Sasak, Meno-Mené dialect

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Sasak is a Malayo-Sumbawan (Adelaar 2005) language spoken as a primary language in Lombok, Indonesia (see the map in Figure 1). It is estimated to be spoken by 2 million (Clynes 1995) or 2.5 million (Marli 2015) people. Sasak is reported to have four (Jacq 1998) or five (Austin 2003) major dialects, to which Austin (2003) gives informal names based on the pronunciation of the deictic words for 'like this' and 'like that': *Ngenó-Ngené* (central northeast, central east, and central west coasts of Lombok), *Menó-Mené* (central Lombok), *Ngotó-Ngeté* (northeastern Lombok), *Ngenó-Mené*, also known as *Kutó-Kuté* (north Lombok), and *Meriaq-Meriku* (south central Lombok). The dialects with the broadest geographical distribution are *Menó-Mené* and *Ngenó-Ngené*.

This study reports on the Menó-Mené dialect. Panji Tanashur, the paper's second author, translated 'The North Wind and the Sun' into Sasak, practiced the story, and read it three times. A Bahasa Indonesia version of the story is found in Soderberg & Olson (2008), which also cites a Malay version in IPA (1949). Panji Tanashur also read the individual words illustrating the sounds. He is a native speaker of the Menó-Mené dialect of Sasak, was age 23 at the time of recording; he lived in Praya for all but three years of his life, and uses Sasak daily. He is also proficient in Bahasa Indonesia and in English. Our goal with this work is to focus on Sasak sounds, rather than include the extended inventory due to borrowed items (for example, [f] in [maaf] also pronounced [maap] 'pardon me, excuse me', and [z] in [zaman] 'era', both loans from Arabic; no audio recordings for either). In our study, we recorded a total of 152 unique word forms and 98 unique morphological roots.

There is a modest literature on Sasak, but it is largely an understudied language. In addition to an online Sasak–Indonesian dictionary (http://kamusbahasasasak.blogspot.hk/), there are the print dictionaries of Thoir (1985), Staff (1995) and the unpublished Austin (2016); there is

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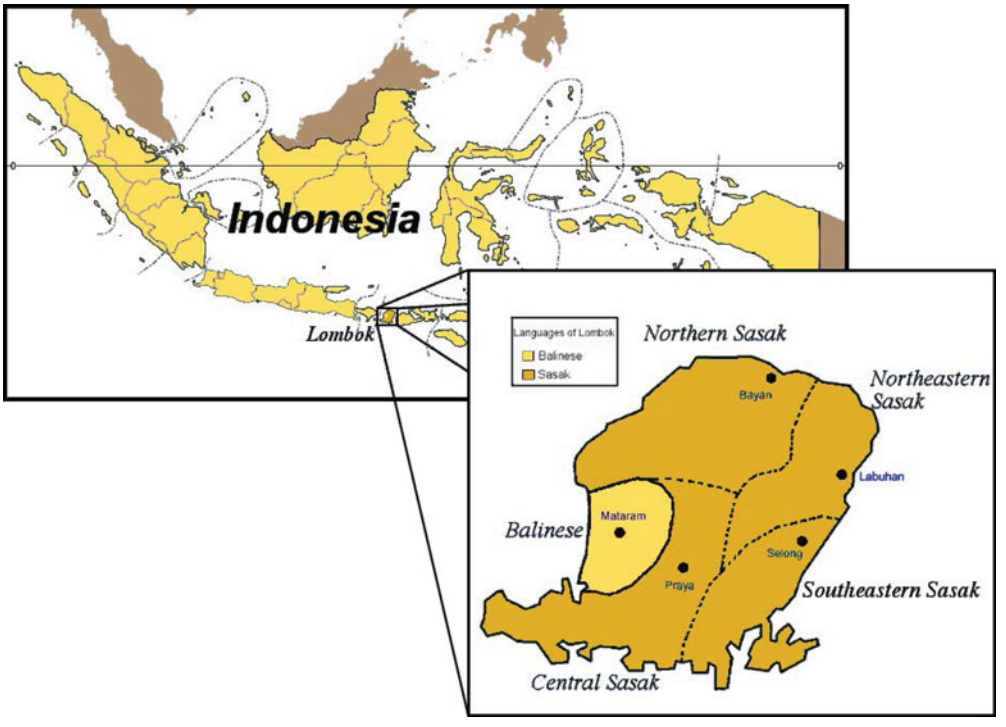

Figure 1 (Colour online) Geographic location of Lombok in Indonesia (overview map) and regions where Sasak is spoken on Lombok (inset map). Labels in the inset refer to places in Lombok where Sasak dialect groups and Balinese are spoken.

at least one grammar (Thoir, Reoni & Karwan 1985/6), and two collections of papers (Austin 1998, 2000).

Consonants

The Sasak sound inventory has 19 consonantal phonemes.

	Bilabial	Alveo-dental	Post-alveolar	Palatal	Velar	Glottal
Plosive	p b	t d			k g	ʔ
Affricate			tɕ dʑ			
Nasal	m	n		ɲ	ŋ	
Trill/Tap		r				
Fricative		s				h
Approximant				j	w	
Lateral approximant		l				

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p	papah	*papah*	‘equal’
b	bapaʔ	*bapaq*	‘father’
m	mapak	*mapak*	(place name)
t	tahan	*tahan*	‘hold on’
d	dapak	*dapak*	‘over-sized’
n	nahan	*nahan*	‘hold on’
r	rapat	*rapat*	‘discussion’
s	sapaʔ	*sapaq*	‘greet’
l	lapah	*lapah*	‘starving’
tɕ	tɕap	*cap*	‘touch & leave a mark’
dʑ	dʑap	*jap*	‘prepare’
ɲ	ɲah	*nyah*	‘ancestor/descendent’
j	jaʔ	*yaq*	FUTURE
k	kapal	*kapal*	‘ship’
g	gamaʔ	*gamaq*	(interjection)
ŋ	ŋapal	*ngapal*	‘memorize’
w	wah	*wah*	PERFECTIVE
ʔ	mpaʔ	*mpaq*	‘fish’
h	hape	*hape*	‘cellphone’

Oral and nasal stops

Plosives and affricates may be voiced or voiceless. Voiceless /p t tɕ k/ are unaspirated with positive, near-zero VOT, while voiced /b d dʑ g/ are characterized by large, negative VOT, as illustrated in Figure 2. Voiceless oral stops are not released (audibly) when in syllable-final position; affricates and voiced stops do not appear in syllable-final position.

