

Vowel Harmony in Bale

A study of ATR harmony in a Surmic language
of Ethiopia

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Abstract

ATR, advanced tongue root, is a phonological feature among vowels. In many African languages vowels assimilate in their value of ATR in order to share the same value of that feature and manifest ATR harmony. ATR harmony is examined in this paper as manifested across morpheme boundaries within nouns in Bale, a Surmic language of Ethiopia. The data presented was collected at a workshop on ATR harmony held by SIL International in Mizan Teferi, Ethiopia, 2009. The vowel system in Bale displays a nine vowel inventory with a feature dominance of [+ATR] vowels which spread their feature both leftward and rightward to recessive [−ATR] vowels. The [+ATR] dominance is also present as a floating feature without any phonological material. The vowel /a/ is analysed as a neutral vowel, co-occurring with both [+ATR] and [−ATR] vowels within roots.

Keywords

Vowel harmony, African linguistics, phonology, ATR, Surmic languages, Bale, Kacipo-Balesi, nominal suffixes

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Abbreviations

ATR	Advanced Tongue Root
sg	singular
pl	plural
C	consonant
V	vowel
V ₁	first vowel position
V ₂	second vowel position
F ₁	first formant

1 Introduction¹

Vowel harmony takes place when vowels in some phonological domain obligatorily share the same value of a vowel feature (Casali 2008 p.496). ATR, advanced tongue root, is a phonological feature among vowels in many African languages. When vowels in some phonological domain undergo alternation or assimilate in order to share the same value of that feature, it is called ATR harmony. Spread of harmony often takes place within specific morphological domains e.g. a whole word, or a segment of a word, according to the dominance rules that control in what way vowels have to undergo alternation (Archangeli & Pulleyblank 2007 p.363). Languages with dominant vowel harmony divide the vowels into two harmony sets, where one set is dominant and trigger vowels of the targeted set to assimilate (p.362).

The aim of this paper is to analyse ATR harmony in a Surmic language called Bale. An initial analysis of Bale, including the vowel system, has been made by Yigezu and Dimmendaal (1998). Some rules of the ATR harmony in Bale are mentioned but the authors express that: “The nature and domain of these rules require much further research” (p.288). This paper sets out to explain the nature and domain of some of those rules as manifested across morpheme boundaries within nouns and their suffixes. There is a study done on the number classification in Bale (Dimmendaal 2000), where the number marking system is analysed. Unlike earlier studies this one aims to demonstrate; 1) the ATR harmony displayed within the plural and singular alternation and 2) the behaviour of the vowel /a/. Following an introduction to ATR harmony, including dominance, direction of harmony spreading and the behaviour of the vowel /a/ in section 2, the data and method are described in section 3. The vowel inventory and word-structure in Bale, followed by the results, will be demonstrated in section 4. The analysis of the data will be discussed in section 5 and the conclusions of the study will finally be presented in section 6.

2 Background

ATR harmony is considered an African phenomenon, as many of the languages described as having ATR harmony are found in sub-Saharan Africa (Casali 2008 p.497). There are other languages that have been reported to have at least some form of ATR harmony, but those languages may differ considerably in the way ATR harmony is displayed compared to African languages (p.505). Casali further describes that the phenomenon is best known in the Niger-Congo and Nilo-Saharan language families. Further within the Nilo-Saharan language family, the Nilotic languages are well-known for having ATR harmony but the phenomenon has also been attested in the Central Sudanic, Saharan and Surmic languages.

Bale, referred to in Ethnologue (2005 p.191) as Kacipo-Balesi (koe), is classified as a Nilo-Saharan, Eastern Sudanic (Eastern) language, belonging to the group of southwest Surmic languages.

Ethnologue also names the different dialects of Bale e.g. Balesi, Zilmamu and Kachipo, which are all

¹ I would like to give special thanks to SIL Ethiopia for letting me take part in the ATR Harmony Workshop and making it possible by giving me a ticket from the Ethiopian Airlines. Special thanks also to the informants for sharing the richness of their language with me, and to Constance Kutsch Lojenga who gave me insight into ATR harmony. I also want to thank Gerrit Dimmendaal for sharing interesting data and my supervisor Eva Lindström for assistance and support. Last, but not least thanks to God for making the impossible possible.

