instead.⁸

Table 18

Development of nasalised vowel with [j]

	Burak	Loo	Maghdi	Mak	Kyak	Moo	Leelau	Tha	Doso	Dza
‘meat’	$n\hat{a}m$	$n\acute{a}m$	$n\acute{a}m$	$n\grave{a}m$	$n\check{\jmath}$	$n\check{\jmath}m$	$n\acute{a}m$	$n\bar{e}$	$y\check{\jmath}m$	$j\check{\jmath}$
‘bad’								$n\acute{a}w$	$y\hat{u}w$	

Table 19 shows that vowel nasalisation also occurred upon loss of preceding nasals intervocalically in Tha-Doso-Dza, although one of the occurrences is attested in Kyak as well.

3.3. Tone

High, mid, low, falling and rising tones were noted. Table 20 presents some roots with fairly consistent tone. High and low tones are switched in Doso, except that H does not become L after a voiced

⁸ The development of [j] through $*nV > j\check{\jmath}$ tends to imply that [j] occurs before nasalised vowels in Doso-Dza. Dza $j\check{\jmath}m$ ‘fish’ is an exception, where [j] realises initial *s, but no other exceptions are found either in this wordlist or over a larger data set of 2600 Dza words (Othaniel 2016). Some other roots in the Appendix ‘brother, sister’, ‘good’, ‘red’ show more comprehensive change $nVN > C\check{V}$ in which the nasalised vowel could be derived from loss of either the preceding or the following nasal.

Table 19

Nasalisation with loss of intervocalic nasal ($CV_1NV_2 > C\tilde{V}_2$)

gloss	Burak	Loo	Maghdi	Mak	Kyak	Moo	Leclau	Tha	Doso	Dza
‘cold’	támá	tàmā	tāmā	támá	tém	tém	témθá	t̃	tà	t̃
‘red sldr. ants’	tùŋɛ	(t̃f̃wā)	(f̃bō)	(zwà)	s̃	z̃ɪŋz̃ɛn	θ̃ɪŋà	θ̃á	s̃	s̃

obstruent. There is also some evidence of a mid tone level. Many roots, however, are more inconsistent in their tone across varieties. For now, we decline to reconstruct tone for items where tone is too inconsistent to be matched to the series below. We speculate that inconsistent tone may be the result of underlying tone sequences on monovocalic roots, as well as roots that have been reclassified for tone in some of the varieties.

3.4. Breathy voice

Vowels with breathy voice also occur. These are found sporadically, and always correspond to modal vowels of the same quality in other varieties. Table 21 shows some examples after nasal consonants.

Table 22 shows breathy voice after considerably less stable obstruent consonants. The consonant is usually voiced, except the *f in ‘new’, and in Dza where the consonant devoices. This rules out the possibility that breathy voice is simply an enhanced variant of modal voice, instead implying that breathy voice is a distinct laryngeal feature found in both branches (especially but not exclusively in Burak-Loo and Doso-Dza). There is some correlation with tone, as breathiness never co-occurs with high tone, but it is not exclusive to either mid or low tone, as is especially clear in Dza. The breathy feature repeatedly co-occurs with reduction of obstruents, including devoicing (or debuccalisation of *f) in Dza in the first group of roots in Table 22, and development of the voiceless labial-palatal [u̥] in Doso-Dza in the second group of roots.

Table 20

Tones

	Burak	Loo	Maghdi	Mak	Kyak	Moo	Leclau	Tha	Doso	Dza
*L	L	L	L	L	L	L	L	L	H	L
‘answer’	gàb	gàb	gàb	gàb	gwàb	gwàb	gwàb	gwà	gwàŋ	kwà
‘bark’	kàklè	kàlè	kôŋ	kwàŋ	pwàm	pəŋ	kwàŋ	kwàŋ	pwá	pwà
*H (nouns)	H	H	H	H	H	H	H	H, L	L	H
‘eye’	nú	núŋ	núŋ	núŋ	núŋ	nəŋ	núŋ	nú	nəŋ	nəŋ
‘front’	tí	tí	tí	sí	sí	sí	ŋí	cì	tí	tí
‘millstone’	ní	ní	ní	ní	ní	ní	ní	ŋwàŋwì	nì	ní
‘liver’	ŋí	ŋí	ŋí	ŋí	ŋwàŋwì	ŋí	ŋí	ŋí	nì	ŋí
*H (verbs)	H	H	H	H	H	H	L	H	L, H	H
‘eat’	təŋ	təŋ	təŋ	təŋ	təŋ	təŋ	təŋ	təŋ	təŋ	təŋ
‘push’	tók	tók	tók	tók	tók	tók	tók	ló	tók	tók
‘hit’	gbáp	gbáb	gbáb	gbáb	gbáb	bóp	bwap	gbá	gbá	gbá
‘ask’	bíp	bép	bíp	bíp	bí	bíp	bíp	bim	bí	bí
*M	M	M	M	M	M	M?	L	M?	M?	M
‘swallow’	mí	mí	mí	mí	mí	mí	mí	mí	mí	mí
‘thing’	nūŋ	nūŋ	nūŋ	nūŋ	nūŋ	nūŋ	nūŋ	nəŋ	nəŋ	nəŋ

Table 21

Breathy vowels

gloss	Burak	Loo	Maghdi	Mak	Kyak	Moo	Leelau	Tha	Doso	Dza
‘rain’	<i>mē</i>	<i>mē̤</i>	<i>māi</i>	<i>mūi</i>	<i>mū</i>	<i>múŋ</i>	<i>mùŋ</i>	<i>méŋɲiló</i>	<i>m̃ŋ</i>	<i>m̃éŋ</i>
‘hand’	<i>n̄</i>	<i>n̤̄</i>	<i>nā</i>	<i>nā̃</i>	<i>ná</i>	<i>ná</i>	<i>ná</i>	<i>nà</i>	<i>nâ</i>	<i>nā̃</i>
‘four’	<i>n̄t</i>	<i>n̤̄t</i>	<i>nàr</i>	<i>nēt</i>	<i>nē</i>	<i>nē</i>	<i>nəi</i>	<i>nəŋə</i>	<i>nəŋə</i>	<i>ɲə</i>

The data suggests, albeit not conclusively, that breathy voice may be a conditioning factor behind changes in obstruents (see also §4.1).⁹

4. Consonants

Jen languages are rich in consonants and in sound changes to consonants, with the following sounds reconstructed. Palatal **ɲ* and velar **ŋ* are in complementary distribution, so no phonemic distinction is made between them in the chart.

Table 23

Proto-Jen consonants

	labial	alveolar	postalveolar	velar	labio-velar	glottal
plosives	*p *b	*t *d	*c	*k *g	(*kp) *gb	
affricates		*ts *dz	*tʃ *dʒ			
fricatives	*f *v	*s *z	*ʃ			(*h)
nasals	*m	*n	*ɲ			
implosives	*ɓ	*ɗ				
trill		*r				
approximants		*l	*y *ɥ		*w	

⁹ A related question for further research is whether breathy voice is properly associated with the vowel or with the entire root (which includes the affected initial consonant) in each variety.

Table 22

Breathy vowels after obstruents

gloss	Burak	Loo	Maghdi	Mak	Kyak	Moo	Leelau	Tha	Doso	Dza
'leg'	võ	võ	vò	bō	bō	bō	bò	bò	bù	pū
'fencing mat'										
'answer (v.)'	gàb	gàb	gàb	gə̀	gə̀	gwə̀b	gə̀	gī	gì	kī
'neck'	dòl	dūl	dùl	dūl	dūl	dúl	dwùl	gwə̀	gwə̀ŋ	kwə̀
'stand'	dē	dē	də̀i	də̀i	dē	dē	dē	fwí	d̥ʒwìm	t̥fwī
'snake'		bjàk	bjàk	bjàk	bjàk	bjàk	bjàk		d̥ʒi	tsì
'feather'								jàu	d̥ʒə̀u	tsò
'say'	gē	gē	d̥ʒē	d̥ʒē	bjàŋ	bjàŋ	bjàŋ	ʃē	d̥ʒəm	tsā
'elephant'	d̥ʒók	d̥ʒók	d̥ʒək	gə̀	d̥ʒē	d̥ʒē	gə̀	kijè	kə̀ŋ-ká	tsà
'count'				zók	zók	zək	zək	ðə̀u	zò	sò
'ashes, dust'				zēn	zēn	zēn	ðən	hò	zəm	sə̀
'new'	fū	fū	fū	fū	fū	fū	fū	hò	və̀u	fò
'blood'	wě		uē	zwī	zī	zī	zī	vì	n̥uì	uĩ
'sand _B '	d̥ʒwē	zwē	zwə̀i	zwī	zī	zī	zwī	vī	uĩ	uĩ
'lion'	d̥ʒwē	d̥ʒwē	d̥ʒwə̀	zwā	zwā	zwā	zwā	zwā	uā	uā
'smoke'	wū	d̥ʒwə̀	wú lwà	dú	d̥ʒū	d̥ʒū	dù	ðú	uĩ	uĩ

4.1. Root-initial consonants

Root-initial consonants are presented here grouped by manner of articulation. Table 24 shows voiceless plosives. The labial **p* splits to [p] and [f] in the second branch according to the following vowel, as retained in Maghdi, and with some spirantisation to [f] borrowed into Mak. However, **t* and **k* occur in fully stable examples. A palatal **c* is evident in some incomplete series, contrasting with affricates listed in later tables. Labial-velar **kp̄* is poorly attested in just one root of the second primary branch (assumed borrowed into Mak, as argued in §3.3).

Table 25 shows voiced plosives. These devoice in Dza, but with exceptions — perhaps because breathy voice is a precondition for devoicing (§3.5),¹⁰ although this is not established across all the data. The labial **b* is assumed to have split in the first branch (the [v] fits better here than under **v*, although this split is strangely contrary in its distribution from **p > f* in the second branch), but with Mak influenced by the [b] pronunciation of the second branch. The alveolar **d* develops affrication in Dza before high vowels, [d͡ʒ] before [i], or [d͡z] otherwise, as also seen in more data from deimploded **d̥* below. The labial-velar **gb̄* develops implosivity in Kyak-Moo-Leelau (Harley (2020) has [g͡b] in Kyak).

Table 26 shows three root-initial nasals **m*, **n*, **ɲ*, with other sounds developing from **ɲ*. Contrast between palatal **ɲ* and alveolar **n* is weak for lack of **n* before front vowels or **ɲ* before back vowels. However, **ɲ* is in complementary distribution with root-final **ŋ* (§4.2) and also realised as [ɲ] word-initially before [w] in both Kyak-Moo-Leelau and Doso-Dza. Therefore, instances of **ɲ* in the Jen language cluster may ultimately derive from either ***n* or ***ŋ* at higher levels of reconstruction.

¹⁰ We are grateful to Mark van de Velde and Matthew Harley for this suggestion.

Table 24

Voiceless plosives

	Burak	Loo	Maghdi	Mak	Kyak	Moo	Leelau	Tha	Doso	Dza
*p/_e			<i>p</i>		<i>p</i>	<i>p</i>	<i>p</i>		<i>p</i>	<i>p</i>
‘nail (v.)’			<i>pē</i>		<i>pì</i>	<i>pí</i>	<i>pí</i>		<i>pī</i>	<i>pí</i>
*p/_i	<i>p</i>	<i>p</i>	<i>p</i>	<i>p,f</i>	<i>f</i>	<i>f</i>	<i>f</i>	<i>f</i>	<i>f</i>	
‘moon’	<i>pǎ</i>	<i>pí</i>	<i>pí</i>	<i>pí</i>	<i>fī</i>	<i>fí</i>	<i>fī</i>	<i>fī</i>	<i>fíuim</i>	<i>ùí</i>
‘wipe’	<i>pērē</i>	<i>pìré</i>	<i>pìlá</i>	<i>fērà</i>	<i>fá</i>	<i>fá</i>	<i>fá</i>	<i>fà</i>	<i>fī</i>	
*t	<i>t</i>	<i>t</i>	<i>t</i>	<i>t</i>	<i>t</i>	<i>t</i>	<i>t</i>	<i>t</i>	<i>t</i>	<i>t</i>
‘shoot’	<i>tá</i>	<i>tá</i>	<i>tá</i>	<i>tǎ</i>	<i>tà</i>	<i>tá</i>	<i>tà</i>	<i>tà</i>	<i>tà</i>	<i>tá</i>
‘eat’	<i>táj</i>	<i>táj</i>	<i>táj</i>	<i>táj</i>	<i>táj</i>	<i>táj</i>	<i>tàj</i>	<i>táj</i>	<i>tàj</i>	<i>táj</i>
*k	<i>k</i>	<i>k</i>	<i>k</i>	<i>k</i>	<i>k</i>	<i>k</i>	<i>k</i>	<i>k</i>	<i>k</i>	<i>k</i>
‘squeeze’	<i>kám</i>	<i>kám</i>	<i>kám</i>	<i>kám</i>	<i>kám</i>	<i>kám</i>	<i>kám</i>	<i>kì</i>	<i>kám</i>	<i>ká</i>
*c	<i>f</i>	<i>f</i>	<i>f</i>	<i>c</i>	<i>c</i>	<i>c</i>	<i>c</i>	<i>f</i>	<i>ts</i>	<i>c,tʃ</i>
‘shadow’	<i>fíj</i>	<i>fíj</i>	<i>fíj</i>	<i>cíj</i>	<i>jíj</i>	<i>kúlwáj</i>	<i>cíj</i>	<i>ńj</i>		
‘wing’	<i>fíj</i>	<i>fíj</i>	<i>fénē</i>		<i>cén</i>	<i>cén</i>	<i>kán</i>		<i>tsēw</i>	<i>tʃē</i>
‘near’					<i>cán</i>	<i>cénsǎj</i>			<i>cà</i>	
*kp?			<i>kp</i>	<i>kp</i>	<i>kp</i>	<i>kp</i>	<i>kp</i>		<i>kp</i>	<i>j</i>
‘many’			<i>ìkpǎì</i>	<i>kpǎě</i>	<i>kpǎ</i>	<i>kpǎdín</i>	<i>kpǎl</i>		<i>kpǎl</i>	<i>ùǎn</i>