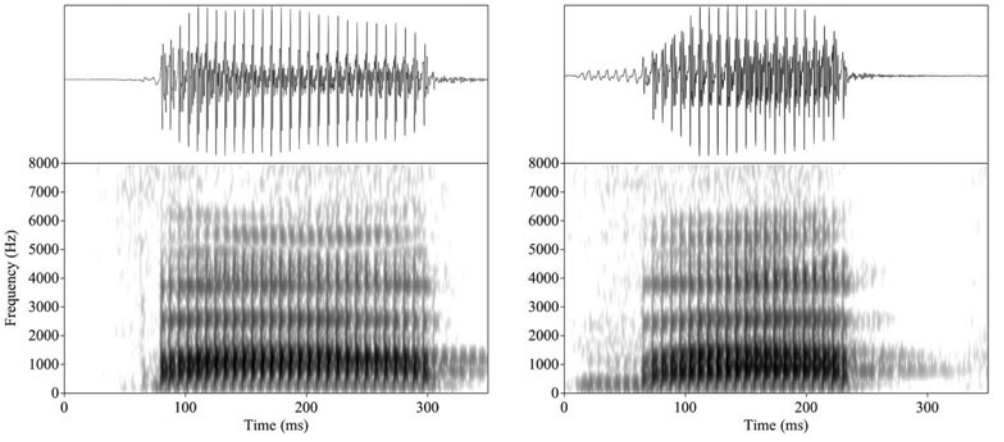

Figure 2 Waveforms and spectrograms for initial voiceless and voiced bilabial plosives: /p/ in /papah/ *papah* ‘equal’ (left) and /b/ in /bapaʔ/ *bapaq* ‘father’ (right).

In terms of place of articulation, oral and nasal stops show a four-way contrast: bilabial /p b m/, alveodental /t d n/, postalveolar/palatal /tɕ dʑ ɲ/, and velar /k g ŋ/. The articulatory tongue configurations for lingual sounds (alveolar, postalveolar/palatal, velar) are shown in ultrasound images in Figure 3 and traces from ultrasound images in Figure 4. (Due to limitations of ultrasound, the tongue tip is not shown.)

Figure 3 shows voiced and voiceless plosives as well as nasals in the three lingual places of articulation. The sounds [t d n] appear to be alveolar, with the tongue root slightly more advanced for the voiced [d]. Postalveolar affricates /tɕ dʑ/ exhibit not only raising of the tongue dorsum toward the anterior palate but also raising of the anterior part of the tongue toward the alveodental region, indicating a large region of anterior constriction during the articulation of these sounds. With the palatal nasal /ɲ/, there is a more posterior location of constriction, at the hard palate, and less tongue-tip raising than in the affricates. (See Archangeli et al. 2017 for further analysis of coronal stop articulations in Sasak.) For velar stops /k g ŋ/, dorsal

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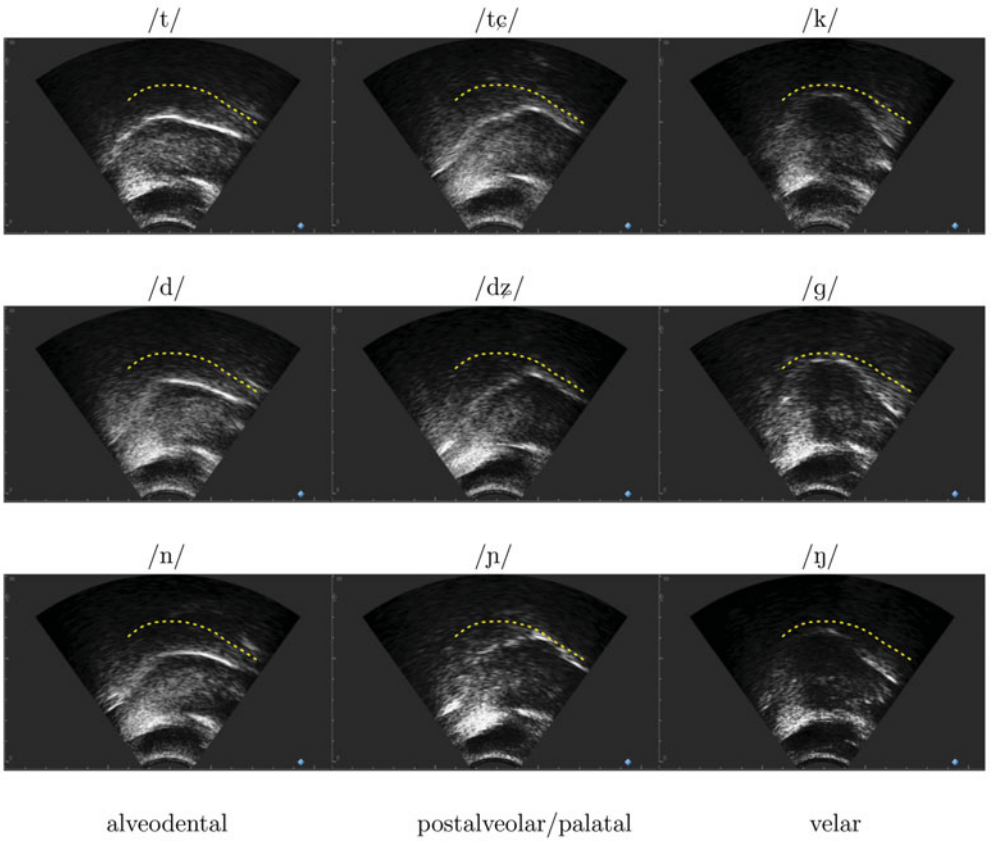

Figure 3 (Colour online) Ultrasound images showing contrasts in lingual place among oral and nasal stops. Leftmost column: alveodental stops /t d n/ in /tahan/ *tahan* 'hold on', /dapak/ *dapak* 'over-sized', /nahan/ *nahan* 'hold on'; center column: alveolar/palatal oral affricates and nasal stop /tɕ dʑ ɲ/ in /tɕap/ *cap* 'touch and leave a mark', /dʑap/ *jap* 'prepare', /ɲah/ *nyah* 'ancestor/descendent'; rightmost column: velar stops /k g ŋ/ in /kapal/ *kapal* 'ship', /gamaʔ/ *gamaq* (interjection), /ŋapal/ *ngapal* 'memorize'. The dotted line in each image indicates the location of the palate. The front of the oral cavity is toward the right-hand side of each image.

constriction is typically located at the soft palate or toward the middle of the hard palate, depending on vocalic context.

Figure 4 overlays the tongue contours for three tokens of each of the lingual plosives and nasals, by voicing and nasality. Velars /k g ŋ/ (green) are high and back; alveodentals /t d n/ (black) are produced with lowered tongue body and raised tongue tip. Postalveolar/palatal sounds (yellow-orange) show two articulatory positions, one with a raised tongue tip and slightly raised tongue dorsum in affricates /tɕ dʑ/ and another position with raising of the tongue tip and full constriction of the tongue front at the hard palate in nasal stop /ɲ/, showing an articulation more similar to that of [j] than to those of affricates /tɕ dʑ/.