closely related to the Southwest Surmic languages, Didinga and Murle. Further it is described in the Ethnologue that Bale is the name of a people living on the Boma plateau in the Southern border area between Sudan and Ethiopia. The number of first language speakers of Bale is estimated in the Ethnologue to be around 14 000, of whom 4000 live within the Ethiopian border. Among neighbouring groups, mostly eastern Nilotic, the area where the Bale people live is called Kachipo and those neighbouring groups refer to the Bale people and their language by that name (Yigezu & Dimmendaal 1998 p.275). Another neighbouring group with the Southeast Surmic language Tirma, call them by the name Bale (p.276), that is also the name used in this paper (note that Yigezu and Dimmendaal 1998 spell it Baale). The informants of the data presented in this paper call themselves Suri and consider themselves as a clan within the Suri group. Suri is an ethnonym used by mainly three groups in the South-West Ethiopian area, the Tirma, Chai and Bale people (Yigezu & Dimmendaal 1998 p.277). These three groups share some cultural traditions, e.g. their women have lip plates and they make their living from raising livestock. Inter-marriages between the subgroups are not uncommon, which has resulted in families where both Bale and Tirma or Chai are spoken (p.279).

There is very little published material on Bale. This is partly because there has been confusion concerning the classification of the language and whether one has been dealing with one or several languages (Yigezu & Dimmendaal 1998 p.273). Earlier studies of the Surmic languages of Ethiopia and Sudan were carried out by Archibald and Bryan (1966), Arensen (1989), Bryan (1945) and Unseth (1988) among others. The most detailed linguistic analysis of Bale has been made by Yigezu and Dimmendaal (1998). But the ATR harmony system in Bale has only been treated briefly within that analysis. ATR vowel harmony in African languages in general is better known and described but the phenomenon within Surmic languages is less well described.

2.1 ATR and its phonetic correlates

Trask (1996 p.39) defines ATR as vowels involving a forward position of the tongue root which causes the middle and lower pharynx to be enlarged and the volume of the pharyngeal cavity to increase. The feature would therefore be better defined in terms of expansion of the pharyngeal cavity than just an advancement of the tongue root (Casali 2008 p.506). Compared with the neutral position of the tongue root, the advanced tongue root has a tighter curve in a longitudinal profile that raises the body of the tongue (Laver 1994 p.141), see Figure 1. Vowels with a less advanced position of the tongue root are also referred to as RTR, retracted tongue root, with a tongue root position that decreases the volume of the pharyngeal cavity (Trask 1996 p.39). ATR as feature has earlier been interpreted as [+tense]. Trask (1996 p.352) defines [+tense] as vowels with “greater muscular tension, more extreme movements of the vocal organs and greater subglottal air pressure than their” [-tense] counterparts, thus having a similar physical basis as for [+ATR] vowels. But there seems to be a lack of agreement on definitions (p.352).