Table 25

Voiced plosives

	Burak	Loo	Maghdi	Mak	Kyak	Moo	Leelau	Tha	Doso	Dza
*b	b	b	b	b	b	b	b	b	b	p
‘egg’	bāŋ	bāŋ	bāŋ	bāŋ	būŋ	būŋ	būŋ	būŋ	būŋ	pūŋ
‘stab’	bēt	bēt	bā	bā	bē	bē	bāi	bā	bāi	pā
*b	v	v	v	v, b	b	b	b	b	b	b, p
‘tomorrow’	vē	vē	vāi	vāi	būŋ	būŋ	būŋ	bāŋ	būŋ	bāŋ
‘leg’	vō	vō	vō	bō	bō	bō	bō	kābō	kābū	kāpū
*d	d	d	d	d	d	d	d	d	d	d
‘drum / dance’	dāŋ	dāŋ	dāŋ	dāŋ	dāŋ	dāŋ	dāŋ	dāŋ	dāŋ	dāŋ
*d/ i	d	d	d	d	d	d	d	ɟ	d̥z, d̥ʒ	ts, tʃ
‘stand’	dē	dē	dāi	dāi	dē	dē	dē	dē	d̥ʒi	tsi
‘neck’	dōl	dūl	dūl	dūl	dūl	dūl	dūl	ɟwí	d̥ʒwim	t̥ɟwí
*g	g	g	g	g	g	g	g	g	g	g, k
‘greet’	gum	gumē	gòm	gùm	gwəmbē	gūm	gūm			
‘thunder’				gàmvər		gànɟfər	gàmvər	gəŋvwē	gámvəi	gǎfɛ
‘big’			gòŋ	gwəŋ	gǎzɪ	āŋgǎ	āŋgǎ	nágò	ángǎ	àkǎ
‘fencing mat’				gē	gē	d̥ʒē	gāi	gī	gì	kī

End of Table 25

	Burak	Loo	Maghdi	Mak	Kyak	Moo	Leclau	Tha	Doso	Dza
*g/_u,w	g	g	g	g	g	g	g	g	v	v,f
‘king’	gúb	gwàb	gúb	gúb	jìgwé	jìgwé	jìgwèi	kú	jivá	tvà
‘pull’	gúb	gúb	gúb	gúb	gèb	gùb	gùb	gù	vè	fí
‘long’	gbènè	gbíná	d̥zúnā	d̥zúnā	gwèn	gwèn	góni		vĩ	fĩ
‘person’			jú-gùl	jù-gùl					jì-vè	ì-fĩ
‘grass’					gūk	gūk	gùk	gù	vù	hĩ
*gb	gb	gb	gb	gb	gb	bw	bw	gb	gb	gb
‘hit’	gbáp	gbáb	gbáb	gbáb	gbáb	bóp	bwáp	gbá	gbá	gbá

Table 27 shows three approximant series **w*, **ɥ*, **y* reconstructed from incomplete examples. As in all our comparative data, the palatal approximant is transcribed using the standard IPA symbol [j], but in reconstruction the symbol **y* has been used to support integration into Africanist scholarship. The labial-palatal **ɥ* merges with **w* in both Burak-Loo and Kyak-Moo-Leelau, while the structure **yu* becomes /ɥi/ in several varieties, in effect these are further instances of **u > wi* (this includes **yo* ‘cook’ affected by vowel raising **o > u* in Doso-Dza). In addition to these three approximants, voiceless approximants are also attested in Tha, Doso, and Dza, but these are innovations, found in other tables.

Table 28 shows two liquids **l*, **r*, but the only root containing an initial trill (**rab*) is lost in Tha and in Doso-Dza.

Table 29 shows intervocalic liquids, where a more complete series can be drawn up for **r*. The **r* appears intervocalically due to **-rV* extensions that are always present in the first branch but only sporadically in the second branch. Dza is one of the varieties where the trill merges with the lateral, a process also found in Dza loanwords (Fulfulde *mālōrī* → Dza *mālōlī* ‘rice’), despite Dza having trills in ideophones (Benson 2020).

Table 30 shows implosives, which occur except in Dza, where they reduce to plain plosives. Deimplosion in Dza is recent because elderly Dza speakers still use implosives (Othaniel 2016). This loss is not in imitation of Hausa because Hausa has implosives, suggesting instead attrition in younger speakers. The alveolar **ɖ* is found in irregular correspondences with the lateral, implying a stem-initial consonant alternation of unknown function, so that **ɖ* can only be reliably reconstructed in ‘basket’ and ‘calabash’ (plus ‘dog’ in Table 35). Like the **d* series, deimplored **ɖ* in Dza is affected by affrication to [d͡ʒ] before [i] or [d͡ʒ] before [u] or [w]. In Tha, **ɖ* reduces to [d] before [u], and to [j] otherwise, and deimplosion of **ɓ* also seems underway.

Table 31 shows further examples of the irregular *l~ɖ* alternation with instances of [k] in our data for Kyak and Moo. These roots show greater variation in their form as a whole. The [k] nearly always occurs before [i], suggesting it may represent a phonologically conditioned

Table 27

Approximants

	Burak	Loo	Maghdi	Mak	Kyak	Moo	Leelau	Tha	Doso	Dza
*w	w	w	w	w	w	w	w	w	w	w
‘throw’		wá	wā	wà	wà	wá	wǎ		wà	wá
‘come’					wè	wá	wè	wè	wè	wú
‘kill’	wòb	wèb	wòp	wèb						
‘walk’	wē(lé)	wēlé	wé(lè)	wō						
*ɥ	w	w	ɥ	ɥ	w	w	w	ɥ	ɥ	ɥ
‘wind’	wəbɛ	wílbɛ	ɥá	ɥâ	wá	wá	wà	(nàcà)	ɥà	ɥá
‘blood’	wě		ɥē	ɥē					ɥùì	ɥĩ
‘belly’					wá	wá	wá	ɥà	ɥà	ɥá
‘tail’	wĩn	wēn	ɥén	ɥēn						
*y	j	j	j	j	j	j	j	j	j	j
‘leaf’	jǎŋ	jəŋ	(nəŋ)	jəŋ	jək	jəŋ	jəŋ	jəŋ	jəŋ	jəŋ
‘full’		jĩ	jĩnĩ	jĩdás	jĩlɛŋ	jĩŋ	jĩθà	jĩ	jĩlè	jĩlâ
*y/_u	j	j	j	j	j	Ø	ɥ	ɥ	ɥ	ɥ
‘person / child’	jũ	jũ	jú	jú	jú	jú,wĩ	jú,ɥì	ɥì	ɥì	ɥì
‘cook’	jǒ	jō	jəɪwē	jəɪ	jō	jǒ	jò	jəɪ	ɥì	ɥì

Table 28

Liquids

	Burak	Loo	Maghdi	Mak	Kyak	Moo	Leclau	Tha	Doso	Dza
*l	l	l	l	l	l	l	l	l	l	l
‘lie (down)’	láu	láu	láu	laū	ló	lǒ	ló	láu	lweì	lwé
‘hear’	lárè	lárà	lálē	lárí	lí	lí	là	là	lí	lí
*r	r	r	l	r	r	r	r	-	-	-
‘two’	ràb	ràb	làp	rāb	ràb	ràb	ràb	nè-jà	ná-jiù	jǔng

Table 29

Intervocalic liquids

	Burak	Loo	Maghdi	Mak	Kyak	Moo	Leclau	Tha	Doso	Dza
*l	l	l	l	l	l	r	l			
‘fear’	vlí	vlí	vìlì	sìvǎlǎ	vǎ	vǎrí	vìlì			
*r	r	r	l	r	r	r	r	Ø	r	l
‘white’	vùrùm	vèrùm	vùlùm	vèrùm	vèrùm	vèrùm	vèrùm	jávù	vèw	fí
‘fly’	wúrí	wùrí	wlí	wùrà	wúréjén	wùrínjí	éjǎí	wǐjè		
‘fruit’	túrí	túrí	fwírí	súr	sǎw	sí	sì	cì	ǎjírì	ǎjǎí
‘dream’	mórá	múrá	mwàlà	mwà	mwèn	mwèn	mwènì	mwùmwi	mwùí	mwǎí
‘night’	vèrè	vèrè	vòlè	vòrè	vì	vì	vì	vè	ǎjǎvǎ	ǎvì
‘hear’	lárè	lárà	lálē	lárí	lí	lí	là	là	lí	lí
‘wipe’	pèrē	pìrè	pílà	fèrà	fá	fá	fá	fà	fí	
‘know’	érē	éré	flà	trà	í	ìbət	ìbət	ǎjè	fbì	jí

Table 30

Implosives

	Burak	Loo	Maghdi	Mak	Kyak	Moo	Leelau	Tha	Doso	Dza
*ɓ	ɓ	ɓ	ɓ	ɓ	ɓ	ɓ	ɓ	ɓ	ɓ	ɓ
‘rope’	ɓél	ɓəl	ɓāl	ɓəl	ɓɛl	ɓál	ɓəl	ɓəl	ɓəl	ɓè
‘ask’	ɓíp	ɓép	ɓíp	ɓíp	ɓí	ɓíp	ɓíp	ɓím	ɓí	ɓí
*ɓ/_i,j	ɓ	ɓ	ɓ	ɓ	ɓ	ɓ	ɓ	(ɓ)	ɔ	ɔ̃
‘mosquito’	ɓé	ɓé	ɓē	ɓē	ɓjà	ɓjá	ɓjà	jà	ɔjà	ɔjá
‘vomit’	ɓóm	ɓóm	ɓám	ɓám	ɓíém	ɓém	ɓēmē	ɓiē	ɔjēm	ɔjá
‘horn’	ɓwék	ɓɔk	ɓí	ɓī	ɓí	ɓí	ɓì	ɓì	ɔì	ɔ̃
*ɔ	l~ɔ	l~ɔ	l~ɔ	l~ɔ	l~ɔ	l~ɔ	l~ɔ	l~j, d	l~ɔ	l~ɔ, ɔ̃, ɔ̃
‘basket’	ɔk	ɔk	ɔk	ɔk	ɔk	ɔk	ɔk	láu	lō	lò
‘calabash’	ɔē	ɔē	ɔaí	ɔaí	ɔē	ɔē	ɔaí	lài	lì	ɔ̃
‘name’	lān	lān	lān	lān	ɔwān	ɔwān	ɔwān	ɔwān	ɔwān	ɔwān
‘nose’	lúrí	lúrí	lwlí	ɔwí	ɔwí	ɔwí	ɔwí	ɔwí	ɔwí	ɔwí
‘bite’	lúm							ɔwí		
‘locust bean tree’			lwai	lwai	ɔwí	ɔwí	lwí	jí	ɔwí	ɔwí
‘fire’	lwà	lwà	lwà	lwà	ɔwà	ɔwà	lwà	ɔwà	ɔwà	ɔwà
‘call’	lú	lú	lúnwà	lúnwà	lúnwà	lúnwà	lúnwà	lúnwà	lúnwà	lúnwà
‘pull up’	lúb	lúb	lúb	lúb	lúb	lúb	lúb	lúb	lúb	lúb
‘tooth’	lé	lé	lāi	lāi	lē	lē	lāi	jèi	ɔi	ɔi
‘take’					lē	lē	lāi	jèi	ɔi	ɔi

palatalisation of [d] to [ʃ] or [ç], bearing in mind that other authors transcribe a palatalised implosive in Kyak [ɖyim] ‘tongue’ (Kleine-willinghöfer 1996, Harley 2020).

Table 32 shows fricatives in various unstable correspondence series. Devoicing is observed in Dza for *ɖ and *z as seen already in voiced plosives, but again there are exceptions. There is a persistent problem of lack of attestations of *s and *z in the first branch, partly due to initial consonant alternations in verb stems (see Table 6 above). Postalveolars are distributed across both branches so are reconstructible; a limited contrast with alveolar is apparent in ‘fish’ vs. ‘crocodile’. In Doso-Dza, *s, *ʃ or *z become [h] with unclear conditioning environment, and [j] before non-low central vowels [i] or [ə], becoming [ɟ] in Doso.

Table 33 presents affricates. Affricate series are complex with plosive, fricative and affricate correspondents. We find no conditioning by the following vowel that would derive affricate correspondents from the softening of plosives. Instead, the series partly resemble the relevant fricative series *s, *z, *ʃ, and in some cases varieties of both branches attest frication, all supporting reconstruction of affrication. Alveolar-postalveolar contrast is preserved in various ways, but is also neutralised in various contexts. We attempt to explain different correspondence series for *ts̄ and for *tʃ̄ in terms of following vowels, this too is complex because the vowels vary from variety to variety.

4.2. Root-final consonants

Table 34 presents the limited set of consonants that are reconstructible root-finally. These are nearly all conserved in the first seven varieties, but there is extensive loss in Tha, Doso and Dza (as parallel developments rather than shared innovation, given the survival of more final consonants into Doso). Only *ŋ is retained in all varieties. This is surprising, because *ŋ cannot be reconstructed root-initially, although it is in complementary distribution with root-initial *ɲ (§4.1). Root-final *r is only supported from varieties of the second primary branch plus Mak.