The glottal stop /ʔ/ occurs only in morpheme-final position, sometimes as a variant production of final /k/. Because syllable-final oral stops are typically released without audible plosion, there are limited acoustic cues for place that might serve to distinguish /k/ from /ʔ/ in word-final position. However, the articulatory data demonstrate a clear contrast in lingual articulation, with dorsal raising toward the middle of the palate for final /k/ versus the absence of such lingual raising for final /ʔ/, as seen in the acoustic representations and

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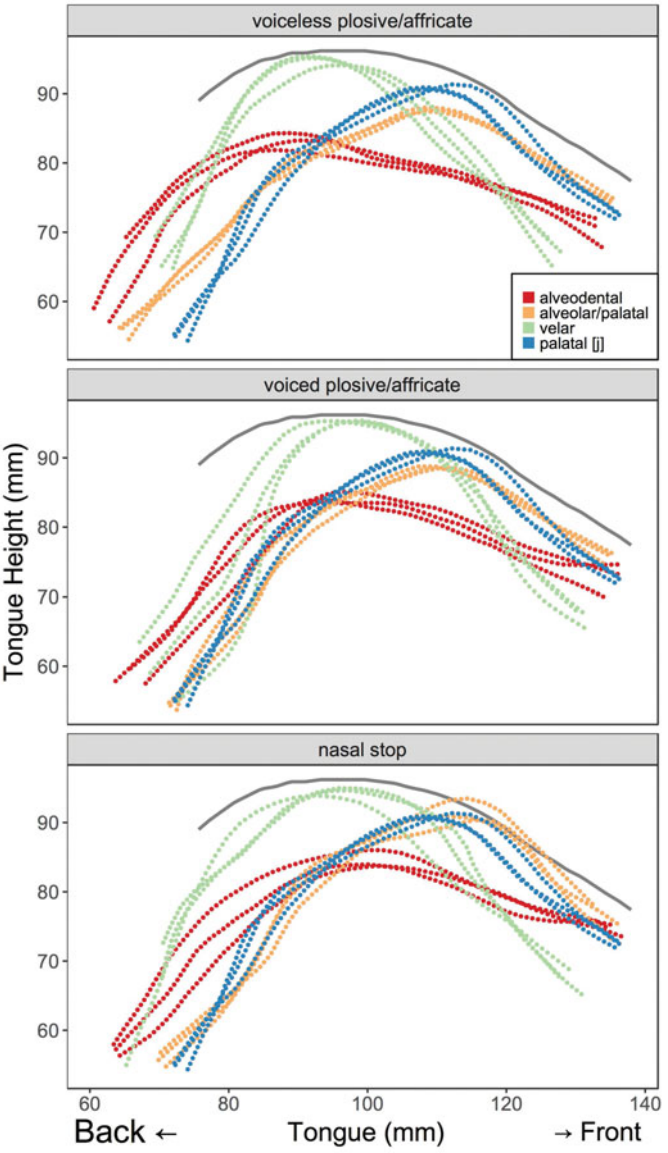

Figure 4 (Colour online) Tongue contour traces of three productions each of voiceless plosives/affricate (top), voiced plosives/affricate (middle), and nasal stops (bottom) for the words shown in Figure 3, compared for spatial reference with the palatal approximant /j/ (blue/medium-dark gray) from /jaʔ/ *yaq* (FUTURE marker).

ultrasound images of the words /bala-k/ *balak* 'my devil' and /balaʔ/ *balaq* 'someone' in Figure 5.

Trill/tap

The Sasak trill /r/ is sometimes produced as an alveolar tap. The trill variant is more common word-initially and word-finally, while the tap is common intervocalically, as illustrated in the words /rapat/ *rapat* 'discussion', /araʔ/ *araq* 'there is', and /gambar/ *gambar* 'picture' in

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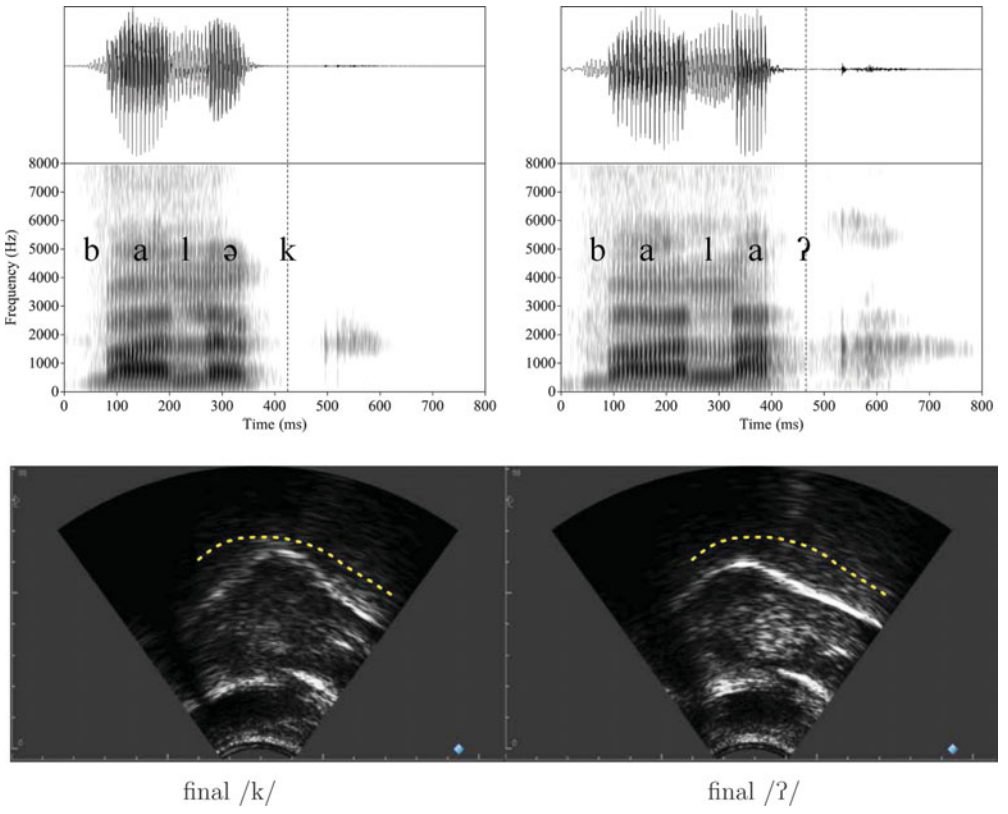

Figure 5 (Colour online) Acoustic (waveform and spectrogram) and articulatory (ultrasound) illustrations of the contrast between final /k/ as in /bala-k/ [balək] *balak* 'my devil' (left) and final /ʔ/ as in /balaʔ/ *balaq* 'stop someone' (right). The dashed vertical line in the waveforms and spectrograms indicates the time during the constriction interval at which the corresponding ultrasound frames were extracted. In the ultrasound images, the dotted line shows the location of the palate. The front of the oral cavity is at the right.

Figure 6. In utterance-initial and utterance-final positions, there is a tendency for the trill to be produced with partial devoicing.