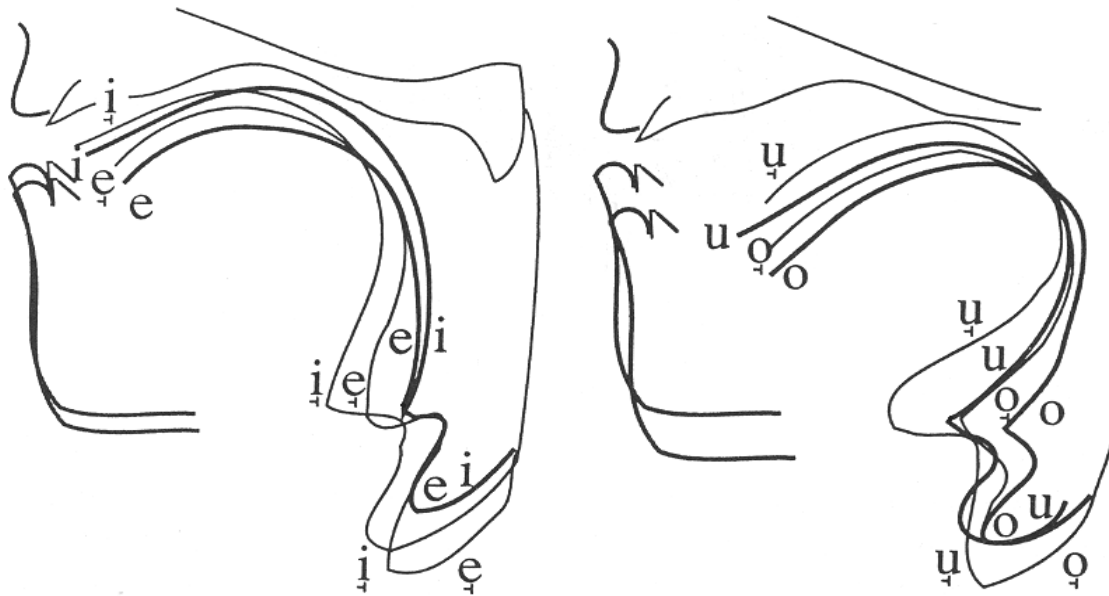


Figure 1 Sagittal sections for [+ATR], marked ₄, and [-ATR] vowels.
 From LADEFOGED. *A Course in Phonetics (with CD-ROM)*, 5E. © 2006 Heinle/Arts & Sciences, a part of Cengage Learning, Inc. Reproduced by permission.
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There is also an acoustic difference between [+ATR] vowels e.g. [i], [u], [e] and [o], and their corresponding [-ATR] vowels e.g. [ɪ], [ʊ], [ɛ] and [ɔ]. As the advancement of the tongue root tends to raise the tongue body, one of the strongest phonetic indicators of ATR is probably the change in the first formant frequency F_1 , the acoustic correlate of tongue height (Casali 2008 p.506). The [+ATR] vowels therefore have a lower F_1 than their [-ATR] counterparts. It has been reported that speakers can use either tongue height adjustment or tongue root movement with or without a change in larynx position to implement ATR contrast (Ladefoged 2006 p.224). Ladefoged describes that speakers of the West African language Akan use one of two methods in widening the pharynx: 1) they advance the tongue root, or 2) they rely only on larynx lowering. At present there is no consensus of the articulatory mechanisms involved in the vowel quality differences that facilitate the auditory distinction of ATR contrast and it is not known if the same articulatory mechanisms are at work in the same way in all languages (Casali 2008 p.511).

It has long been known that [+ATR] vowels affect the perception of vowel quality, as they tend to sound 'higher' than their [-ATR] counterparts (Casali 2008 p.508). This is caused by the intensity of formant frequency, [+ATR] vowels have more spectral energy at higher frequency levels than their [-ATR] counterparts, which makes the [+ATR] vowels perceptually sound brighter (Ladefoged 2006 appendix). ATR is sometimes treated as a kind of vowel height feature, mostly in languages where the features [high] and [low] for vowels are insufficient and the primary function of ATR is to distinguish auditory height e.g. in seven-vowel systems where the only [+ATR] vowels are also [+high] vowels (Casali 2008 p.511). In ATR harmony systems with two sets of contrastive high vowels (see section 2.2), the high [+ATR] vowels e.g. [i] have a lower F_1 than the mid [-ATR] vowels e.g. [ɛ]. In between are the high [-ATR] vowels e.g. [ɪ] and the [+ATR] mid vowels e.g. [e] that can have almost equal and overlapping values of F_1 (Casali 2008 p.508). As the auditory height for [-ATR] high vowels and

[+ATR] mid vowels can even be identical, it is made very difficult for non-native speakers to distinguish them (p.509). Attempts have been made at finding other acoustic correlates that change the voice quality of [+ATR] vowels and facilitate auditory distinction (p.510). But just as there is no consensus on the articulatory mechanisms at work in [+ATR] vowels, there is no consensus on how acoustic and auditory correlates facilitate distinction in ATR harmony systems (p.511).

2.2 Vowel inventories

There are different vowel inventories displayed within ATR harmony languages. According to the number of vowels manifested on the surface, one can divide languages into different groups. There are ten-, nine- and eight-vowel systems, two types of seven-vowel systems, of which only one has two sets of contrastive high vowels, and five-vowel systems (Casali 2008 p.499-504). A very common vowel system among Nilo-Saharan languages is the nine-vowel system, also Bale display a nine-vowel system (see section 4.1). A nine-vowel system includes five [-ATR] vowels and only four [+ATR] vowels yielding two harmony sets (Casali 2008 p.502):