Various interactions of the final consonant with the preceding vowel are also evident in Table 34. Sonorants *n, *ŋ, *l reduce to [m] in Doso after

Table 31
Items transcribed with [k] in Kyak and Moo

	Burak	Loo	Maghdi	Mak	Kyak	Moo	Leclau	Tha	Doso	Dza
‘tongue’	dǎk	dǎk	dǎk	lěŋ	kūm	kāk	lén	láy	lījēm	lá
‘today’	dī	dī		dāsī	kijà	kikà	dīgà		lījè	dǣnī
‘yesterday’	lɛ	lɛ	lijè	lē	kí	dī	lālì	ǰ	dǣù	dò
‘knee’	lǎk	lǎk	lǎk	lwèŋ	káŋ	ziúáŋ	lwáy	lòjàŋ	dǣwèŋ	dǣwáy

Table 32
Fricatives

	Burak	Loo	Maghdi	Mak	Kyak	Moo	Leclau	Tha	Doso	Dza
*f	f	f	f	f	f	f	f	f	f	h
‘new’	fū	fū	fū	fū	fú	fú	fú	fù	fù	hú
*v	v	v	v	v	v	v	v	v	v	v, f
‘night’	vèrè	vèrè	vōlè	vōrè	vì	vì	vì	vē	dǣŋvì	hì
‘white’	vùrūm	vérūm	vùlūm	vūrūm	vērūm	vērūm	vērūm	jávù	vàw	fē
*s	ʃ	ʃ	ʃ	s	s	s	θ, ʃ	θ, ʃ	h, y	h, j
‘fish’	ʃijè	tjē	ʃāi	səl	θəŋ	səŋ	θəŋ	θùŋ	yùŋ	jùŋ

End of Table 32

	Burak	Loo	Maghdi	Mak	Kyak	Moo	Leelau	Tha	Doso	Dza
‘wife’	ʃɛ	ʃəl	ʃē	sʃjē	sí	sí	ʃím	ʃi	hē	hē
‘year’					sá	sā	θà	θà	hà	há
*ʃ	ʃ	ʃ	ʃ	s	s	s	θ	s	s	ʃ
‘croco- dile’	ʃíp	ʃíp	ʃíp	ʃɪb	swám	sìp	θìp	sì	sì	ʃí
*z	d̪ɜ̄	d̪ɜ̄	d̪ɜ̄	z	z	z	ð	ð, ...	z, ...	s, ...
‘ele- phant’	d̪ɜ̄ók	d̪ɜ̄ók	d̪ɜ̄ók	zók	zók	zók	zók	ðə̀ù	zò	s̄
‘song’		d̪ɜ̄i	d̪ɜ̄i	zi						
‘count’				zēn	zēn	zēn	ðən	hò	zəm	sà
‘dig’				zà	zà	zà	ðà	ðà	hà	hà
‘walk’				zō	zō	zò	ðə̀ù	ðòbò	hò	hō
‘kill’				zə̀p	zə̀p	zə̀p	ðə̀p	θə̀	jə̀	jə̀
‘red’				zēn	zēn	zēn	ðə̀ni	áɜ̄ɛ	j̄ɛ	j̄ɛ

Table 33

Affricates

	Burak	Loo	Maghdi	Mak	Kyak	Moo	Leelau	Tha	Doso	Dza
* $\overline{\text{ts}}/_i,\tilde{\text{a}}$	<i>t</i>	$\overline{\text{tj}}$	<i>f</i>		<i>s</i>	<i>(s)</i>	θ	θ	<i>s</i>	<i>s</i>
'red sp. of ants'	<i>tùŋɛ̀</i>	$\overline{\text{tjwā}}$	<i>ʃbō</i>		<i>sà</i>	<i>zàŋzən</i>	<i>θŋà</i>	<i>θá</i>	<i>sà</i>	<i>sà</i>
* $\overline{\text{ts}}/_i,i$										
'rabbit'			<i>t</i>	<i>t</i>	<i>s</i>	<i>s</i>	<i>t</i>	<i>c</i>	$\overline{\text{tj}}$	$\overline{\text{ts}}$
			$\overline{\text{tj}}\overline{\text{zā}}$	$\overline{\text{tj}}\overline{\text{zā}}$	$\overline{\text{sfbē}}$	$\overline{\text{sfbē}}$	<i>tìà</i>	$\overline{\text{nc}}\overline{\text{clai}}$	$\overline{\text{tj}}\overline{\text{dijē}}$	$\overline{\text{tslē}}$
* $\overline{\text{tj}}/_ə$	<i>t</i>		<i>f</i>	<i>s</i>	$\overline{\text{tj}}$	$\overline{\text{tj}}$	θ	<i>c</i>	$\overline{\text{ts}}$	$\overline{\text{ts}}$
'tie'	<i>tép</i>	<i>lép</i>	<i>ʃáb</i>	<i>sáb</i>	$\overline{\text{tj}}\overline{\text{ab}}$	$\overline{\text{tj}}\overline{\text{ab}}$	<i>θəp</i>	<i>cà</i>	$\overline{\text{tsà}}$	$\overline{\text{tsà}}$
* $\overline{\text{tj}}/_i,u$	<i>t</i>	<i>t</i>	<i>ʃ,t</i>	<i>s</i>	<i>s</i>	<i>s</i>	<i>s,ʃ</i>	<i>c</i>	$\overline{\text{tj}}$	$\overline{\text{tj}}$
'fruit'	<i>túrí</i>	<i>túrí</i>	<i>ʃwírí</i>	<i>súr</i>	<i>šw</i>	<i>sí</i>	<i>sì</i>	<i>cì</i>	$\overline{\text{tj}}$	$\overline{\text{tj-l}}$
'front'	<i>tí</i>	<i>tí</i>	<i>tí</i>	<i>sí</i>	<i>sí</i>	<i>sí</i>	<i>ʃí</i>	<i>cì</i>	$\overline{\text{tj}}$	$\overline{\text{tj}}$
* $\overline{\text{dz}}$	<i>d</i>	<i>d</i>	<i>d</i>	<i>d</i>	<i>z</i>	<i>z</i>	<i>z</i>		$\overline{\text{ts}}$	<i>t</i>
'heart'		<i>dú</i>	<i>dù</i>	<i>dü</i>	<i>z</i>	<i>z</i>	<i>zú</i>		$\overline{\text{tswəm}}$	<i>twé</i>
* $\overline{\text{dʒ}}$	$\overline{\text{dʒ}}$	$\overline{\text{dʒ}}$	$\overline{\text{dʒ}}$	$\overline{\text{dʒ}}$		<i>z</i>	<i>zú</i>		<i>d</i>	<i>d</i>
'when?'	$\overline{\text{dʒaù}}$	$\overline{\text{dʒaù}}$	$\overline{\text{dʒaù}}$	$\overline{\text{dʒaù}}$					<i>dàù</i>	<i>dó</i>

some (but not all) low tone vowels. There are observable co-occurrence patterns of **k* after **o*, **m* after **ə*, alveolar stops **t*, **n* after front vowels, **r* after central vowels, and **b*, **ŋ*, **l* after either **u* or **ə*. Vowel changes are also visible accompanying final consonant loss in Tha, Doso and Dza.

4.3. Labialisation and palatalisation

Palatal articulation can only be reconstructed after **b* as in Table 35, although it appears sporadically with other consonants in the data. There is a shift to a full palatal [j] in Tha (or affricate in Doso-Dza).

Labial articulation is reconstructible after many more consonants. The root-initial consonant usually follows the series given above in §4.1, and the [w] is rarely lost, but may be vocalised before [i] as **wi > u*, or before [ə] as **wə > o*, and there are some other departures from this general pattern. Table 36 presents **kw* which is unstable in different ways in each root despite **k* itself being stable. For ‘scratch’, original **kw* allows hardening in the first branch to [p] where the opposite reconstruction is doubtful given the stability of **p* before [e] (Table 24), or in the second root with more intensive meaning, to [kp̄].

Table 37 presents labialised series in which labiodental fricatives and labial approximants emerge. The appearance of the labial-palatal [ɸ] in Tha indicates that it is functionally /jw/, so that the previously established change **d > j* recurs as **ɸw > jw*. Likewise, its voiceless counterpart [ɸ̥] develops in Doso-Dza from **sw* and **zw*, hence it is functionally /jw/. The voiceless labial-velar [ɱ] develops in Dza in some series with single examples (also ‘maize’ in Table 34).

Tables 38 and 39 present labialised affricates that derive from different sources in different vowel contexts. Before [u] or [wə], affricates have plosive reflexes in the first branch, but we do not analyse this as development of affrication in the second branch, because the affricate series contrast with plain plosives **t*, **d* and each other in this environment, and therefore will be reconstructed as affricates. The affricates with [w] before front vowels in Table 39 are attempts to explain the contrasting series found there; these series may also be compared with affricates without [w] in Table 33.

Continuation of Table 34

	Burak	Loo	Maghdi	Mak	Kyak	Moo	Leelau	Tha	Doso	Dza
*n	n	n	m	n	n	n	n	(ŋ)	ŋ	ŋ
‘one’	kwîn	kwîn	swîm	cwîn	kwîn	kwîn	kún	cùngà	ts̃ŋ	ts̃ŋ
‘name’	lân	lân	lân	dîn	dwîn	dwîn	dîn	dù	djîŋ	djîŋ
*n	n	n	n	n	n	n	n	Ø	m	Ø
‘beer’	mîn	mîn	mîn	mîn	mîn	mîn	mîn	mù	mîn	mí
‘mortar’	dàn	dàn	dàn	dàn	zwèn	vèn	zwàn	ìdàù	dzwàm	tswā
‘count’					zēn	zēn	ðân	hò	zàm	sà
*ŋ	ŋ	ŋ	ŋ	ŋ	ŋ	ŋ	ŋ	ŋ	ŋ	ŋ
‘eat’	táj	táj	táj	táj	táj	táj	tàŋ	táj	tàŋ	táj
‘thing’	nūŋ	nūŋ	nūŋ	nūŋ	nūŋ	nūŋ	nùŋ	nèŋ	néŋ	nūŋ
‘egg’	bāŋ	bāŋ	bàŋ	báj	bùŋ	bùŋ	būŋ	būŋ	bèŋ	pūŋ
*ŋ	ŋ	ŋ	ŋ	ŋ	ŋ	ŋ	ŋ	Ø	m	Ø
‘feather’				bjàŋ	bjàŋ	bjàŋ	bjàŋ	jê	dzàm	ts̃q
*l	l	l	l	l	l	l	l	Ø	Ø	Ø
‘stone’	tál	tál	tál	tál	tál	tál	tál	tài	tèi	té
‘rope’	bél	bāl	bāl	bàl	bāl	bál	bàl	bài	bài	bè

End of Table 34

	Burak	Loo	Maghdi	Mak	Kyak	Moo	Leelau	Tha	Doso	Dza
‘back’	məl	mál	dīmāl	māl	mwəl	mwəl	mwəl			
‘skin’				swəl	swəl	swəl	swəl	jwə	ḍzwə	ṭswə
*l	l	l	l	l	l	l	l	Ø	m	Ø
‘neck’	dòl	dtul	dùl	dtul	dūl	dtul	dwul	jwí	ḍgʷim	ṭjwī
*r?				r	r	r	r	Ø	Ø	Ø
‘thunder’				gàmvùr	kwáɲvùr	gàɲfùr	gàmvùr	gəɲvwe	gámvaù	gǽf
‘swell’					hár		hár		hài	hé

Table 35

Palatalisation with bilabial plosive

	Burak	Loo	Maghdi	Mak	Kyak	Moo	Leelau	Tha	Doso	Dza
*by		bj	bj	bj	bj	bj	bj	ʃ	ḍz	ṭs
‘snake’	bjàk	bjàk	bjàk	bjàk	bjàk	bjàk	bjàk	ʃà	ḍzàù	ṭsə
‘feather’				bjàk	bjàk	bjàk	bjàk	ʃḍ	ḍzám	ṭṣḍ

Table 36

Labialisation with velar plosive

	Burak	Loo	Maghdi	Mak	Kyak	Moo	Leclau	Tha	Doso	Dza
*kw/_i	kw	kw	kw	kw,cw	kw	kw	kw,cw	cw	ts,tʃ	ts,tʃ
‘one’	kwɪn	kwɪn	(swɪm)	cwɪn	kwɪn	kwɪn	kún	cùŋgà	tsɪŋ	tsɪŋ
‘dry’	kwē	kwəl	kwəl	kwəl	kwɪ	kwɪ	cwɪ	yìjē	tʃiŋ	tʃi
*kw/_ĩ					kw	kw	kw	c	kw	ɱ
‘maize’					kùná	kúnà	kúnà	cí	kwɛ̃	ɱɛ̃
*kw/_é	kw	kw	kw	kw	kw	kw	kw	kw	kw	kw
‘tortoise’	kɔŋ	kɔŋ	kɔŋ	kɔŋ	kwóŋ	kwáŋ	kɔŋ		kwəŋ	kwáŋ
*kw/_è	kw	kw	kw	kw	pw	pw	kw	kw	pw	pw
‘bark’	kòklɛ̃	kòŋ	kòŋ	kwəŋ	pwəm	pòŋ	kwəŋ	kwəŋkà	pwá	pwə
*kw/_e		p	p	p		kw	kw			
‘scratch’		pəl	pəl	pəl		kɔ̃	kwəl			
*kw	kᵛ	kᵛ	ḡb		kw					kw
‘scratch (destructive)’	kᵛáká	kᵛáká	ḡbáyà		kwà					kwà

Table 37

Development of labiodental fricatives and labial approximants

	Burak	Loo	Maghdi	Mak	Kyak	Moo	Leclau	Tha	Doso	Dza
*ɖw	ɖw	ɖw	ɖw	ɖw	ɖw	ɖw,ɥ	ɖw	ɥ (jw)	ɖw	ɖzw
‘dog’	ɖwǎ	ɖwǎ	ɖwǎ	ɖwǎ	ɖzwǎ	wǐɖwǎ	ɖwǎ	ɥǐɖwǎ	jǐɖwǎ	ǐɖzwǎ
‘fire’	(lwǎ)	(lwǎ)	(lwǎ)	(lwǎ)	ɖwǎ	ɥǎ	(lwǎ)	ɥǎ	ɖwǎ:	ɖzwǎ
*gw	ḡb	ḡb	ḡzu	ḡzu	gw	gw	gw	ɥ (jw)	ḡz	ṡs
‘groundnuts’	ḡbērē	ḡbērē	ḡlǎ	ḡḡūrǎ	gwī	gwī	gwǐ	ɥé	ḡzēi	ṡsē:
*sw/_e#	fw	(t)jw	fw	sw	f	f	f	f	f	sw
‘gray hair’	fwē	tjwé			fī	fī		vǐ	fī	swǐ
*sw	fw	(t)jw	fw	sw	sw	sw,f	sw	f.θ	ɥ (jw)	ɥ (jw)
‘ten’	ʃɔb	ʃɔb	ʃɔwɔb	swəb	swəb	swəb	səp		ɥə	ɥə
‘sand’ _A	fwǎ	fwǎ	fwǎ	swǎ	swǎ	swǎ	swǎ	fa	ɥǎn	ɥǎ
‘snail’			ʃɔ	sə	swè	fè	swē	ɲfjǎ	ɥē	ɥē
‘knife’					swèn	swèn	swàn	θǎ	ɥəm	ɥə
*zw/_a	ḡzw	ḡzw	ḡzw	zw	zw	zw	zw	zw	ɥ (jw)	ɥ (jw)
‘lion’	ḡzwǐ	ḡzwǐ	ḡzwǐ	zwǐ	zwǐ	zwǐ	zwǐ	zwǐ	ɥǐ:	ɥǐ

End of Table 37

	Burak	Loo	Maghdi	Mak	Kyak	Moo	Leclau	Tha	Doso	Dza
*zw	$\overline{d}zw$	$\overline{d}zw$	$\overline{d}zw$	zw	zw	z	z(w)	v	y (jw)	y (jw)
‘sand’ _B	$\overline{d}zw\grave{e}$	zwē	zwài	zwē	zwī	zǐ	zwí	vī	yì	yì
‘wash’	$\overline{d}z\grave{o}b$	$\overline{d}z\grave{o}b$	$\overline{d}z\grave{o}b$	zwáb				và		
‘blood’					zwī	zǐ	zī	vì	nyì	yì
*vw				zw	v	v	v	v	vw	m
‘fight’				zwā	vēm	vēm	vēm	vēm	vwəm	mā
*sw	dw	dw	fw	sw	sw	sw	sw	fw	y (jw)	m
‘clay’	dòp	dòb	föp	swàb	swáp	swáp	swáp	fwà	yè	mà

Table 38

Affricates before rounded vowels or [wə]