Fricatives

There are two fricative phonemes, /s h/. Ultrasound data indicate that the tongue position for the articulation of /s/ is comparable to that of other alveodental sounds. In general, /h/ occurs in initial position only in a few words, all borrowed; the item /hape/ *hape* 'cellphone' is thought to be modified from borrowed 'handphone'. Further distribution of /h/ is discussed in the Prosody section.

Approximants

There are two central approximants, palatal /j/ and labiovelar /w/. Ultrasound data in Figure 4 above show that the lingual articulation of /j/ is quite similar to that of the palatal nasal stop /ɲ/, with a tongue-tip position that is slightly lower than that in postalveolar affricates /t͡ɕ d͡ʑ/, see Figure 4. Central approximants /j w/ appear only in syllable-initial position.

The lateral approximant /l/ appears to be apical without dorsal raising or pharyngeal constriction, as observed in the ultrasonic imaging data. Syllable-initial and syllable-final /l/ appear to have the same position of the tongue.

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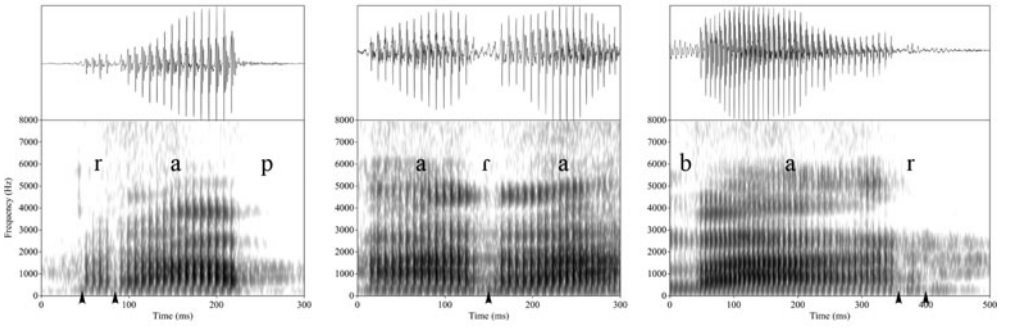

Figure 6 Waveforms and spectrograms for /r/: word-initial trill as in /rapat/ *rapat* 'discussion' (left), intervocalic tap as in /araʔ/ [araʔ] *araq* 'there is . . . ' (center), and word-final trill as in /gambar/ *gambar* 'picture' (right). Arrows at the bottom of each spectrogram indicate intervals of alveolar occlusion during each trill or tap.

Vowels

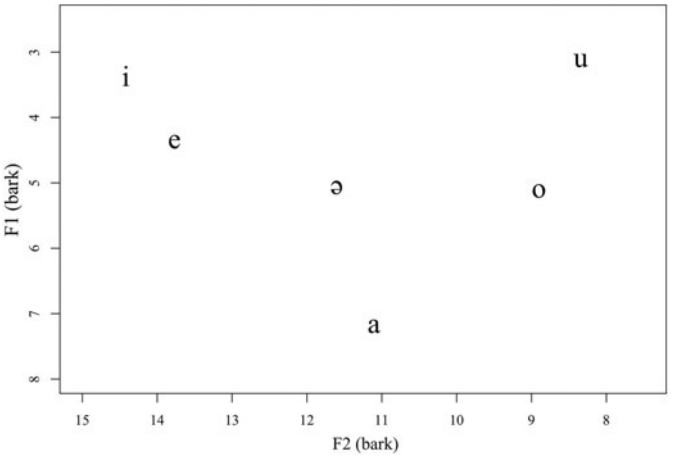

Figure 7 Acoustic formant values for the six vowel phonemes in Sasak.

i	ariʔ	*ariq*	'younger brother'	baliʔ	*baliq*	'puberty'
e	areʔ	*areq*	'leave'	balek	*balek*	'flip, reverse'
ə	arə	*ara*	(type of tree)	balək	*balak*	'my devil'
a	araʔ	*araq*	'there is . . . '	balaʔ	*balaq*	'stop someone'
o	aro	*aro*	(interjection)	baloʔ	*baloq*	'crocodile'
u	aru	*aru*	'early'	baluʔ	*baluq*	'eight'

Sasak has six vowel phonemes, two front, two central, and two back. The formant values are shown in Figure 7: F1 of [i] and [u] are comparable, while F1 of [e] is slightly lower than that of [ə] and [o]. Back vowels are articulated with lip-rounding. Variation in vowel height and frontness/backness depends on position within word and/or stress. (Stress falls on the final syllable in Sasak, except for pronominal clitic syllables, where stress is penultimate. Consequently, stress and position-in-word essentially identify the same classes of syllables – stressed and word-final or unstressed and nonfinal.)

Chahal (1998) presents the allophonic variation in the vowel productions of a single speaker of the central dialect of Sasak. The principal claim in Chahal (1998) is that vowel height is affected by syllable type (O(pen) or C(losed)) and stress (stressed or unstressed)),

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with the lowest productions observed in vowels that occur in closed, stressed syllables. To test this claim, we measured formants from both vowels in three iterations (produced by Tanashur) for each item in the list of examples below, in which the onset of every syllable is coronal (tokens of /a/ in /bala/ *bala* 'devil' are shown to give a reference point for both the height and the front-back dimensions; see also discussion of Figure 9 and examples in 'Single C clitics added to words ending with non-high vowels' for more on /bala/). (Recall that the final syllable is stressed in Sasak.)

Identical mid vowels in open and closed syllable combinations

	FRONT VOWELS			BACK VOWELS		
OO	lete	*lete*	'come'	lolo	*lolo*	'tree (generic)'
OC	leteŋ	*leteng*	'vehicle turn signal'	lotoŋ	*lotong*	'very dark skin'
CO	lende	*lende*	(interjection)	londo	*londo*	'introverted, taciturn'
CC	lenteŋ	*lenteng*	'wrap'	lontoŋ	*lontong*	'pounded rice wrapped in banana leaf'

Our data are not entirely consistent with the Chahal (1998) claim about open and closed syllables. Rather, mid vowels tend to cluster around central first and second formant values regardless of syllable composition, as shown in Figure 8. However, we found that both vowels in /lontoŋ/ *lontong* 'pounded rice wrapped in banana leaf' were substantially lower than the other mid, back vowels in /loto/ *loto* 'tree (generic)', /lotoŋ/ *lotong* 'very dark skin', and /londo/ *londo* 'introverted, taciturn'. Peter Norquest (p. c.: email 24 January 2017) suggests this is because /lontoŋ/ – or /lɔntɔŋ/ – is a fairly recent borrowing from Indonesian and reflects the vowel qualities of the donor language.