(1)	[-ATR]		[+ATR]	
	ɪ	ʊ	i	u
	ɛ	ɔ	e	o
	a			

The nine-vowel system has four sets of harmonic counterparts, that only differ in their ATR value (p. 500). The two sets of [+ATR] and [-ATR] are mutually exclusive within a single morpheme (p.502). Therefore the dominant set, often the [+ATR] set, triggers the vowels of the opposite set to undergo alternation (p.500). The vowel /a/ is according to its phonetic properties characterised as a [-ATR] vowel and there are reasons to consider it a [-ATR] vowel also phonologically but in many languages the vowel /a/ behaves as a neutral vowel (see section 2.3.3). Though the vowel /a/ does not have a [+ATR] counterpart underlyingly, there are languages with a surface [+ATR] realisation of the vowel /a/, such languages are considered to have a nine-vowel system since they only have nine vowels underlyingly (Casali 2008 p.502). Though consonants normally have no effect on ATR harmony it has been reported in Nilo-Saharan languages of East Africa that semivowels [j] and [w] have made adjacent [-ATR] vowels undergo alternation to their [+ATR] counterparts (p.504).

2.3 Morphophonology

2.3.1 ATR dominance

There is an assumed division in the types of assimilation manifested within vowel harmony languages; asymmetric assimilation and symmetric assimilation (Casali 2008 p.513). Asymmetric value assimilation, also known as dominant, is manifested when segments of one ATR value make segments of opposite value undergo alternation (p.512). In other words, one feature assimilates to the other,

regardless of where in the word the feature is positioned; whether in a root or an affix. This harmony pattern is characteristic for the Nilo-Saharan languages of East Africa, it is also common within languages with two sets of contrasting high vowels e.g. nine-vowel systems (p.515). Languages that manifest dominant harmony have dominant affixes that never change their ATR value, but cause the vowels within roots to undergo alternation in order for whole words to share the same ATR value (p. 514). If the dominant value is within a suffix, that suffix will also cause any prefixes added to the root, to undergo alternation (p.517). Affixes that undergo alternation are recessive. Languages displaying dominant harmony have recessive as well as dominant affixes (p.515). [+ATR] is typically the dominant feature, that causes recessive [-ATR] vowels to undergo alternation (p.514). Though [-ATR] dominance has been attested in seven-vowel systems, with only one set of contrasting high vowels, it is rarely found in other vowel systems (p.519). The type of assimilation which is manifested in dominant harmony languages is based on phonological or featural asymmetry, that one value, regardless of its position, triggers the vowels of opposite value to assimilate (p.516). This type of harmony “is rarely found in vowel harmony systems involving features other than [ATR]” (p.514).

Systems based on symmetric assimilation manifest a type of harmony where the ATR values are treated symmetrically, affixes always assimilate to roots, this is assumed to take place regardless of ATR value (Casali 2008 p.513). This harmony pattern is referred to as ‘root-controlled’, as the ATR value of the vowels in the root never changes, and all affixes are recessive as they take the ATR value of the root (p.514). Root-controlled harmony has been suggested to be based on morphological asymmetry rather than on phonological asymmetry (p.516).

An alternative analysis, opposed to the traditional view on root-controlled harmony, has suggested that root-controlled languages can have dominant [+ATR] vowels but only positioned in roots (Casali 2008 p.517). Casali also mentions that languages with affixes assimilating to roots displaying [+ATR] root dominance may have lost their [+ATR] dominant affixes but continued to function as a dominant harmony language, with [+ATR] dominance causing [-ATR] vowels assimilate to [+ATR]. This brings forth a suggestion that dominant languages permit [+ATR] vowels to occur in both roots and affixes while the root controlled only permit [+ATR] vowels in roots (p.518). A language that has lost its [+ATR] affixes would only manifest [-ATR] vowels underlyingly in affixes “with the consequence that all affix vowels would appear to assimilate to root vowels” (p.517). In other words both root-controlled and dominant harmony display [+ATR] dominance and dominant affixes cannot occur without [+ATR] dominance (p.519). Casali further explains that it is very common that both types of assimilation, asymmetric and symmetric, co-occur, and many ATR harmony languages with two contrasting sets of high vowels manifest both root-controlled and dominant harmony, with [+ATR] vowels present in both affixes and roots. Root-controlled languages seem to have lost the contrastive [+ATR] vowels in affixes only displaying recessive [-ATR] affixes assimilating to roots (p.517).