	Burak	Loo	Maghdi	Mak	Kyak	Moo	Leclau	Tha	Doso	Dza
*t/_u	t	t	t	t	t	tj̥	t		ts̄	t
‘work’	túmí	túmí	túmí	ṇtò	tó	tj̥ò	tō		ts̄um	tú
*d/_u		d		d	d̥z̄	d̥z̄	d			
‘smoke’		dùṇḡ		dû	d̥z̄û	d̥z̄û	dù			

End of Table 38

	Burak	Loo	Maghdi	Mak	Kyak	Moo	Leclau	Tha	Doso	Dza
	<i>t</i>	<i>t</i>	<i>t</i>	<i>t</i>	<i>s</i>	<i>s</i>	<i>s</i>	<i>t, c</i>	$\overline{ts}$	$\overline{ts}$
* $\overline{ts}/_u, w$										
‘bury’	<i>tú</i>	<i>tǔ</i>	<i>tú</i>	<i>tǔ</i>	<i>sú</i>	<i>sú</i>	<i>sú</i>	<i>tù</i>	$\overline{tsw\acute{t}}$	$\overline{tsw\acute{t}}$
‘honey’		<i>tē</i>	<i>táj</i>	<i>tàŋ</i>	<i>swàŋ</i>	<i>sàŋ</i>	<i>sàŋ</i>	<i>cwáj</i>	$\overline{tswàŋ}$	<i>twáj</i>
‘ashes’				<i>twǎŋ</i>		<i>sáj</i>	<i>sáj</i>	<i>cwáj</i>		
* $\overline{tj}/_u, w$	<i>t</i>	<i>t</i>	<i>t</i>	<i>t</i>	$\overline{tj}$	$\overline{tj}$	$\overline{tj}$	<i>c</i>	$\overline{ts}$	$\overline{ts}$
‘far’		<i>túrē</i>	<i>túlà</i>	<i>tú</i>	$\overline{tj\acute{u}}$	$\overline{tj\acute{u}}$	<i>tú</i>	<i>cwē</i>	$\overline{tjw\acute{t}}$	$\overline{tsw\acute{t}}$
‘few’	<i>tòp</i>	<i>tóp</i>	<i>tóp</i>	$\overline{tswàb}$	$\overline{tjwàb}$	$\overline{tjwàb}$	$\overline{tjwàb}$		$\overline{tswàní}$	$\overline{tswàní}$
‘do’					<i>tó</i>	$\overline{tj\acute{o}}$	<i>tó</i>		$\overline{tswèi}$	$\overline{tswè}$
* $\overline{dz}/_u$	<i>d</i>	<i>d</i>	<i>d</i>	<i>d</i>		<i>z</i>	<i>z</i>		$\overline{tsw}$	<i>tw</i>
‘heart’		<i>dú</i>	<i>dù</i>	<i>dū</i>		<i>zū</i>	<i>zū</i>		$\overline{tswàm}$	<i>twé</i>
* $\overline{dz}/_w$	<i>d</i>	<i>d</i>	<i>d</i>	<i>d</i>	<i>zw</i>	<i>v</i>	<i>zw</i>	<i>d</i>	$\overline{dzw}$	$\overline{tsw}$
‘mortar’	<i>dàn</i>	<i>dàn</i>	<i>dàn</i>	<i>dàn</i>	<i>zwèn</i>	<i>vèn</i>	<i>zwàn</i>	<i>ìdàù</i>	$\overline{dzwàm}$	$\overline{tswā}$

We have adopted sequential structures Cw and Cj as a working hypothesis, as opposed to secondary modifications within complex root-initial consonants $/C^w/$ and $/C^j/$, although the data offers possible arguments for either analysis. As for arguments for a sequential analysis, first, the economy principle disfavors secondary articulation because it would double the size of the phoneme inventory, and this is avoided by allowing $/w/$ or $/j/$ as the second of two onset consonants. Second, this onset structure automatically derives the fact that labial articulation does not appear with coda (syllable-final) consonants. Third, vowel/diphthong alternations $[o] \sim [wə]$ and $[e] \sim [jə]$ in 3.2 associate the $[w]$ or $[j]$ with the following vowel, not with the preceding consonant. Fourth, certain sound changes to plosives and affricates take place before either $[u]$ or $[w]$, or before either $[i]$ or $[j]$, supporting an analysis in which $[w]$ and $[j]$ immediately follow the root-initial consonant like $[u]$ and $[i]$.

There are, however, counter-arguments favouring a secondary modification analysis. Many of the sound changes found in the data relate labialised or palatalised structures to unitary segments, so the simplest account of these changes would be from unit to unit, thus $b^j > j$, $n > j$, $p > k^w$, $k^w > \widehat{kp}$, $g^w > \widehat{dz}$, $d^w > \upsilon$, $v^w > m$, $s^w > j^w$, etc. This argument is not quite watertight, for the important reason that structural re-interpretations by speakers of one sound as two, or two sounds as one, can themselves occur as historical change (Blevins 2004). Speaker re-interpretation is suggested in our data for ‘brother, sister’, which is heard as $\upsilon\partial$ in Tha but as $jw\partial\eta$ in Kyak. Nevertheless, the sheer number of changes linking labialised or palatalised structures to unitary segments is striking, and appears to weigh in favour of the secondary modification analysis (countering the first argument against secondary modification). A second counter-argument is that affricates are also not admitted word-finally, so that a restriction disallowing all complex consonants word-finally would be a stronger explanation for the lack of word-final labialised or palatalised consonants (countering the second argument against secondary modification). Third, some sound changes restructure a sequence of two phonemes, such as $j\partial > j\partial$ and $ju > \upsilon i$, hence

Table 39

Affricates with [w] before front vowels

	Burak	Loo	Maghdi	Mak	Kyak	Moo	Leelau	Tha	Doso	Dza
*sw/_e,ə			fɰ	sw	sw	sw	sw	cw	ts̥w	ts̥w
‘burn’			ʃwɛnɛ	swɛn		swɛn		cwɛ	ts̥wɛm	ts̥wɛ
‘skin’					swɛl	swɛl	swɛl	ɟwɛ	ɟzwɛ	ts̥wɛ
*ts̥w/_e	tw	tw	fɰ	sw	tʃɰ	f	sw	cw	ts̥w	tʃɰ
‘ear’	twɛ	twɛ	ʃwɛ	swɛ	tʃɰɛ	fɛ	swɛ	cwɛ	ts̥wɛ	tʃɰɛ
*tʃɰ/_e	tw	tw	fɰ	sw	ts̥w	tʃɰ	tw	tw	tʃɛ	tʃɛ
‘spit’ _B	twɛ	twɛ	ʃwɛ	swɛ	ts̥wɛ	tʃɰɛ	twɛ	twɛ	tʃɛ	tʃɛ
*cw		p	ɰ (ɟw)	ɰ (ɟw)	ts̥w		cw		ts̥w	ts̥w
‘bite’		pɛ	ɰɛ	ɰɛ	ts̥wɛ	nɛ	cwɛ		ts̥wɛ	ts̥wɛ

alternations involving on-gliding diphthongs can be interpreted the same way, thus $k^w\bar{a} > ko$, $b^i\bar{a} > be$ etc. (countering the third argument against secondary modification). Fourth, there are sound changes conditioned by a following front vowel irrespective of whether labial articulation is present, thus $d(^w) > \widehat{d\bar{z}}(^w)/_i$. This appears to rule out [w] as the following segment, because the consonant is affricated before [i], which leaves labialisation as a feature of the consonant itself (countering the fourth argument against secondary modification).

The latter arguments suggest that our working analysis as onset CC sequences is unsatisfactory, but given the conflicting distributional and comparative evidence we suggest that phonetic evidence will be necessary to help resolve the matter in a given variety. Moreover, the variation already observed in [ɥ] ~ [jw] implies that a variationist approach (allowing for variation between a segment with secondary modification and sequence of two segments), with or without a stratal approach (a sequence at one level and a secondary modification at another level), may provide a more satisfactory analysis.

5. Conclusion

Jen is a language cluster whose branches are united at 50% lexical similarity. Autonyms distinguish ten communities within the cluster, but these form six language-like units at 90% lexical similarity, or more than six if for example Doso is considered distinct from Dza on phonological grounds, or if others are considered distinct on geographical grounds. A primary genetic branching between Burak-Loo-Maghdi-Mak and Kyak-Moo-Leelau-Tha-Doso-Dza is supported by lexicostatistics, lexical isoglosses, phonological isoglosses (nasalised vowels and /h/), morphological isoglosses (initial consonant alternations and rhyme alternations), and by numerous sound correspondences. Hence, the first seven Bikwin varieties are not a genetic group, although they are related culturally and geographically.

The complexity of sound change in the Jen language cluster is considerable. Some changes are conditioned by open vs. closed syllable

structure, and others involve restructuring of two adjacent segments, both demonstrating that comparative analysis in this language cluster must continually consider structural context, instead of focusing only on individual segments. Some sounds are removed by one change and replenished by another, and there are several irregular changes. The complexity of sound change is most extensive in Tha and Doso-Dza, including roots in which every segment has undergone change, and including the development of voiceless approximant sounds not found in the more phonologically stable Bikwin varieties. A matter for future researchers is how the unusually extensive degree of sound change in the riverine Jen varieties might be explained.

The sheer complexity of sound change in the Jen language cluster also limits application to alphabet development. Some points are clear: implosives and the trill are lost in Dza and absent from its alphabet, but will need to be represented in other Jen languages, for which implosive symbols are readily available from Hausa orthography. The second branch is distinguished by nasalised vowels and /h/, therefore they only need to be represented in writing in that branch, as they are in Dza orthography. Because of the complexity of sound change, the more basic methodological step of comparing sound inventories (Dimmendaal 2011: 9) often seems more helpful for identifying alphabet needs in Jen languages (Othaniel 2017). This is partly because the Dza alphabet is based on a particularly large sound inventory in Dza from which other languages can select letters they need depending on which sounds are contrastive. This includes vowels, where sound correspondences are unstable and vowel systems may or may not retain the original contrasts, particularly the non-high front and back vowel contrasts /e/-/ɛ/ and /o/-/ɔ/, and the central vowel contrasts /ɑ/-/ə/ or /ə/-/ɪ/.

Finally, irregular correspondences often suggest morphology in Jen languages that is not yet understood. Verbal stem alternations in the initial consonant are a feature of the earliest branching in the cluster, and also occur more recently in other verbs. Their functions are largely unclear here, except in two examples where consonant alternations distinguish direction (**gɪlb* ‘pull’ vs. **lub* ‘pull up’) and transitivity

(**gb̥ab* ‘hit’ vs. **wab*/**zab* ‘kill’). Another initial consonant alternation *l/d* occurs in nouns, also of unknown function, but it has been active recently in dialect clusters of the second branch, alternating between Leelau and Kyak-Moo in several roots (‘fire’, ‘knee’, ‘locust-bean tree’, ‘tongue’, ‘yesterday’), and between Doso and Dza (‘calabash’, ‘today’). Particularly in ‘tongue’, the *l/d* alternation recalls evidence from other Niger-Congo languages that the lateral is an old affix (Norton 2018: 437). Other irregular patterns involve mid vowels and diphthongs, recalling similar relations in Chadic languages (Boyd 2002). These too are recently active, but whether they have a morphophonemic basis is unclear. Breathy voice appears irregularly, but is a historic feature of many root morphemes, distinct from modal voice and tone.

Appendix. Reconstructions

Reconstructions appear with the standard starred notation as in **kwin* ‘one’. IPA symbols used in the comparative wordlist that differ from widely used Africanist symbols have been replaced by the latter symbols in the reconstructions to facilitate their integration in further scholarship as in **ya* ‘you (pl)’ (Burak *jà* etc.). Where tone fits a series for H, M or L tone, it has been reconstructed. Absence of tone from the reconstruction indicates that we do not know what tone to reconstruct.

The following additional conventions have been used. Roots supported by only one of the two primary branches are presented in brackets as in (**ka*) ‘grass’, as the latter roots are ambiguous between retentions from proto-Jen or innovations of that primary branch. Roots with alternate forms in the two primary branches, that cannot be confidently resolved into one reconstructed form, are shown with the two forms separated by a slash as in **so*/**swe* ‘snail’.

On each line, forms which are not considered cognate to the reconstructed form are given in brackets. There is an element of uncertainty in this, especially given the possibility of irregular initial consonant alternations in this language cluster. I have therefore sought to avoid use of brackets whenever I can see a possibility of cognacy between forms that partially resemble each other.

Pronouns

Gloss	Proto-Jen	Burak	Loo	Maghdi	Mak	Kyak	Moo	Leelau	Tha	Doso	Dza
‘I’ ‘me’	*nì *mì	mì mì	mē mì	nì mì	má mà	ḡ (bāḡ)	(bāḡ) (bāḡ)	ḡ mì	ḡ mì	ḡ mì	ḡ mì
‘you (sg)’	*mò/*mà	mà	mò	mò	mwā	mà	mà	mà	mà	mà	mà
‘he, she’ ‘her, him’	*nə (*u)	nà ná	nà nà	nà nā	nà nā	ú wə	ú wù	ù wù	ná ná	ù wə	ò wə
‘we’	*ḡi	bó	ḡi	ḡi	ḡi	ḡi	ḡi	ḡi	ḡi	ḡi	ḡi
‘you (pl)’	*ya/*ba	jà	jē	jà	ḡi	ḡi	ḡi	ḡi	ḡi	ḡi	ḡi
‘they’	*ní *ye/*le	né	jē	ní	ní	í	í	ì	í	ì	ì

Numerals

Gloss	Proto-Jen	Burak	Loo	Maghdi	Mak	Kyak	Moo	Leelau	Tha	Doso	Dza
‘one’	*kwín	kwín	kwín	swím	cwín	kwín	kwín	kún	cún-gà	tsín	tsín
‘two’	*rǎb	rǎb	rǎb	lǎp	rǎb	rǎb	rǎb	rǎb	(nà-jà)	(ná- ḡi)	(jún)
‘three’	*tǎt	(búnín)	(búnú)	tǎr	tǎt	tē	tē	tǎi	nà-tà	nà-tà	tá