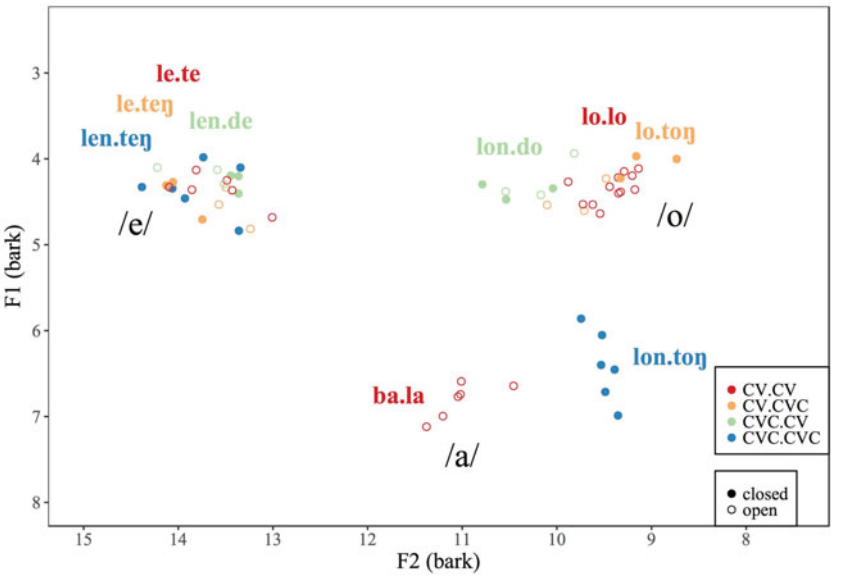

Figure 8 (Colour online) Vowel formant measures by syllable type (open or closed), based on up to three repetitions of each item. Mid vowels are from the words listed under 'Identical mid vowels in open and closed syllable combinations' above. Item labels and data points are color-coded by syllable-type combination (red/black = open–open, orange/medium gray = open–closed, green/lightest gray = closed–open, blue/dark gray = closed–closed).

Following Clynes (1995), Chahal (1998) also investigated height harmony between the two syllables of a disyllabic word and found that the height of a vowel may vary allophonically with the height of another vowel in the same word, with closed syllable lowering drawing down the height of a vowel in an adjacent open syllable. Our results are not consistent with

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the claims about height-harmony in Chahal's model, which would predict that each vowel in words like /lotoŋ/ and /lontoŋ/ would be lowered relative to /o/ occurring in a word with only open syllables, due to the presence of a word-final closed syllable and a leftward spread of height harmony. Because the item /lotoŋ/ contains relatively high (not low) mid-vowel productions (with low F1 values; see Figure 8), closed-syllable lowering does not appear to be at work.

Focusing on mid and low vowels, we controlled for phonetic context by comparing CVCV words with and without the three pronominal clitics, /-k/ *k* 'I; me; my', /-m/ *m* 'you; your', and /-n/ *n* 'he/she/it; him/her/it; his/her/its' in order to examine vowel quality in morpheme-final open syllables. These clitics take on a non-syllabic (as below) or syllabic form, depending on the structure of the preceding syllable. With nominal or verbal stems ending in an open syllable, the clitic becomes the coda of the final syllable. (See Austin 2004 on the syntactic properties of Sasak clitics.)

Single C clitics added to words ending with non-high vowels

			1.SINGULAR	2.SINGULAR	3.SINGULAR
e	lete	'come'	/lete-k/ [le.ˈtek] 'I come'	/lete-m/ [le.ˈtem] 'you come'	/lete-n/ [le.ˈten] 'he/she/it comes'
o	lolo	'tree'	/lolo-k/ [lo.ˈlok] 'my tree'	/lolo-m/ [lo.ˈlom] 'your tree'	/lolo-n/ [lo.ˈlon] 'his/her/its tree'
a	bala	'devil'	/bala-k/ [ba.ˈlak] 'my devil'	/bala-m/ [ba.ˈlam] 'your devil'	/bala-n/ [ba.ˈlan] 'his/her/its devil'

We found little difference between morpheme-final vowels preceding a pronominal clitic and those vowels not followed by a clitic. If the clitics change the structure of the final syllable from open to closed, then these results further contradict Chahal's claim that mid-vowel height is lowered in closed, word-final syllables, as shown by the spectral measures in Figure 9.

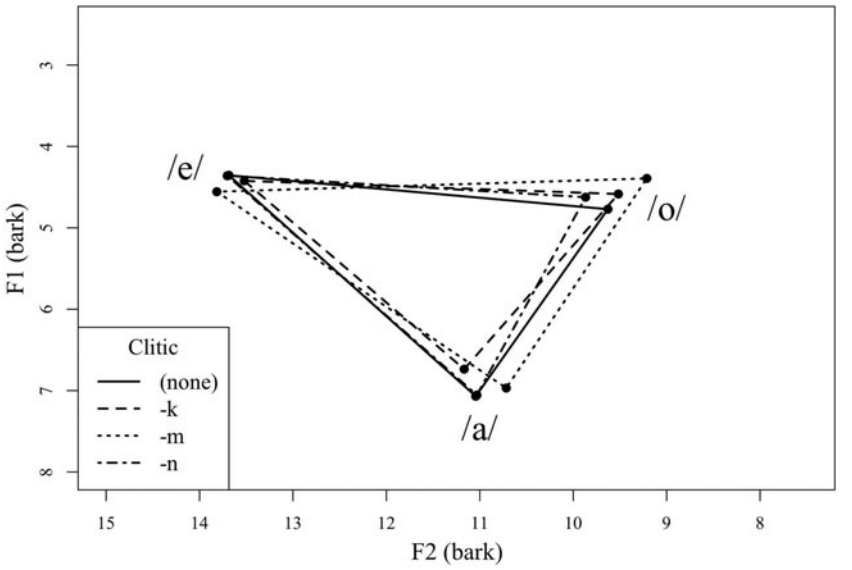

Figure 9 Spectral measures for mid and low morpheme-final vowels /e a o/ in open vs. closed syllables, based on three iteration each of the cliticized and uncliticized items in the list of examples above in 'Single C clitics added to words ending with non-high vowels'. Data points represent F1–F2 values averaged across iterations of the same word. There is little difference in formant values according to clitic type; /e a o/ are produced with the same quality whether word-final or before a final pronominal clitic /-k/, /-m/, or /-n/.

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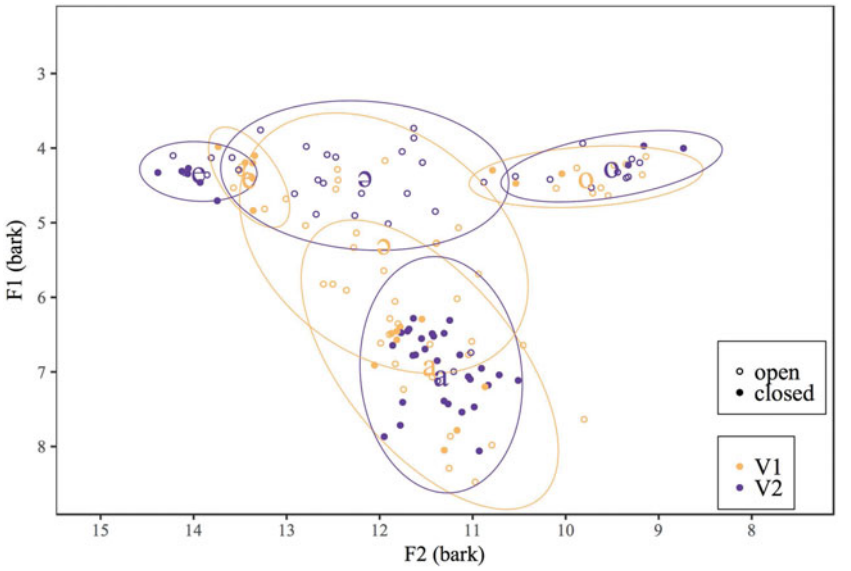