2.3.2 Directionality

There are phonological and morphological domain restrictions which control in what direction the dominant feature may affect other vowels to assimilate (Archangeli & Pulleyblank 2007 p.363). Depending on where the dominant feature, also called trigger, is placed, the vowels to its left or right will be affected. Archangeli and Pulleyblank (2007 p.367) further explain that the root is morphologically the trigger in root-controlled harmony, causing affixes to undergo alternation, spreading its feature both leftward, to prefixes, and rightward, to suffixes. The dominant harmony languages may display bi-directional feature spreading; leftward, by dominant suffixes, and rightward, by dominant prefixes (Casali 2008 p.533). It has been suggested that there is a strong tendency among

ATR harmony languages to apply right to left spreading (p.535). In other words it would be more common that a dominant [+ATR] vowel is preceded by [-ATR] vowels than followed by [-ATR] vowels.

2.3.3 Behaviour of the vowel /a/

As mentioned in section 2.2 there are reasons to consider the vowel /a/ phonologically a [-ATR] vowel. The vowel /a/ never undergoes any change in a [-ATR] environment and affixes with both a [-ATR] and a [+ATR] form are most typically realised in their [-ATR] form, when preceded or followed by a root where /a/ is the only vowel (Casali 2008 p.529). There are some nine-vowel systems where the vowel /a/ has been attested to only co-occur with [-ATR] vowels within roots (p. 528). But Casali explains that the vowel /a/ within many nine-vowel languages behaves as a neutral vowel that can co-occur freely with both [+ATR] and [-ATR] vowels.

Though the vowel /a/ does not have a [+ATR] counterpart underlyingly in a nine-vowel system, it can be realised as an allophonic variant on the surface in a [+ATR] context (p.528). Typical surface realisations of the vowel /a/ in a [+ATR] environment is a low or mid central [+ATR] vowel e.g. [ɜ] (p.529). There are also languages, though relatively few, in which a central [+ATR] counterpart of the vowel /a/ is an independent phoneme (Kutsch Lojenga 2002 p.1). In some languages the front vowel /e/ and the back vowel /o/ have been attested as independent phoneme realisations of the vowel /a/ in a [+ATR] environment (p.2). Kutsch Lojenga further describes that there are several back vowels that have been attested as allophonic variants of the vowel /a/ e.g. [ɑ], [ʌ], [ɯ] or [ɤ]. A single language can employ different strategies regarding the vowel /a/ in a [+ATR] environment e.g. it has been attested that the vowel /a/ only alternates to its [+ATR] counterpart in suffixes and not in prefixes (p. 9). In other languages where the vowel /a/ surfaces only as [a], without undergoing any phonetic changes in a [+ATR] environment, it may be referred to as a neutral vowel but without the loss of either its phonetic or phonological ATR value (Casali 2008 p.529).

In some languages when /a/ precedes or follows a dominant vowel, it can block it from spreading its feature to vowels of opposite ATR value; in such cases the vowel /a/ behaves as ‘opaque’ (p.531). In languages where the vowel /a/ does not prevent the dominant feature from spreading, nor alternate to a [+ATR] allophonic variant itself, it is said to be ‘transparent’ (p. 532). Casali also mentions that in languages where the vowel /a/ is realised as a [+ATR] counterpart, either as an allophone or as a contrastive phoneme in a [+ATR] context, it is neither transparent nor opaque but takes part in the assimilation.

3 Data and method

From april 6 to 24, 2009, the Summer Institute of Linguistics conducted a workshop on ATR vowel harmony in three Surmic languages, Me'en, Suri and Bale, in Mizan Teferi, Ethiopia. The workshop was led by Dr. Constance Kutsch Lojenga from the University of Leiden. The data for this paper was collected during the workshop with the help of five informants: Barjenda Kejaw, Bargelical Wara, Marge Zuzurmane, Shorubala Bohe and Wokono Kibira. The five men were living in the language area and they were all native speakers of the same dialect of Bale. Two were over 50 and the others were in their 30s. In addition to Bale they also spoke Tirma and two of them knew Amaharic, one of them also spoke some English. Communication was mainly done in Amaharic, by the SIL team, or in

English through an interpreter. The informants' level of schooling differed, the two older men had never been in a school program, the others knew the fidel writing, the writing system used for Amaharic. As the Latin and IPA characters used in transcription were new to all of the informants, each informant practised reading and writing. As their awareness grew of the vowel-system in their own mother tongue they would also help in transcribing. The main goal was that all informants would participate in order to gather a good corpus of lexical items. For the collection of data they were asked to give names of items within different semantic domains e.g. tree species, animals and body parts. At the end of the three weeks the data consisted of around 300 nouns with both the singular and the plural form. For phonological analysis a corpus of minimum 1000 lexical items was aimed at but because of time limitations it was not reached.