Gloss	Proto-Jen	Burak	Loo	Maghdi	Mak	Kyak	Moo	Leclau	Tha	Doso	Dza
‘four’	*nat	nēt	nēt	nār	nēt	nē	nē	nai	nə-ŋə	ná-nə	ŋə
‘five’	*nub	nōb	nōb	núwōp	núwəb	(nùŋúŋ)	ŋǔ	nú	nə-nù	(nə-ù)	(nǹmì)
‘six’		ná-ŋin	ní-ŋin	nà-ŋin	ná-sín	nárən-kwín	nà-rən-kwín	nənə-kún	nē-ŋcò	ùt-tjùŋ	ùt-tšəŋ
‘seven’		ná-rè	ná-rə	nă-lə	nà-rá	ná-rè	nàn-džerē	nənə-í-rà	ŋə-dí-dí	ùt-ŋù	ùt-ŋùŋ
‘eight’		ná-tát	ná-tát	gónò-gònò	gəŋə-nā	gìnē	gògúinē	ŋgùnəi	ŋə-dí-dí	kənà-kənà	ùt-tá
‘nine’		ní-nít	nì-nit	là-ŋon	lá-səŋ	swəŋ swəp	súsúlà	səŋ səp	ŋə-nəi	ùəŋ-ùə	ùt-ŋə
‘ten’	*swəb	ŋəb	ŋəb	ŋúwəb	swəb	swəb	swəb	səp	nəθē	ùə	ùə
‘fifteen’		ŋóp-dí-nəb	swəb-dí-nəb	ŋóp-dí-núwəb	swəb-í-lí-núwəb	swəb-dí-nùŋúŋ	səb-úŋú	lí	nəθé-dà-nánəŋù	lí	lí
‘twenty’		fá-kwín	ŋú-rəb	fă-ŋwín	fá-cwín	zəm-kwín	zəm-kwín	ðim-kún	ŋəŋcò	hwùn-tjəŋ	ŋwù-tšəŋ
‘hundred’		fá-nəb	tjù-səb	fă-núwōp	fă-núwəb	gə-rəb	zəm-ŋú	ðim-nú	ŋəŋ-nəŋ-nəŋù	hùn-ùt	ŋwù-nǹmì

Content words

Gloss	Proto-Jen	Burak	Loo	Maghdi	Mak	Kyak	Moo	Leelau	Tha	Doso	Dza
‘answer (v.)’	*gwə̀b	gə̀b	gə̀b dē	gə̀b jwā	gə̀b	gwə̀b	gwə̀b	gwə̀b	gwə̀	gwə̀ŋ	kwə̀
‘arm, hand’	*nq	nq	nq	nə	nə	nə	nə	nə	nə	nə, nə	nə
‘arrow’	*bu	(ə-r-fɔk)	ʔér-bwí	(təu)	(núŋ-təu)	bú-tfí	bú-tfí	bú-tfí	ŋbù	bù-tsə	bú-tfí
‘ashes’	*gwe *tswəŋ	gwí	gwí	d̥gwe	twəŋ	gwí	sŋ	sŋ	cwəŋ yá	vəu	fə
‘ask’	*bɪp	bɪp	bép	bíp	bíp	bí	bíp	bíp bá	bim	bí	bí
‘back’	*māl	māl	māl	d̥māl	māl	mwəl	mwəl	mwəl	(jəkù)	(tswà)	(tswà)
‘bad’	*aɓo	ɓək-lé	àɓɔ	(ɟínàd̥kə)	màɓó	àɓó	àɓɔ	màwó	(ɟáw)	(yūw)	àbē
‘bark’ (cf. ‘tree’)	*kwəŋ	kək-lè	kə-lē	kəŋ kəp	kwəŋ kəp	pwəm	pəŋ	kwəŋ kəp	kwəŋ kà	pwə	pwə
‘basket’	*dɔk	dɔk	dɔk	dɔk	dɔk	kùdɔk	ká-dɔk	dɔk	kələu	kəlō	lò
‘beer’	*mín	mín	mín	mín	mín	mín	mín	mín	mù	mim	mí
‘belly, stomach’	(*fū) (*yú)	fū	fū	fū	fū	wá	wá	wá	yà	yà	yá

Gloss	Proto-Jen	Burak	Loo	Maghdi	Mak	Kyak	Moo	Leelau	Tha	Doso	Dza
'beneath'	* <i>pi</i> * <i>b₀</i> leg	<i>bī</i>	<i>vō</i>	<i>bī</i>	<i>bí</i>	<i>pí</i>	<i>pī</i>	<i>pè-swà</i>	<i>bò</i>	<i>bù</i>	<i>pū</i>
'big'	* <i>gop</i>	(<i>kámùr</i>)	(<i>mút</i>)	<i>gòŋ</i>	<i>gwəŋ</i>	<i>gǝzi</i>	<i>āŋgā</i>	<i>āŋgā</i>	<i>nágò</i>	<i>ángà</i>	<i>àkā</i>
'bite'	* <i>tum</i> * <i>cwi</i>	<i>lúm</i>	<i>pəl</i>	<i>uĩ</i>	<i>uĩ</i>	(<i>tswē</i>)	<i>ŋē</i>	<i>cwē</i>	<i>dū</i>	(<i>tswí</i>)	(<i>tswí</i>)
'bitter'	* <i>ŋe</i>	(<i>uá</i>)	<i>ŋēt</i>	(<i>uá</i>)	(<i>uá</i>)	<i>ŋí</i>	<i>ŋì</i>	<i>ŋí-ò</i>	<i>ŋwí</i>	<i>ŋí</i>	<i>ŋí</i>
'black'	* <i>bil</i>	<i>bíliŋ</i>	<i>bíl</i>	<i>bíliŋ</i>	<i>bíliŋ</i>	<i>bíliŋ</i>	<i>bíl</i>	<i>à bíliŋ</i>	<i>nàdì</i>	<i>bí</i>	<i>bí</i>
'blood'	* <i>uē</i> / * <i>zwī</i>	<i>wě</i>	(<i>düm</i>)	<i>uē</i>	<i>uē</i>	<i>zwí</i>	<i>zĩ</i>	<i>zĩ</i>	<i>vĩ</i>	<i>ŋyĩ</i>	<i>yĩ</i>
'bone'	* <i>kub</i>	<i>kúp</i>	<i>kúp</i>	<i>kóp</i>	<i>kwəb</i>	<i>kāp</i>	<i>kāb</i>	<i>kùkùp</i>	<i>kùkù</i>	<i>kùkuə</i>	<i>kùkú</i>
'bow' (cf. 'arrow')	* <i>kə(n)-to</i>	(<i>ká-fjək</i>)	<i>tau</i>	<i>kápəu</i>	<i>kəntəu</i>	<i>kántĩ</i>	<i>kánti</i>	<i>kəntəu</i>	<i>gǝtəu</i>	<i>kəntəw</i>	<i>kántwəŋ</i>
'break' (v.)	* <i>ob</i> / * <i>ab</i>	(<i>kǎ</i>)	(<i>ká</i>)	<i>òp</i>	<i>ʔəb</i>	<i>áb</i>	<i>áb</i>	<i>áb</i>	<i>gwə</i>	<i>uə</i>	<i>wá</i>
'breast' (cf. 'swal- low')	* <i>mī</i>	<i>mĩ</i>	<i>mĩ</i>	<i>mì</i>	<i>mĩ</i>	<i>mĩ</i>	<i>mĩ</i>	<i>mĩ</i>	<i>mĩ</i>	<i>mì</i>	<i>mì</i>
'breathe'	* <i>hum</i>	<i>úmé</i>	<i>úma</i>	<i>ùmà-lè</i>	<i>əmə</i>	<i>əmə</i>	<i>əmə</i>	<i>əmə</i>	<i>hū</i>	<i>hū</i>	<i>hū</i>

Gloss	Proto-Jen	Burak	Loo	Maghdi	Mak	Kyak	Moo	Leclau	Tha	Doso	Dza
'brother, sister'	* <i>ɲin</i> (* <i>ɲəŋ</i>)	<i>ɲín mì</i>	<i>ɲín</i>	<i>ɲín</i>	<i>ɲín</i>	<i>jwəŋ</i>	(<i>ɲɔ-ɲəm</i>)	<i>ɲá-ɲəm</i>	<i>ɲə</i>	<i>ɲí</i>	<i>ɲí</i>
'burn'	* <i>swen</i>	(<i>k'órá</i>)	(<i>k'órá</i>)	<i>ɲwèné</i>	<i>swēn</i>	(<i>li</i>)	<i>swén</i> (<i>li</i>)	(<i>li</i>)	<i>cwē</i>	<i>tswə́m</i>	<i>tswə́</i>
'bury'	* <i>tsu</i>	<i>tú</i>	<i>tú</i>	<i>tú</i>	<i>tú</i>	<i>sú</i>	<i>sú</i>	<i>sú</i>	<i>tú</i>	<i>tswí</i>	<i>tswí</i>
'bush'	* <i>daŋ-grass</i>	<i>dà-kà</i>	<i>dà-kà</i>	<i>dí-ka'</i>	<i>dà-kà</i>	(<i>wē-gùk</i>)	(<i>wē-gùk</i>)	<i>dàŋ-gùk</i>	<i>tátŋ-gù</i>	<i>bátŋ-ɲù</i>	<i>bìŋ-hù</i>
'cala-bash'	* <i>dɛ</i>	<i>dɛ</i>	<i>dɛ</i>	<i>dɛ</i>	<i>dɛ</i>	<i>dɛ</i>	<i>dɛ</i>	<i>dɛ</i>	<i>lɛ</i>	<i>li</i>	<i>ɔ́ɔ</i>
'call (v.)'	* <i>lu-be</i>	<i>lú</i>	<i>lú</i>	<i>lúvə̀</i>	<i>víní</i>	<i>lɛbē</i>	<i>lɛbē</i>	<i>lɛbəl</i>	<i>dúbi</i>	<i>dípi</i>	<i>dɛ́ɔ́pi</i>
'carving axe'	* <i>sa</i>	(<i>dúmk'ól</i>)	<i>sà</i>	<i>jà</i>	<i>sá</i>	<i>sá</i>	<i>sá</i>	<i>óá</i>	<i>ɣé á θá-nèŋ</i>	<i>sà</i>	<i>sá</i>
'cassava'	* <i>we</i> * <i>kum</i>	<i>wē-kúma</i>	<i>wí-kíná</i>	<i>bāi</i>	<i>ɲé-kúma</i>	(<i>rógó</i>)	(<i>zəŋ</i>)- <i>kwəm</i>	(<i>dən</i>)	(<i>júkə</i>)	<i>wəl</i>	<i>wé</i>
'child'	* <i>yu</i> 'person' (* <i>mzan</i>)	<i>jū</i>	<i>jū</i>	<i>jú</i>	<i>júkúŋŋəŋ</i>	(<i>wíŋdɔŋ</i>)	(<i>wí</i>)	(<i>ɲí</i>)- <i>mðən</i>	(<i>ɲí</i>)	<i>ɲwən</i>	<i>ɲwə̀</i>
'clay'	* <i>dwab</i> , * <i>swəb</i>	<i>dòp</i>	<i>dəb</i>	<i>ɔ̀p</i>	<i>swəb</i> <i>ɲíŋ-mwí</i>	<i>swáp</i>	<i>swáp</i>	<i>swáp</i>	<i>ɣáwà</i>	<i>ɲə</i>	<i>mə</i>
'clean'	* <i>i</i>	<i>dí</i>	<i>dí</i>	<i>dí</i>	<i>ɛn</i>	<i>ɲŋ</i>	<i>í</i>	<i>ìθá</i>	<i>ká</i>	<i>ì</i>	<i>kí</i>

Gloss	Proto-Jen	Burak	Loo	Maghdi	Mak	Kyak	Moo	Leelau	Tha	Doso	Dza
‘cloud’	*ɬ(-ɾum)	túrūm	túrūm	túrūm	teɬ	tɛ	tê	təi	dùlè	tʃi	tʃi
‘cobra’	*nuŋ/ *ŋwam	ŋá-múk	ŋà-mók	á-mók	ŋá-mú	bjɔŋ- mūŋ	bək- ŋwām	bjək- ŋwām	jəŋgù	ɲwām	ɲwé
‘cold’	*təma	təmə	təmə	təmə	təmə	tém	tém	tém	té	tà	tá
‘come’	*yɔ/*wə	jí	jí	jí	já	wè	wá	wə	wə	wə	wú
‘cook’	*yo	jǒ	jǒ	jəwə nūŋ	jəu	jǒ	jǒ	jò	jəu	ɲi	ɲi
‘count’	(*daba) (*zən) < *dʒən?	dəbə	dəbə	dəbə	dəbə	zən	zən	à dən	(hə)	zəm	sə
‘crab’	*bɨŋ *gəŋ	dʒɛŋɛ	bɨŋ	bəŋ	bəŋ	búŋ	búŋ	ɲbúŋ	ŋgə̀ləŋ	ŋgə̀ləŋ	kəŋ
‘crocodile’	*fɨb	fɨp	fɨp	fɨp	sɨb	swəm	sɨp	θɨp	sì	sì	ʃɛ
‘cut’	*gab	gəb	kəp	gəb	kəp	kū	kū	(bàr)	gə	kwəi	kə
‘dance’ (c.f. ‘drum’)	*dəŋ	(dʒɛt nūŋ)	(dʒɛt nūŋ)	dəŋ	dəŋ	dəŋ	dəŋ	dəŋ	dəŋ	dəŋ	dəŋ
‘demo- lish’	*dVre	(móre)	(móre)	dú, dúlè	dúr	dír	dír	dír	dhwé	dèi	dè

Gloss	Proto-Jen	Burak	Loo	Maghdi	Mak	Kyak	Moo	Leclau	Tha	Doso	Dza
‘die’	*bwi	bwé-rè	bít-rē	bít-là	bê-rá	bwi	bwi	bwi	bwi	bwiŋ	bwi
‘dig’	*ya/*za	jă	jā	jà	já	zà	zà	ðà	ðà	hà	hà
‘dirty’	*bil	lúŋ	bil	bil	díŋ	bil	bilít	bilít	bì	bít	bí
‘do’	*nə (*tjō)	nē	nē	ná	ná	tó	tjō	tó	nə	tswèi	tswè
‘dog’	*dwa	dwa	dwa	dwa	dwa	dzwá	widwá	dwa	uúà	jídwa	idzwa
‘dream’	*mu-rV	má-rá	mú-rà	mwa-là	mwa	mwen	mwen	mwanì	mwmwì	mwi-rà	mwi-lé
‘drink’	*no/*ŋwa (*nu)	ɲɔ	ɲwá	ɲɔ	núɲá	ɲwà	ɲwà	ɲwà	nù	ɲwà	ɲwá
‘drum’ (cf. ‘dance’)	*dan	dən	dən	dən	dən	dən	dən	dən	(gəŋgən)	dən	dən
‘dry’	*kwe	kwé-lé	kwat	kwat	kwat	kwí	kwí	cwí	uŋjē	tŋŋ	tŋ
‘dust’	*kuntār (*vok)	kwintār	cúndār	(bap)	kúndúr	vùk	kúndúr	kúndúr	kúfí	vàù	fō
‘ear’	*tswi	twé	twí	fwé	dɔk-swé	tŋwí	dɔk-fí	dɔk-swí	bwa-cwí	tswi-tswí	tŋwí-tŋwí
‘earth’	*gwam	(hijélé)	(bít)	lò-góm	lò-gwám	lùŋ-gwəm	lò-gwám	lón-gwám	jəfát-gwé	fāt-gwám	fāt-gwà