Figure 10 (Colour online) Formant values for non-high vowels /e ə a o/ by position within word (orange/light gray = unstressed V1, purple/black = stressed V2) and syllable type (empty circle = open syllable, filled circle = closed syllable), based on three repetitions each of the items presented in Figure 8. Productions from the word [lɔn.tɔŋ] *lontong* 'pounded rice wrapped in banana leaf' have been omitted from the set, since it may be a loanword with exceptional pronunciation. Productions of /ə a/ in both V1-position and V2-position were taken from eleven /ə/-items and 18 /a/-items occurring in Figure 7 and in the Narrative section below. Vowel symbols represent the mean F1–F2 values for each combination of vowel and vowel position, and ellipses indicate one standard deviation away from each central value.

The general pattern that emerges from our data is that vowel quality differs depending on position within the word. Specifically, vowels in the final syllable of a word, when stressed (see Stress section), tend to have spectral qualities located more peripherally than non-final, unstressed vowels, as shown in Figure 10. The unstressed, non-final vowels occupy a smaller acoustic vowel space than the stressed vowels. The effect is greatest with the central /ə/, which raises to [ɨ] in final syllables. See also Teeuw (1957), Archangeli & Yip (2016b) on Sasak vowel quality.

Finally, the sounds that we present as approximant consonants, /j w/, might be analyzed as allophones of the vowels /i u/, as is done in Austin (2004, 2016) (though the dictionaries of both Austin (2016) and Staff (1995) include /w/- and /j/-initial words). If this is the case, then an analysis would involve a change in front and back high vowels /i u/ to their corresponding palatal or labial-velar approximants [j w] when preceding another vowel, as in /uah/ [wah] *wah* 'PERFECTIVE' and /iaʔ/ [jaʔ] *yaq* 'FUTURE'. Under either analysis, neither [j] nor [w] is found in syllable- or word-final position.

Prosody

Syllables

The typical Sasak syllable consists of a short vowel with an optional onset and an optional coda. In word-initial position, syllabic nasals are also possible. While unaffixed words are typically disyllabic, there are both monosyllabic words and words longer than two syllables. The syllable types are illustrated by underlining in the following examples, where the lefthand column shows vowel-final syllables and the righthand columns shows consonant-final syllables:

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Sasak syllable types

	VOWEL-FINAL SYLLABLES			CONSONANT-FINAL SYLLABLES		
V . . .	a.ŋin	*angin*	'wind'	a.iʔ	*aiq*	'water'
CV . . .	pa.pah	*papah*	'equal'	ʤap	*jap*	'prepare'
CCV . . .	pli.ser	*pliser*	'navel'	blok	*blok*	'fool'
N̩.CV	m̩.bi.soʔ	*mbisoq*	'INTR.wash s.t.'	m̩.paʔ	*mpaq*	'fish'

The first three rows show the different onset types: onsetless, single consonant onset, consonant cluster onset respectively. The last row shows syllabic nasals preceding an open syllable (lefthand column) and a closed syllable (righthand column). The small vertical line under the initial nasal consonants in this row is to indicate that these are syllabic consonants. (There are audio recordings for the following items: /aŋin/ *angin* 'wind', /papah/ *papah* 'equal', /ʤap/ *jap* 'prepare', /mpaʔ/ *mpaq* 'fish'. For items without audio recordings, /pliser/ *pliser* 'navel' comes from fieldnotes while the other items are from Staff 1995: /aiʔ/ *aiq* 'water' (p. 7), /blok/ *blok* 'fool', /mbisoʔ/ *mbisoq* 'INTR.wash s.t.' (both p. 56).)

Although /ʔ/ does not occur in onset position, a glottal stop articulation may occur word-initially in hiatus contexts across word boundaries. The constriction may be complete, resulting in 'creaky' phonation at the juncture between vowels. Clynes (1995) implies that /h/ is not a possible onset in native words; Staff (1995) and Austin (2016) have a few /h/-initial items, e.g. [hak] *hak* 'right, human right, prerogative', [hasil] *hasil* 'hope'. However, /h/ frequently occurs in word-medial, syllable-onset position within morphemes (as in /tahan/ *tahan* 'hold on') and as a re-syllabified onset across morphological boundaries involving /h/-final words (as in /bədah-an/ *bedahan* 'piece, fragment' from /bədah/ *bedah* 'broken, smashed', no recording; Staff 1995: 44).

Syllable-initial CC sequences occur in both word-initial and word-medial positions. Syllable-initial CC sequences are typically a voiced or voiceless oral stop followed by /r/ or /l/: /graŋgraŋ/ *granggrang* 'seagrass', /tlagə/ *tlaga* 'pool', /ʧlilonŋ/ *clilong* (a traditional food), /ʧaplok/ *caplok* 'take someone else's property' (fieldnotes; no recordings). Clynes (1995:515) states that there are no 'CLVC' monosyllables, where 'L' is /r l/, however Staff (1995) includes several words of this shape; Tanashur also has several, e.g. /blek/ *blek* 'shake a tree to get something out', /griʔ/ *griq* 'fall down'. /sl/ is also a possible onset, /sluŋsluŋ/ *slungslung* 'happen' Staff (1995: 351). The phonemic status of CC onsets has yet to be determined. Many items have an alternative pronunciation with an intervening (potentially epenthetic) [ə]. This is generally the case in *s*C-initial words where C is a voiceless oral stop: /staŋ/ *stang* 'handle (e.g. on motorbike)' as [sətaŋ] and /spaŋ/ *spang* 'delicious' (Staff 1995: 354) as [səpaŋ] (fieldnotes, no recording). There are also cases where unstressed /ə/ is either devoiced or not pronounced, which can lead to onset consonant devoicing: [b̥sə.pa.kat] from /bə-səpakat/ *besepakat* 'INTR-agree'.

An excrescent vowel may also be found with the addition of word-final pronominal clitics (/-k/ '1.SG', /-m/ '2.SG', /-n/ '3.SG') to verbal or nominal stems. For vowel- and /r/-final words, the clitics may close the final syllable, as in /tau-m/ *taum* 'person-2.SG' as [ta.um], or alternatively be preceded by a short epenthetic vowel preceding the clitic, /tau-m/ [ta.u.əm] *taum*. When the verb or noun ends with a consonant, the clitics are preceded by a short epenthetic /ə/-like vowel, as in /bapaʔ-m/ [ba.pa.ʔəm] *bapaqm* 'father-2.SG'. In cases where there is an epenthetic vowel, the location of stress remains the same, that is, on the final syllable of the morphological stem (the penultimate syllable of the word) rather than on the syllable containing the clitic.