Gloss	Proto-Jen	Burak	Loo	Maghdi	Mak	Kyak	Moo	Leelau	Tha	Doso	Dza
‘eat’	*təŋ	təŋ	təŋ	təŋ	təŋ	təŋ	təŋ	təŋ	təŋ	təŋ	təŋ
‘egg’	*bəŋ	bəŋ	bəŋ	bəŋ	bəŋ	bəŋ	bəŋ	bəŋ	bəŋ	bəŋ	pəŋ
‘egret’	*ləŋək (*tjɛŋfō)	fəmləŋək	səmləŋək	nɛŋləŋək	(jɛlɛŋbɛlɛ)	tjɛŋfō	zəlɔŋək	cɛŋcəu	ɲɛndɛ	tjɛŋfəu	səsɔ̀
‘elephant’	*zək	dʒək	dʒək	dʒək	zək	zək	zək	zək	ðəu	zə	sə
‘eye’	*nɛŋ	nɛ	nɛŋ	nɛŋ	nɛŋ	nɛŋ	nɛŋ	nɛŋ	bwá-nú	nɛŋ	nɛŋ
‘fall’	*o	wō	wō	jəu	jəw	ō	ō	ò	ʔò	ò	ō
‘far’	*tjɛu	(gʰɛnɛ)	tɛrə	tɛlɛ	tɛ	tjɛu	tjɛu	tɛ	cwɛ	tjɛwɛ hɛw	tswɛ
‘fat’	*ɲwɛ	nwɛ	nwɛ	ɲwɛ	ɲwɛ	ɲwɛ	ɲwɛ	ɲwɛ	ɲwɛ	nwɛ hɛw	ɲwɛ
‘father’	*ta	tá	tét	tá	tá	tō	tá	dá	dá	dá	tá
‘fear’	*vɛlɛ, *sɛ	vɛlɛ	vɛlɛ	vɛlɛ	sɛvɛlɛ	vɛl	vɛrɛ	vɛlɛ	(núdɛ)	(bɛ)	sɛrɛ
‘feather’	(*byəŋ) = hair	(fɛ)	(fɛ)	(ba)	(bá)	bjəŋ	bjəŋ	bjəŋ	ɲɛ	dzám	tɛsɛ
‘faeces’	*bwe/ *bwiŋ	bɛjɛ	bwaɛ	bɛi	bɛi	bɛŋ	bɛŋ	bɛŋ	wɛ	bəŋ	bəŋ
‘fencing mat’	*ko *gɛ	dʒɛ kɔ-rɛ	kɛrɛ	kó-lɛ	kó-rɛ	gɛ	kwəŋ dʒɛ	gɛi	gɛ	gɛ	kɛ

Gloss	Proto-Jen	Burak	Loo	Maghdi	Mak	Kyak	Moo	Leclau	Tha	Doso	Dza
'fetch'	* <i>ŋə</i>	<i>nūŋ-ŋí</i>	<i>nē</i>	<i>ŋə́</i>	(<i>bá</i>)	(<i>bá</i>)	(<i>bá</i>)	(<i>bá</i>)	<i>nə́</i>	<i>tə́</i>	<i>tə́</i>
'few'	* <i>[wəb]</i>	<i>tòp</i>	<i>təp</i>	<i>tóp</i>	(<i>tsəb</i>)	(<i>tsəb</i>)	(<i>tsəb</i>)	(<i>tsəb</i>)	(<i>tsəb</i>)	(<i>tsəb</i>)	(<i>tsəb</i>)
'fight'	(<i>*vwəp</i>)	(<i>[əp]</i>)	(<i>[fəb]</i>)	(<i>túlà</i>)	<i>zwā</i>	<i>vīm</i>	<i>vīm</i>	<i>vīm</i>	(<i>ŋbē</i>)	<i>wvəm</i>	<i>mā</i>
'finish (v.)'	(<i>*fanV</i>) (<i>*Cŋ</i>)	<i>fánó</i>	<i>fānē</i>	<i>fánē</i>	<i>fání</i>	<i>ðim máŋ</i>	<i>zám(ŋ)</i>	<i>ðámát</i>	<i>cē</i>	<i>tŋ</i>	<i>tŋ, ját</i>
'fire'	* <i>lwa</i>	<i>hwà</i>	<i>hwà</i>	<i>hwà</i>	<i>hwà</i>	<i>chwà</i>	<i>uà</i>	<i>hwà</i>	<i>uà</i>	<i>chwà</i>	<i>chwà</i>
'fish'	* <i>se / *sŋ</i>	<i>fjŋè</i>	<i>fjē</i>	<i>fāi</i>	<i>seí</i>	<i>θŋ</i>	<i>sŋ</i>	<i>θŋ</i>	<i>θŋ</i>	<i>uŋ</i>	<i>jŋ</i>
'float'	* <i>[o-mu]</i>	<i>lāúndlómě</i>	<i>hwē</i>	<i>tòl lō</i>	<i>lómwì</i>	<i>lómúŋ</i>	<i>lwēŋlō</i>	<i>lómúŋ</i>	<i>wkòmŋ</i>	<i>pám</i>	<i>pá</i>
'flow'	* <i>cal</i>	<i>fí, fí-lí</i>	(<i>ják</i>)	(<i>fánē</i>)	<i>cál</i>	<i>zēl</i>	(<i>náp'ŋn</i>)	<i>cəl</i>	<i>zì</i>	<i>zē</i>	<i>sē</i>
'flower'	* <i>vin-IV</i>	<i>bilē</i>	<i>bilélé</i>	<i>vinlě</i>	<i>vínè kəp</i>	<i>vín</i>	<i>vínú</i>	<i>vín</i>	<i>fī</i>	<i>fŋ, fŋ-ŋ</i>	<i>fŋ-ŋ</i>
'fly'	* <i>wu-rV</i>	<i>wírt nā</i>	<i>wúrí</i>	<i>wílí</i>	<i>wúrà</i>	<i>wúré-fŋ</i>	<i>wúrt-ŋí</i>	<i>ŋí-ŋí</i>	<i>wí-jè</i>	(<i>jà</i>)	(<i>jà</i>)
'fog'	* <i>kokam</i> (<i>*biCŋ</i>)	<i>kām</i>	<i>kām</i>	<i>kókām</i>	<i>kwàxām</i>	<i>béŋ</i>	<i>zám</i>	<i>kūyām</i>	(<i>dúlé</i>)	<i>bútsŋ</i>	<i>təbútsŋ</i>
'food'	<i>thing-eat</i>	<i>nūŋ-təŋ(ē)</i>	<i>nūŋ-təŋ(á)</i>	<i>nūŋ-təŋ(è)</i>	<i>núŋ-təŋ</i>	<i>nūŋ-təŋ</i>	<i>nūŋ-təŋ</i>	<i>nūŋ-təŋ</i>	<i>nūŋ-təŋ</i>	<i>nūŋ-təŋ</i>	<i>nūŋ-təŋ</i>
'front'	* <i>fj</i>	<i>tí</i>	<i>tí</i>	<i>tí</i>	<i>sí</i>	<i>sflē</i>	<i>sí</i>	<i>θǎfí</i>	<i>cì</i>	<i>fj</i>	<i>fj</i>

Gloss	Proto-Jen	Burak	Loo	Maghdi	Mak	Kyak	Moo	Leelau	Tha	Doso	Dza
'fruit' (cf. 'tree')	*tʃu-rV	túrí	túrí	ʃwírí	súr kəp	síw	sí kəp	sí kəp	cí kə nɛŋ	ʃí-rí kə	tʃí-lí
'full'	*yí, (*yíla)	(bót)	jí	jìní	jìdás	jìlɛŋ	jɛŋ	jìðə	jí	jìlə	jìlə
'give'	*(d)ə	fá-lé	fá	ɛ	ə	dɛ	dí	də	də	də	tə
'go'	*dV (*tə)	dót	dwát	dɔ	tá	tɛ	tɛ	tə	dí	tə	tɛ
'good'	*jin(a)	ní, ní-ná	níná	nínà	máʔín	nín	nín	màdɛŋ	nɔlɔŋ	yúɛŋw	hǐ
'gourd'	*kuluk	(dʒàrə)	(dʒàrə)	kúluk	kúlùk	kúlùk	kúlùk	kúlùk	gəw	kù	là
'grass'	(*ka) (*guk)	ká	ká	ká	ká	(bá)	gúk	gúk	gù	vù	hǐ
'gray hair'	*swě *bu	ʃwě	tʃwé	vũŋ	bũ	fĩ	fĩ	ɲbù	zəŋkú á vɛ	fĩ	swĩ
'greet'	*gum	gum-lí	gumě	gòm	gùm	gwəmbě	gùm	gùm	(dè)	(tsə)	(tsə)
'grind'	*nam	nəm	ném	nám	nəm	nəm	nám	nəm	mè	ná	ná
'ground-nuts'	*gwe	gběɛ	gběɛ	(zùlà)	(nũŋ-dʒurá)	gwĩ	nũŋ gwĩ	nũŋ-gwĩ	nú-ɣé	nũŋ-dʒɛi	nũŋ-tsɛ
'gruel'	*dam	(bǐl)	(bǐl)	dám	mà-dám	mìn-dám	màn-dám	mũŋ-dám	(mɛŋ)	(mɛŋ-ló)	(lò)

Gloss	Proto-Jen	Burak	Loo	Maghdi	Mak	Kyak	Moo	Leclau	Tha	Doso	Dza
'Guinea corn'	(*yV) (*m̥n)	(ǰǎ)	(ǰā)	(ǰǎ)	(ǰiǎ)	m̥n	n̥n̥ m̥n	n̥n̥ m̥n	m̥	m̥m̥	m̥w̥
'hair'	(*byən)	(fɛ)	(f)	bā	bā	bā-lò	bjəŋ	bjəŋ	gəŋkù	d̥zəm	ts̥a
'head, on'	*lo (*ku)	lò, lwě	lò, lwě	lò	lǎu	lò	lò	lò	jə-kù	kù	kú
'hear'	*li	lárè	lárà	lálē	lǎré	lǐ	lǐ	là	là	lì	lǐ
'heart'	*d̥zu *ji	nigə	dú	d̥i	d̥i	lɔŋ	zū	zū	jɪnǎ	ts̥wəm	twé
'heavy'	*bina	b̥inǎ	b̥inǎ	b̥inǎ	b̥inǎ	b̥wəŋd̥ŋ	b̥wēn	b̥un	m̥m̥	m̥w̥	m̥w̥
'hit'	*g̥báb	g̥bəp	g̥báb	g̥báb	g̥báb	g̥báb	bóp	b̥wəp	g̥bá	g̥bá	g̥bá
'hoe'	(*bən)	(j̥uká)	(d̥ám)	(d̥op)	(d̥ip)	gwám̥bá	bəŋ	b̥əŋ	bəŋ	b̥m̥	p̥ǐ
'hole'	*bwa	b̥wā	b̥wà	b̥wà	b̥wà	b̥wà	b̥wà	b̥wà	b̥wà	b̥wà	b̥wà
'honey'	*ts̥wəŋ	(ɲw̥n̥n̥n̥)	tē	m̥aɪ-təŋ	m̥aɪ-t̥ɔŋ	swəŋ	m̥uŋ-səŋ	səŋ	cwəŋ	m̥uŋ-ts̥wəŋ	ɲw̥n̥n̥n̥
'horn'	*bi	b̥wɛk	b̥ɛk	b̥i kəp	b̥i	b̥i	b̥i	b̥i	lòŋ	d̥i	d̥ɛ
'hus-band'	*be	b̥ɛ-m̥	l̥ibā	b̥ɛ	b̥aɪ-m̥	b̥ɛ	ib̥ɛw̥ɛ	b̥əm	b̥i	b̥i	b̥w̥
'hyena'	*zə-tu	d̥ɛd̥ɛd̥ɛ	(ɲw̥ánk̥m̥)	(d̥fɛ)	(n̥ád̥m̥l̥)	z̥əz̥	z̥əz̥	zw̥át̥	t̥u	t̥w̥	ts̥w̥

Gloss	Proto-Jen	Burak	Loo	Maghdi	Mak	Kyak	Moo	Leelau	Tha	Doso	Dza
'kill'	*wəb/*zəb	wəb	wəb	wəp	wəb	zəp	zəp	ðəp	θə	jə	jə
'king'	*gwəb	gub	gwəb	gub	gub	jì-gwê	jì-gwê	jè-gwài	kú	jì-vá	í-və
'knee'	*lwəŋ	lɔk	ɲwɔlɔk	lɔk	mwəlwəŋ	kát	ɲwəzɔlɔk	ɲwəlwəŋ	lòjəŋ	ɔwəŋ	ɔwəŋ
'knife'	(*swən)	(tɔlɔ)	(tɔlɔ)	(bɔ)	(bɔ)	swən	swən	swən	θá	yəm	yə
'know'	*ɬ	é-rě	é-ré ʃɔ	ɬ-là nē	ɬ-rà	í	ŋ	ìbəl	ŋjě	thè	jí
'laugh'	*mám	mám	mám	mám	məm	mám	mám	məm	mí	məm	má
'leaf'	*yəŋ	jəŋ	jəŋ	ɲəŋ	jəŋ	jək	jəŋ	jəŋ	jəŋ	jəŋ	jəŋ
'left (side)'	*mɛ	mɛ	márə	màlè	māl	mē	mē	mài	mù	mì	mì
'leg, foot'	*bɔ	vɔ	vɔ	vɔ	bɔ	bɔ, bɔk	bɔ	bò	ká-bò	ká-bù	ká-pū
'lie (down)'	*lɔ	laú	laú	laú	laú	lɔ	lɔ	ló swà	laú	lweì	lwé
'light (not heavy)'	*yab	jəblá	(bimóbb)	jəblɛ	jəbli	(wənɔ)	jəb	jəbí	(mùŋ)	jě	jéfləŋ
'lion'	*zwə	(bəɬəŋə)	ɔwə	ɔwə	zwə	zwə	zwə	zwà	zwà	yú:	yú

Gloss	Proto-Jen	Burak	Loo	Maghdi	Mak	Kyak	Moo	Leclau	Tha	Doso	Dza
'live'	*u	ú lí	wú lè	wù cí	bù lí	kú	(ə)	(ə)	nówù	kú	kú lè
'liver'	*ɲí	ɲí	ɲí	ɲí	ɲí	ɲwɲwí	ɲí	ɲí	ɲì	ɲì	ɲíɲí
'locust bean tree'	*lwe	(mēḂ)	(mēḂ)	lwāi	lwāi	dwí	dwí kəp	kəp lwí	kájí	ká-dwí-jě	d̥wí-sòtɔ́
'long'	*gwenV	gb̥ɛ́nɛ́	gb̥h̥n̥á	d̥z̥t̥n̥á	d̥z̥t̥n̥á	gwɛ́n	gwɛ́n	á gónì	ɲɔɲwì	vī-là	fī
'maize'	(*ɾa-bo) (*kun-a)	jàbó	jábó	gb̥t̥gb̥h̥n̥i	j̥ɛ́ɛkwáɲ	k̥n̥d̥	m̥ɔɲ-k̥n̥d̥	m̥ɔɲ-k̥n̥d̥	m̥i-cí	m̥ɔɲ-kwè	í-wè
'man'	*li-be	lí-bɛ	lí-bì	lí-bāi	lí-bāi	k̥n̥d̥ = (j̥i = 'person')	ì-bé	lí-béí	n̥m̥-bì	j̥i-bwí	í-bwì
'many'	(*kpā)	(wè)	(wé d̥m̥n̥j̥ɛ)	(d̥n̥d̥)	líkpāli	k̥pāḂ	k̥pā	k̥pāḂ	(b̥b̥ai)	k̥pāḂ	j̥iāḂ
'meat'	*ɲám	ɲám	ɲám	ɲám	ɲám	ɲǎ	ɲám	ɲám	ɲē	ɲəm	j̥ǎ
'metal'	*bí	bít	bìp	bí	bí	bwí	bwí	bwí	bwí	bì	bì
'mill-stone'	*ɲí	ní	ní	ɲí	ɲí	ɲí	ɲí	ɲí	ɲwáɲwì	ɲì	ɲí
'moon, month'	*pi	pí	pí	pí	pí	fí	fí	fí	fí	f̥ɔɲm	ùḂ
'mortar'	*dzwan	(f̥)	dàn	dàn	dàn	zwɛ́n	vèn	zwán	ìdàù	d̥zwám	tswā

Gloss	Proto-Jen	Burak	Loo	Maghdi	Mak	Kyak	Moo	Leelau	Tha	Doso	Dza
‘mosquito’	*bɛ/ɸya	bɛ́	bé	bē	bē	bjà	bjá	bjà	jà	djà	ḡá
‘mother’	*nə	nâ	ní	nā	nə	nē	nâ	nâ	nà	ná	nă
‘mouth’	*ɲwa	ɲwǎ	ɲwá	ɲwà	ɲwǎ	ɲwá	ɲwá	ɲwà	kəɲwá	ɲwà	ɲwá
‘mud’	*ḡzwab	ḡdɔ́b	dòb	dàɾɔb	swɔ́b	swəb	swɔ́b	(dɔ́bɔk)	ɲúḡ	ḡḡúḡḡwə	(bɔ́bɔ)
‘nail (v.)’	*pe *bək	bə-ré	bək	pē	bək	pì	pí	pí	bə	pī	pí
‘name’	*lɛn/*dʷɛn	lɛn	lɛn	lɛn	dɛn	dʷɛn	dʷɛn	dʷɛn	dù	dɛ́ɲ	ḡɛ́ɲ
‘narrow’	(*təb)	(bèrɛɲ)	(mɛ́f)	(bɔ́nɔɲ)	(mɛ́nəf)	təp	təb	təp	(pɛ́)	tə	tə
‘near’	(*bà-di) (*pe) (*cən)	pē	pē	(gəgəb)	bà-dí	cən	cénɔ́ɲ	bà-ḡḡ	bà-dê	bà-pí bà-pí	cə
‘neck’	*dul	dòl	dùl	dùl	dùl	dùl	dùl	dwùl	ɲwí	ḡḡwùm	ḡḡwí
‘new’	*fù	ká fù	ká fù	á fù	là fù	à fù	à fù	á fù	à fù	à fù	à hú
‘night’	*və	və-rè	və-rè	vò-lè	vò-rè	vì	ɲúɲ vì	ɲúɲ vì	ɲúɲ vè	ḡḡvì	ɲvì
‘nose’	*lur(l)	lurí	lurí	hwí	ḡurə	dùr	dùr	dùr	bwà-dù	bwà-dwì	ḡḡwí

Gloss	Proto-Jen	Burak	Loo	Maghdi	Mak	Kyak	Moo	Leclau	Tha	Doso	Dza
'oil'	* <i>nwì</i>	<i>nwì</i>	<i>nwì</i>	<i>nwié</i>	<i>nwi</i>	<i>nwì</i>	<i>nwì</i>	<i>nwì</i>	<i>nwì</i>	<i>nwì</i>	<i>nwì</i>
'old'	* <i>ko</i>	<i>kó-rē</i>	<i>kà-rè</i>	<i>kó-lí</i>	<i>kū-rí</i>	<i>à kū</i>	<i>kúŋ</i>	<i>á kái</i>	<i>cwè</i>	<i>à cwì</i>	<i>à cwí</i>
'open'	* <i>ba</i> /* <i>fo</i>	<i>bá</i>	<i>bà</i>	<i>ábà</i>	<i>bà</i>	<i>bō</i>	<i>bō</i>	<i>bəù</i>	<i>bò</i>	<i>bəì</i>	<i>bē</i>
'open (eye/mouth)'	* <i>a</i>	<i>bá</i>	<i>bà</i>	<i>ábà</i>	<i>bà</i>	<i>ǎ</i>	<i>ǎ</i>	<i>bəù</i>	<i>bò</i>	<i>bəì</i>	<i>à</i>
'owl'	(* <i>bíj</i>) (* <i>nǐn</i>)	<i>bǐj</i>	<i>bǐj</i>	<i>bǐj</i>	<i>nǐn</i>	<i>nǐn</i>	<i>nǐn</i>	<i>nǐn</i>	<i>ǐhǐn</i>	<i>nǐn</i>	<i>nǐn</i>
'person'	* <i>gúl</i> * <i>yu</i> = child	<i>lul</i>	<i>lul</i>	<i>júgùl</i> <i>júgùl</i>	<i>júgùl</i> <i>júgùl</i>	<i>jú</i>	<i>jú</i>	<i>jú</i>	<i>nùwà</i>	<i>jí-vì</i>	<i>ì-fí</i>
'play'	* <i>bəŋ</i> (* <i>fá</i>)	<i>(kəle)</i>	<i>fláábəŋ</i>	<i>bát</i>	<i>(nǐm-nǐn)</i>	<i>nǐn-fá</i>	<i>(gəb-nǐn)</i>	<i>(nǐm-nǐn)</i>	<i>bəŋ</i>	<i>nǐn-tə</i>	<i>nǐn-tə</i>
'porcupine'	* <i>fē</i>	<i>té</i>	<i>təí</i>	<i>təí</i>	<i>təí</i>	<i>fí-láŋ</i>	<i>fí-láŋ</i>	<i>(làn-də)</i>	<i>(wəbəkə)</i>	<i>(fí)</i>	<i>(fí)</i>
'pull'	* <i>giub</i>	<i>giub</i>	<i>gub</i>	<i>gub</i>	<i>gub</i>	<i>gəb</i>	<i>gub</i>	<i>gub</i>	<i>gù</i>	<i>vì</i>	<i>fí</i>
'pull up'	* <i>lub</i>	<i>lúb</i>	<i>lúb</i>	<i>lúb</i>	<i>lúb</i>	<i>lúb</i>	<i>lúb</i>	<i>lúb</i>	<i>lù</i>	<i>dù</i>	<i>dəwù</i>
'push'	* <i>tək</i>	<i>tək</i>	<i>tək</i>	<i>tək</i>	<i>tək</i>	<i>tək</i>	<i>tək</i>	<i>tək</i>	<i>ló</i>	<i>tə</i>	<i>tó</i>

Gloss	Proto-Jen	Burak	Loo	Maghdi	Mak	Kyak	Moo	Leelau	Tha	Doso	Dza
'python'	*mi	mĩ	mĩlām	mĩ	mĩ	mwi	mwi	bəŋà	mwi	mì	mì
'rabbit'	*tsi-dʒa	(bàrtáú)	(wǝm)	táɗǝ	táɗǝ	sɓɓɛ	sɓɓɛ	tə̀	hɛɛlɛ̀	hɛɛɗɛ̀	tsɛ̀lɛ̀
'rain' (= 'water')	*me/*mɛ	mɛ gák	mɛ	mǎi	mù	mū	múŋ	mùŋ	múŋ-jùlól	mùŋ	múŋ
'red'	*jen/*zen	jŋ	jɛnɛ	jɛnɛ	jŋ	zɛn	zɛn	á ɔ̀nì	ɗɗɛ̀	jɛ̀	jɛ̀
'red soldier ants'	*tsɪŋa	tùŋɛ̀	ɸɸwǎ	ɸɸbɔ	zwà	sǎ	záŋzɛn	θŋà	θá	sǎ	sǎ
'refuse'	*la	lá	lá	(ɸóɸá)	(jibà)	lá	lá	là	(jǎ)	là	lá
'ring'	*ku	(bwt-ná)	(nùŋ ná ɗǝnà)	kú	nùŋ kú	(swám)	núŋ kú	kù-ná	nùŋ kà-nà	nùŋ ɸi	ɸi
'river'	*dwəl *ŋwəm/ *wəm-a	wǝm-á	tùlɔ̀	wúm-á	wúm-à	ɗǝwəl	ŋwəm	dwəl	ŋù	ŋwəm	ŋwǎ
'road'	*ɛ	lát	lát	lólà	(ɗfɛ̀r)	lɛ̀	núŋ lɛ̀	núŋ lɛ̀	(nàgàŋ)	(nàgàŋ)	(nùǎ)
'root'	*ɗik *yáŋ	(ɗǝmù)	ɗik	jáŋ	jáŋ	(pɔ̀)	jŋ kɛ̀p	ɗik	jì	ɸəm	ɸé
'rope'	*bəl	bél	bəl	bəl	bəl	bəl	bál	bəl	bəl	bəl	bè

Gloss	Proto-Jen	Burak	Loo	Maghdi	Mak	Kyak	Moo	Leclau	Tha	Doso	Dza
'rotten'	*zu	(òmà-lé)	d̥ɔ̀l-rə	d̥ɔ̀l-là	zù-rà	zú	à zù	zù	viè	ù	ù:
'round'	*liŋ	(gà-lɛ)	(gā)	gɪjəŋ	(cɪrɔ̀)	d̥ɔ̀ŋ	à d̥ɔ̀ŋ	jìlɪŋ	(kwé)	(kwām)	(kwā)
'rub'	(*ǎ) (*fi) (*Cāŋ)	ǎká	ǎká	ǎ	zūŋ	fá	nū	fá	fá	fi	nū
'salt'	*d̥ɛ	d̥ɛ	d̥ɛ	dàì	dàì	d̥ɛ	d̥ɛ	dàì	d̥wè	zìkwāì	ǎ̀k̥wè
'sand'	*s̥wa-zwɛ	ʃwàd̥ɔ̀wɛ	bəŋ-zwɛ	ʃwàd̥ɔ̀wàì	swàzwɛ	swàzwí	swàzì	swàzwí	fávi	údn̥uì	úǎ̀uì
'say' (cf. 'speak')	*gɛ	gɛ	gɛ	d̥ɔ̀ɛ	gàì	d̥ɔ̀ɛ	à d̥ɔ̀ɛ	gàì	kìjè	(kɪŋ ká)	(ɪsá)
'scratch (not destructive)'	*kwe/*pe (*ʃəŋ)	(kpáká)	pɪ-rɛ	pəì	pəì	fɛ	kɔ	kwai-là	bà	ʃəŋ	ʃəŋ
'scratch (destructive)'	*kwā/*kpa	(lálá)	kpáká	g̥báyà	(pəɪ)	kwà	(fɛ)	(kwai-lá)	(hù)	(ʃəŋ)	kwà
'see'	(*nəŋ) (*byə)	nəŋ	nəŋ	nəŋ	lən	bì	bì	bjà	bì	bà	bà
'seed'	(*lɔk) (*byə)	lək nūŋ	lək nūŋ	lək nūŋ	lók	bɛ-nūŋ	bjà-nūŋ	bé-nūŋ	jà	bjà-nūŋ	pjà-nūŋ

Gloss	Proto-Jen	Burak	Loo	Maghdi	Mak	Kyak	Moo	Leelau	Tha	Doso	Dza
‘shadow’	*ciliŋ	ʃliŋ	ʃliŋ	ʃliŋ	ciliŋ	ʃliŋ	(kɪlɔwəŋ)	cɪliŋ	ɾiŋŋ	(kwəŋ)	(kwəŋ)
‘shake (object)’	*lám(-ə) *d͡ʒɛ	lámá	lámá	d͡ʒɛkɾi	(bɪrɪ)	(wáp)	zár	lám	ʒɛ	(jaú)	(jò)
‘shame’	*siko	kɔ-le-ʃit	kó-ló-ʃit	ʃitəi-lé	sékau-lé	súkú	súkú	θikù	(nɪjəi)	sikù	súkú
‘sharp’	(*lam)	(nɛi)	(nɛi)	(ɪá)	(ɪá)	lám	lám (dɪm)	lám	liiɛ	lám	lá
‘shea butter tree’	*tswáb	(dám)	(dɔwám)	tóp	(gwám)	(ámɔilám)	swáb	(kəp kɪl)	(kə) tà	(kə) tsɔwə	tsɔwə
‘shield’	(*d͡ʒen)	(kɔɾɿŋ)	(kɔɾɿŋ)	(jɪbáb)	(jɪbáb)	d͡ʒen	d͡ʒen	ʃen	ʃɛ	ɳɛ	ɳkə
‘shoe’	*hwəŋ	wəŋmɪ	wəŋmɪ	wəŋmɛi	wápmú	ś	ś	əi	hɛ	(bám)	hú
‘shoot’	*ta	tá	tá	tá	tá	tá	tá	tá	tá	tá	tá
‘short’	*kin	kén	kán	(g̃bátà)	(tɪl)	(tɪl)	(tɪlɪl)	(jàðəm)	(ŋwɪnɪl)	(àŋàŋ)	kūkū
‘sing’	(*twa zi) (*lub ɬín)	twá (bəŋ)	twá (d͡ʒɪ)	twá (d͡ʒɪ)	twá (zi)	lɪb (ɬín)	lɪb (ɬín)	lù (ɬín)	d͡ʒwɪ(dwɪ)	lei (ɬín)	lɛ (bɪ)
‘sit’	*u	ú	wúli (hwá)	wù	wɪkɪlā	ì (swà)	ə (ɪnə ə)	ə (swà)	wáθə	kù	kú (ɪú)
‘skin’	*tsɔwəl (*lakə)	tɬl	lákát	láká	lɪká	swəl	swəl	swál (θə)	ɟwə	d͡ʒwə	tsɔwə