There is no phonemic vowel length contrast, but a morpheme-final /ʔ/ may be deleted when it is followed by a vowel-initial suffix, resulting in a V.V sequence: [pəŋ.gi.ta.an] from /pəŋ-gitaʔ-an/ *penggitaqan* 'CAUS-see-3.SG'.

All consonants may occur in syllable-final position except for voiced oral stops /b d g/, postalveolar affricates /ʧ ʤ/, palatal nasal stop /ɲ/, and central approximants /j w/. In the

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middle of a morpheme, CC sequences generally comprise of a nasal stop coda followed by a homorganic (voiced or voiceless) oral stop onset in the following syllable, e.g. /sampah/ *sampah* 'have breakfast' (Staff 1995: 325), /sambaŋ/ *sambang* 'visit each other'. There are also items with /l r/ beginning a morpheme-internal cluster: /talsek/ 'a pin, stick, skewer' (Staff 1995: 362), /parbel/ *parbel* 'dressing for a wound' (Austin 2003: 18). As noted in Clynes (1995), words with a reduplicated structure are not subject to these restrictions on codas: /taʔtaʔ/ *taqtaq* 'chop up' (Staff 1995: 368).

Morphemes may begin or end with a syllabic nasal; examples are given in the list below. In this list, rows show place of articulation and columns show syllabic nasals followed by voiceless (left) and voiced (right) consonants. The vertical line beneath certain nasal consonants indicates that the nasals which are syllabic. The '.' shows a syllable boundary.

Sasak syllabic nasals

m̩p	m̩.paʔ	*mpaq*	'fish'	m̩b	m̩.bah	*mbah*	'grandparent'
n̩t	n̩.tan	*ntan*	'way, manner'	n̩d	n̩.da.us	*ndaus*	'shower'
ɲ̩tɕ	ɲ̩.tɕep	*ncep*	'disappear without a trace'	ɲ̩dʑ	ɲ̩.dʑeʔ	*njeq*	'press down'
ŋ̩k	ŋ̩.kah	*ngkah*	'stop'	ŋ̩g	ŋ̩.gaʔ	*nggaq*	'only'

Syllabic nasal stops at the beginning of a word are always followed by a homorganic voiced or voiceless oral stop. Nasal+voiceless oral stop sequences occur in monomorphemic forms (/m̩paʔ/ *mpaq* 'fish'). Nasal+voiced oral stop sequences occur in both monomorphemic and polymorphemic items: /m̩bah/ *mbah* 'grandparent', and also /m̩-bau/ *mbau* 'INTR-pick.flowers', found in Staff (1995: 42). (In the above list, there is no recording for /ɲ̩tɕep/ *ncep* 'disappear without a trace', found in Austin 2016: 242.)

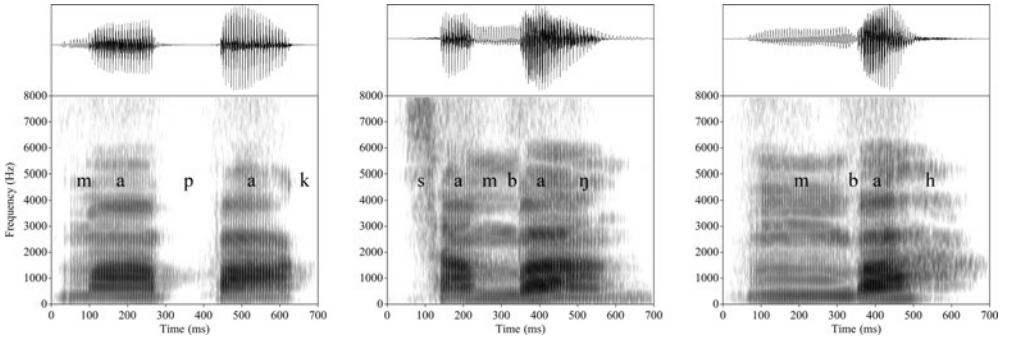

Figure 11 Waveforms and spectrograms showing differences in duration (in ms) between /m/ at the onset of a word-initial syllable (as in /ma.pak/ *mapak* (place name), left), in word-medial coda position (as in /sam.baŋ/ *sambang* 'visit each other', center), and as a word-initial, syllabic consonant (as in /m̩.bah/ [m̩bah] *mbah* 'grandparent', right).

As shown in Figure 11, there is a large difference between the durations of (i) a simple onset nasal stop (approx. 50 ms), (ii) a medial, syllable-coda nasal stop (approx. 100 ms), and (iii) a word-initial syllabic nasal stop (approx. 400 ms). In some cases, it is not clear whether monomorphemic words begin with a syllabic nasal or /ə/ followed by a coda nasal. For example, Staff (1995) gives [əm.paʔ] *empaq* 'fish' while we found [m̩.paʔ] *mpaq* 'fish', as in Austin (2016).

Stress

Stress typically falls on the final syllable (Clynes 1995, citing Thoir 1979), including word-final suffixes, and is associated with f0 peaks during the stressed vowel. Pronominal clitics

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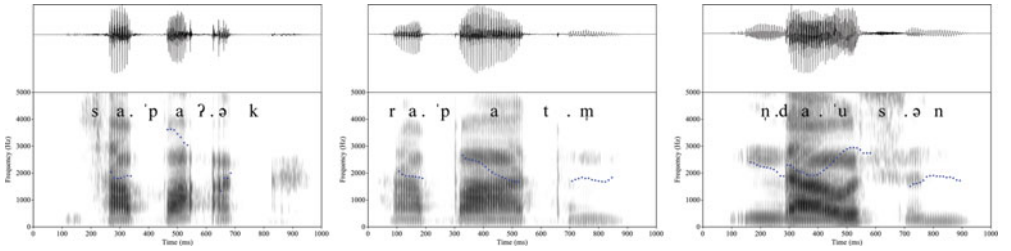

Figure 12 (Colour online) Waveform and spectrogram with overlaid f0 traces (blue/black) showing the location of stress in the cliticized words containing polysyllabic nominal or verbal stems: /sapaʔ-k/ [sapaʔək] *sapaqk* 'greet me' (left), /rapat-m/ [rapatṃ] *rapatm* 'your discussion' (center), and /ndaus-n/ [ṇdausən] *ndausn* 'his/her/its shower' (right). Stressed syllables, which are associated with peak f0, are indicated in the phonetic transcriptions at the bottom of the figure. The vertical axis indicates f0 values rather than frequency values in the spectrogram.

that form an independent syllable (when attaching to a consonant-final stem) are not stressed (Bishop 1998), as in /sapaʔ-k/ [sa.ˈpaʔ.ək] *sapaqk* 'greet me' ('greet' + 1.SG.OBJ), /rapat-m/ [ra.ˈpat.ṃ] *rapatm* 'your discussion' ('discussion' + 2.SG.POSS), and /ndaus-n/ [ṇ.da.ˈus.ən] *ndausn* 'his/her/its shower' ('shower' + 3.SG.POSS) (see Figure 12). Vowels are typically produced with more extreme positions of the tongue dorsum and lips in stressed syllables, resulting in a larger acoustic vowel space within stressed contexts (see Figure 10). Vowel duration also appears to be longer in stressed environments.