Gloss	Proto-Jen	Burak	Loo	Maghdi	Mak	Kyak	Moo	Leclau	Tha	Doso	Dza
'sleep'	*lo	nũŋ-ləú	nũn-ləú	nũŋ-ləù	nũŋ-ləù	nũŋ-ló	nũŋ-ló	nũŋ-ló	nũŋ-ləù	nũŋ-lwəi	nũŋ-lwé
'small'	*tswəb	tiŋəb	tòp	tóp	(kɛŋəŋ)	à tʃwəb	(àn zəŋ)	á twəp	á thəŋ	tswənt	fɛnt
'smell'	*jel	jəlɛ	(jɪnd)	jəlɛ	(kũm)	jəl	(kũm)	jəl	jə	jijə	(tɔ)
'smoke'	*du, *wü	wü	diŋp	wú (lwà)	dú	d̥gú	d̥gú	dú	dú	uì (dɔw)	uì
'snail'	*so/*swe	(pɪ)	(pɪ)	fó	sò	swè	fè	swè	ŋfjə	yè	yè
'snake'	*byək	(kémlem)	bjək	bjək	bjək	bjək	bjəŋ	bjək	jà	d̥zəù	tsə
'soup'	(*ɥa)	(nũŋ-jé)	(nũŋ-jé)	(núŋ-və)	(nũŋ-vé)	wá	wà	(bɔwɪl)	(dlu)	yà	yà
'sour'	(*ɲwɪ (*əm)	nwɪ	nwɪ	nwɪ	ɲwɪ	ám	ám	ám	nũjəi	əm	ŋə
'speak' (c.f. 'say')	*gɛ	gɛ	gɛ	d̥zɛ	gəi	d̥zɛ	(bàŋ) gə	gəi	(həŋwà)	(nə)	(nə)
'spear'	*məm (*bwé)	məm	mwəm	məm	ká-bé	mwəm-lò	mwəm	ká-bwɪ	bwɪ	ká-bwɪ	bwɪ
'spider'	*dəŋ	(ləŋɔ)	(jɛnɪməm)	dəŋdəŋ	dəŋdəŋ	tʃɪəndəŋ	(grəŋgrəŋ)	dɪndəŋ	-	kándəŋ	nándəŋ
'spit'	*tʃwi-tʃwe	twɛ	twɪ	ʃwɪfwɛ	sɪswé	tswɪswɪ	tʃwɪtʃwɪ	tɪtwɪ	twɪtwɪ	tʃɪtʃɪ	tʃɪtʃɪ

Gloss	Proto-Jen	Burak	Loo	Maghdi	Mak	Kyak	Moo	Leclau	Tha	Doso	Dza
'split'	*əŋ	əŋ	əŋ dɛ̃rɛ̃	(bān)	(gǝ́ǎ)	səŋ	à səŋ	əŋ	cə́ɪnǎ	pəm	pě
'squeeze'	*kam	kám	kám	kám	kǎm	kəm	kám	kəm	kě	kəm	kǎ
'stab'	*bə	bət	bɛ̃t	bə	bə	bɛ̃	bjɛ̃	bəi	bə	bə̀u	pə
'stand'	*dɛ̃	dɛ̃	dɛ̃	dai	dai̯	dɛ̃	dɛ̃	dɛ̃	(cə́ɪl-ǎǎ)	ǎǎ̃	tsǎ̃
'star'	*byɪn	(bǎ́ǎ̯l)	(bǎ́sǎ̯l)	bɛ̃n	bɛ̃n	bàn	bjɪn	vɪn	ŋy̯ɪŋ	ǎǎ̃ɪŋ	ŋǎ̃ɪŋ
'stick' (cf. 'tree')	(*kwəb)	(ǎǎ̃ǎ̯b)	(ǎǎ̃ǎ̯b)	(nǎ́lǎ̃ŋ)	(tǎ́l)	súk-wəb	súk-wəb	ðəm-kəp	cwəi	yǎ̀kə	bwǎ̀kə
'stone, moun-tain'	*təl	tál	tál	tál	tál	təl	təl	təl	tə̀i	tɛ̀i	té
'suck'	(*oŋ) (*su)	jumì	aí	fú	ǎ́ú	əŋ	əŋ	əŋ	ŋə̀u	ù	ú
'sun, daylight'	*fV	bɛ̃	bə̀i	fǎ́lɛ̃	fǎ́r	fǎ̃	fū	fū	fɛ̃	fɪ	fɪ
'swallow'	*mǐ	mǐ	mǐ	mǐ	mǐ	mǐ	mí	mì	mǐ	mǐ	mǐ
'sweet'	(*te) (*lab-lab)	(mǎ)	tɛ̃	tə́l	tɛ̃-lɛ̃	lǎ́blǎ́b	lǎ́blǎ́b	lǎ́dɪn	(mǎmǎn)	lǎ́p-lǎ́p	kú́l-lǎ́

Gloss	Proto-Jen	Burak	Loo	Maghdi	Mak	Kyak	Moo	Leclau	Tha	Doso	Dza
'sweet potatoes'	*kita(n)-ko	ʃtəŋcau	citakui	kátəngū	kítəgō	kátəkò	kítəkáu	kátəgə̀	kàrkò	kùdkaù	káləkó
'swell'	*ʃam (*har)	ʃú-rì	ʃúm	(lòk)	ʃəm	hár	ʃəm	hár	(je)	hài	hé
'tail'	(*yen) (*zɛŋ)	wín	wēn	yén	yēn	zɛŋ	zótɛ	ðɪŋ	kə̀ðɪŋ	kə̀uŋ	kápɪ̀
'take'	(*pi) (*ti)	pí	pí	pí	pí	lē	lē	lài	jì	đđ	đđ
'tears'	water-thing (*gam)	mē-nūŋ	mē-nūŋ	məf-nūŋ	ní-mwí	kám-bùr	gəm-bír	mùŋ-núŋ	ngùm-ì	nūŋ-mūŋ	gəm-í
'thick'	*mu	ɲúm	mút	(bínà)	kə mwíwè	mē	à mɪjē	mùwúđŋ	mùm-wə	múm-wə	(j)
'thing'	*nuŋ	nūŋ	nūŋ	nūŋ	nūŋ	nūŋ	nūŋ	nūŋ	nūŋ	núŋ bē	nūŋ
'think'	*ɲam	ɲém	ɲám	ám	ɲəm	zí	à zí	ɲəm bà	(bəŋ)	cəm bí	cé
'throw'	*wa	(bɪŋ)	wá	wā	wà	wà	wá	wá	tà	wà	wá
'thunder'	*gamvɪr	gə̀nùvùrùm	gə̀nùvùrùm	(nánì)	gə̀m-vèr	kwə̀pɪvèr	gə̀pɪfɪr	gə̀m-vɪr	gə̀pɪwə̀	gə̀m-və̀	gə̀pɪ
'tie'	*tsəb	táp	láp	ʃáb	sáb	tʃəb	tʃəb	θəp	cà	tsə	tsá
'today'	*di	di	di	di	di	kɪjə	kikà	diɡà	ùdàndà	liyə̀	diɡɛnɪ

Gloss	Proto-Jen	Burak	Loo	Maghdi	Mak	Kyak	Moo	Leelau	Tha	Doso	Dza
‘tomorrow’	*ve/ *b̥h	vě	vě	vəi	vəi	im-b̥h	b̥h	b̥h	nám-b̥h	b̥h	b̥h-p̥iǎ́
‘tongue’	*d̥ak (*tyaŋ)	d̥ak	d̥ak	d̥ak	l̥ən	k̥im	k̥ik	l̥jén	l̥áŋ	l̥jém	l̥á
‘tooth’	*le	le	laí	laí	laì	l̥ē	l̥ē	laí	j̥h̥	ǎ́	ǎ́
‘tortoise’	*kw̥áŋ	k̥w̥	k̥áŋ	k̥áŋ	k̥áŋ	kw̥óŋ	kw̥áŋ	k̥óŋ	h̥	kw̥àŋ	kw̥áŋ
‘tree’	*k̥ab	(ǎ́)	k̥áp (ǎ́)	k̥áp	k̥áb	k̥áb	k̥áb	k̥áp	k̥à-n̥ŋ	k̥à	k̥á
‘turn’	(*m̥im)	(w̥im̥)	(k̥ō)	(p̥í n̥ā)	(b̥j̥i n̥ā)	m̥im̥	m̥im̥	m̥im̥	(j̥h̥ ŋəi)	m̥im̥	m̥j̥ē
‘twist (v.)’	*lam	ǎ́-l̥im	p̥í-l̥im	(ǎ́)	ǎ́-l̥im	(k̥à-r̥ē)	k̥i-l̥im	k̥i-l̥im	l̥əŋ	kw̥am	(b̥h)
‘under’	*b̥wa *pi beneath	b̥i	b̥i	b̥i	ǎ́	p̥í	p̥i	p̥isw̥ā	b̥ò (= leg)	ǎ́	ǎ́
‘vomit’	*b̥yám	b̥om	b̥om	b̥am	ǎ́-j̥am n̥ŋ	ǎ́-j̥im	ǎ́	ǎ́	b̥j̥ē	ǎ́-n̥ŋ	ǎ́
‘walk’	*w̥o/ *z̥o	w̥ē-l̥é	w̥ē-l̥é	w̥é-l̥é	w̥ō	z̥ō	z̥ò	ǎ́	ǎ́	h̥ò	h̥ō
‘warm’	*b̥um/ d̥um (*lub/ lab)	b̥ur̥um- b̥ur̥um	b̥ur̥um	b̥um	d̥um-d̥um	(sw̥ēn)	ǎ́-l̥ab	d̥um-d̥um	l̥əŋ	l̥i-l̥ub	l̥w̥i-l̥w̥i
‘wash’	*zw̥ab (*dyok)	ǎ́-l̥ab	ǎ́-l̥ab	ǎ́-l̥ab	zw̥ab	ǎ́-l̥ab	ǎ́-l̥ab	ǎ́-l̥ab	v̥á	l̥ó	l̥ó

Gloss	Proto-Jen	Burak	Loo	Maghdi	Mak	Kyak	Moo	Leclau	Tha	Doso	Dza
‘water’	*mɛ / *m̥ɪŋ = rain	m̄	m̄	m̥ɪŋjè	m̥ɪŋj̥	m̥ɪŋ	m̥ɪŋkwàm	m̥ɪn̥kì	m̥ɪcà	m̥ɪŋ	m̥ɪŋ
‘well’		ɓwà-mé	túŋr̥ɪŋ-m̄	ɓwà-m̄	ɓwà-m̥w̥ɪn̥	ɓwà-m̥ɪŋ	ɓwà-m̥ɪŋ	ɓwà-m̥	wá-bù	ɓwà-m̥ɪŋ	ɓwà-m̥ɪŋ
‘what?’	*ɓə	ɓɛ	ɓǎ	ɓó	ɓó	ɓɛjǎ	má	ɓó	ɓà	ɓà	ɓǎdɛ
‘when?’	*d̥ɔ	d̥ɔ̀ɔ̀	d̥ɔ̀ɔ̀	d̥ɔ̀ɔ̀	d̥ɔ̀ɔ̀	(b̥ɪŋj̥)	(n̥ɪŋ-j̥)	(n̥ɪ-b̥)	(ʔɪŋw̥)	d̥ɔ̀	d̥ɔ̀n̥ɪ
‘where?’	*l̥	l̥	l̥j̥ǎ	l̥	l̥	pǎ	pà	p̥l̥	(ŋǎ)	p̄	b̄dɛ
‘white’	*v̥ɪ-rum	v̥ɪr̥um	v̥r̥um	v̥l̥l̥m	v̥r̥um	v̥r̥um	àm v̥r̥um	v̥r̥um	j̥ávù	kɔ á v̥əw	f̥ɪ
‘who?’	*wə (*ya)	w̥ɪ	w̥ɪ	w̥ó	w̥ɪ	j̥á	j̥á	j̥ɪn̥	d̥ɔ̀j̥ǎ	w̥ə	w̥ǎdɛ
‘wife’	*sɛ	l̥ɪ-j̥	l̥ɪ-j̥ɪ	j̄	l̥ɪ-s̥j̄	ì-s̥	s̥	s̥m̥	f̥ɪ	h̄	h̄
‘wind’	*q̥	(w̥əb̥ɛ)	(w̥ɪb̥ɛ)	q̥	q̥	wá	wá	wá	n̥àcà	q̥	q̥
‘wing’	*cən	f̥ɪn̥	f̥ɪn̥	j̄n̄	(l̥aùb̥j̄)	w̥ɔ̀ŋ-c̄n̄	c̄n̄	(ŋw̥ák̄n̄)	(ŋ̥b̥álk̄b̥ɪ)	ŋw̥ák̄s̄w̄	ŋw̥ák̄n̄j̄
‘wipe’	*pi	p̄-r̄	p̄-r̄	p̄-l̄	f̄-r̄	f̄	f̄	f̄	f̄	f̄	(n̄)
‘witchcraft’	*ɓw̥ɪ, *ɓw̄	ɓw̄	ɓw̄	ɓ̄	ɓw̄ ɛ̄s̄	ɓw̄ ɛ̄s̄	j̄ ɓw̄	j̄ ɓw̄	ɓw̄-t̄ŋ	ɓw̄	ɓw̄

Gloss	Proto-Jen	Burak	Loo	Maghdi	Mak	Kyak	Moo	Leelau	Tha	Doso	Dza
‘woman’	*i-se (< *wɪʃe’)	li-ʃɛ	hwá li-ʃəi	li-ʃɛ	lɛ-ʃɪjɛ	ì-sí	jì-sí	jì-sí	nì-ʃi	jì-hei	í-jè
‘word, speech’	*sɔ (*bi)	ʃɔ	ʃɔ:	ʃɔ	sɔ-ká	bà	bà	bā	nà-hō	bì	bì
‘work’	*tumi	túmí	túmí	túmí	nūn n̄tò	nútɥ-tó	nútɥ-ʃɔ	nútɥ-tó	(nútɥ-nà)	ɥwá-tsùm	ɥwá-tí
‘year’	*sa, (*əl)	ɛ̃	ʔɛ̃ɛ̃	ʃál	sál	sá	sā	θà	θà	hà	há
‘yesterday’	*le	lɛ	lɛ	liʃɛ	lɛ	ɛ́ɛ́	ɛ́ɛ́	lài	nútɥ-ʃɛ	ɛ́ɛ́	dò

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