Intonation

Intonation, or phrase-level tonal contours, are beyond the scope of the data we collected. There is a detailed preliminary analysis in Bishop (1998), where intonation patterns in phrases, yes/no questions, *wh*-questions, and focus are addressed. In brief, Bishop (1998) finds evidence in Sasak for contrastive H and L phrase accents, coupled with other tones to form a rich variety of possibilities at the phrase level. For questions, Bishop (1998: 37) suggests that the primary indicator is an utterance-final high boundary tone (which Bishop notates as H*HH%), augmented by a L% or a H% boundary tone, where the L% is associated with rhetorical questions.

Illustrative passage in transcription

In Lombok, it is common to find written Sasak, for example in advertising. The writing system is transparent, with the following symbol/sound correspondences:

a	ə when word-final	*c*	tɕ	*ng*	ŋ
e	e or ə (idiosyncratic)	*j*	dʑ	*ny*	ɲ
n	ɲ before tɕ, dʑ	*y*	j	*q*	ʔ

In word-final position, there is sometimes confusion about whether to use *k* or *q* (see Figure 5 and Archangeli & Yip 2016a).

The parenthesized consonants, as in /n-(t)iup/ *niup* 'INTR-blow' and /pəŋ-gita(ʔ)-an/ *penggitaq* 'CAUS-see-3.SG' indicate a lexical sound that is not realized at the surface. The nasal prefix in /n-(t)iup/ exemplifies the Sasak version of Austronesian nasal substitution (see Blust 2004 for a survey, Austin 2013 for the morphosyntactic properties of nasal verbs in Sasak, and Archangeli et al. 2017 on the phonological and phonetic properties of nasal substitution in Sasak).

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Orthographic transcription

Jelo kance angin daye besiaq kire-kire sai kuatan. Muq terus liwat dengan kadu jaket. Jelo kance angin besepakat sai-sai tao piaq dengan nu bukak jaket ie uah menang. Muq terus angin mulai niup jangke lelah, laguq dengan nu sere antuq jaketn siq telihn. Konteq cerita angin nyerah. Muq terus jelo penggitan kance sinarn saq panas, muq langsungn bukak jaketn. Muq terus angin ngakun ntan jelo ie kuatan.

Phonemic transcription showing morpheme boundaries

/ʤəlo kaɲtɕə aŋin dajə bə-siaʔ kirə-kirə sai kuat-an || muʔ tərus liwat dəŋan kadu ʤaket || ʤəlo kaɲtɕə aŋin bə-səpakat sai-sai tao piaʔ dəŋan nu bukaʔ ʤaket | iə uah mənaŋ || muʔ tərus aŋin mulai n-(t)iup ʤaŋkə ləlah | laguʔ dəŋan nu seren antuʔ ʤaket-n siʔ təlih-n || konteʔ ʧəritə | aŋin ɲ-ərah || muʔ tərus ʤəlo pəŋ-gita-an kaɲtɕə sinar-n saʔ panas | muʔ laŋsuŋ-n bukaʔ ʤaket-n || muʔ tərus aŋin ŋ-aku-n ntan ʤəlo iə kuat-an || /

Phonetic transcription

In each triplet, line 1 repeats the transcription from above, line 2 shows a more narrow phonetic transcription of the recording, and line 3 gives a morpheme-by-morpheme gloss of the text.

ʤəlo	kaɲtɕə	aŋin	dajə	bə-siaʔ	kirə-kirə	sai	kuat-an	‖
ʤəlo	kaɲtɕə	ʔaŋin	dajɨ	bəsiaʔ	kirɨ kirɨ	sai	kuata	‖
sun	COM	wind	north	INTR-discussion	about	who	strong-CMPR	‖

muʔ	tərus	liwat	dəŋan	kadu	ʤaket	‖	ʤəlo	kaɲtɕə	aŋin	bə-səpakat
muʔ	tərus	liwa	dəŋan	kadu	ʤakɛ	‖	ʤəlo	kaɲtɕɨ	ʔaŋin	ᵬsəpakat
then	next	pass	person	use	coat	‖	sun	COM	wind	INTR-agree

sai-sai	tao	piaʔ	dəŋan	nu	bukaʔ	ʤaket	|	iə	uah
saisai	tao	piəʔ	dəŋan	nu	bukaʔ	ʤakɛt	|	iɨ	wah
whoever	can	make, do	person	that	take.off	coat	|	3.SG	PRF

mənaŋ	‖	muʔ	tərus	aŋin	mulai	n-(t)iup	ʤaŋkə	ləlah	|	laguʔ	dəŋan
məna	‖	muʔ	tərus	ʔaŋin	mulai	niup	ʤaŋkə	ləlah	|	laguʔ	dəŋan
winner	‖	then	next	wind	start	INTR-blow	until	tired	|	but	person

nu	seren	antuʔ	ʤaket-n	siʔ	təlih-n	‖	konteʔ	ʧəritə	|	aŋin
nu	seɾen	ãtuʔ	ʤakɛtən	siʔ	təlihən	‖	kɔntɛʔ	ʧəritɨ	|	ʔaŋin
that	more	hold	coat-3.SG	INS	cold-3.SG	‖	short	story	|	wind

ɲ-(s)ərah	‖	muʔ	tərus	ʤəlo	pəŋ-gita(ʔ)-an	kaɲtɕə	sinar-n	saʔ	panas
ɲəɾah	‖	muʔ	tərus	ʤəlo	pəŋgitaan	kaɲtɕə	sinan	saʔ	panas
INTR-give.up	‖	then	next	sun	CAUS-see-3.SG	COM	light-3.SG	which	hot

|	muʔ	laŋsuŋ-n	buka?	ʤaket-n	‖	muʔ	tərus	aŋin
|	muʔ	laŋsuŋən	buka?	ʤakɛtən	‖	muʔ	tərus	ʔaŋin
|	then	immediately-3.SG	take-off	coat-3.SG	‖	then	next	wind

ŋ-(k)aku-n	ntan	ʤəlo	iə	kuat-an	‖
ŋakun	ntan	ʤəlo	iə	kuata	‖
INTR-confess-3.SG	manner, way	sun	3.SG	strong-CMPR	‖

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ABBREVIATIONS

We have followed Leipzig Glossing Rules (Lehmann 1982; Croft 2003: xix–xxv).

1.SG	first person singular	COM	comitative
2.SG	second person singular	INS	instrumental
3.SG	third person singular	INTR	intransitivizer
CAUS	causative	PRF	perfect
CMPR	comparative		

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