In order to find the contrastive vowels in Bale, nouns were grouped into analogous pairs, instead of minimal pairs, which are hard to find within an amount of data as small as 300 words. The analogous pairs contained CV and CVC combinations within roots, in order to avoid the morphophonology within polymorphemic words. As it is difficult to distinguish the [-ATR] high vowels [ɪ] and [ʊ] from the [+ATR] mid vowels [e] and [o] (see section 2.1), all vowels were initially transcribed as the seven vowels; /i/, /u/, /e/, /ɛ/, /o/, /ɔ/, /a/. The nouns were grouped according to their vowels, starting out with the monosyllabic and then the disyllabic nouns, with the same vowel in both first and second vowel position, $V_1=V_2$. Each vowel group was then checked and the vowels [ɪ] and [ʊ] disambiguated and nine different vowels were distinguished. In order to examine the static vowel harmony, vowel co-occurrences and any co-occurrence restrictions within roots, disyllabic roots with combinations of two different vowels in the first and second vowel position, $V_1 \neq V_2$, were investigated. The dynamic vowel harmony, how harmony is revealed across morpheme boundaries, was studied by treating each suffix separately. Each suffix was examined in order to find its underlying form, and see whether it was dominant or recessive regarding assimilation. The ATR harmony as manifested across morpheme boundaries within nouns and their suffixes was studied in order to find any dominant value of ATR, its direction of harmony spreading and the behaviour of the vowel /a/. The singular suffixes identified were; [i], [jɪ]/[ji] and [ðɪ]/[ði]. The plural suffixes identified and analysed were; [ɛn]/[en], [ɛ]/[e], [ɔɣɛ]/[ɔɣɛ], [ði]/[di], [geði], [ɪ]/[i] and different -(C)a suffixes (where C represents different consonants).

Also two genitive suffixes: [ɔ]/[o] in the singular and [u] in the plural, were determined. There may be transcriptional errors in the data presented in this paper, since all transcription is subjective and because consonants were not the focus for this paper, they were not checked in the same ways as vowels. Contrastive vowel length and tone were attested but had to be disregarded because of time limitations and will therefore not be treated in this paper. An initial analysis on vowel length, tone and the consonants in Bale has been made by Yigezu and Dimmendaal (1998). In order to check the vowels and understand the phonetic differences in vowel quality and tone within [+ATR] and [-ATR] vowels one would need to analyse the data digitally, that is left for further research.

4 Results

The following sections will describe the ATR harmony in Bale as manifested across morpheme boundaries within nouns and various nominal suffixes. No other word classes or affixes will be considered. Following a general background of the phonological structure in Bale, each suffix attested

in the data will be examined separately. For each suffix the different variant forms and the direction of harmony spreading will be described. The behaviour of the vowel /a/ will also be looked at.

4.1 The vowel system in Bale

Bale has a nine-vowel inventory with two harmony sets, one [+ATR] and one [-ATR], that are mutually exclusive within roots. Because the vowel /a/ only surfaces as [a] in a [+ATR] environment, without undergoing any change, and co-occurs freely with [+ATR] vowels within roots (see example 4), it is treated as a neutral vowel, though its phonetic properties are [-ATR].

(2) Vowel inventory in Bale

	[-ATR]			[+ATR]		
	front	back	central	front	back	
high	ɪ	ʊ		high	i	u
mid	ɛ	ɔ		mid	e	o
low			a	low		

Below are two examples of each contrasting vowel. The words are monomorphemic nouns in the singular, except /kɪɖɪkɪɖɪ/ which is an adverb in reduplicated form. Within each word, both first and second vowel position contain one and the same vowel, $V_1=V_2$:

(3)	/i/	sini	'cup'	kiɖikiɖi	'armpit'
	/ɪ/	sɪnɪ	'heart'	kɪɖɪkɪɖɪ	'slowly slowly' (adv)
	/e/	kelle	'rabbit'	tegere	'hip'
	/ɛ/	mɛllɛ	'ax'	bɛlbɛl	'butterfly'
	/a/	kaga	'baboon'	haha	'hut'
	/ɔ/	kɔɖɔ	'cowbell'	ɔŋɔl	'elephant'
	/o/	oton	'horn'	koko	'grandmother'
	/ʊ/	tʊtʊ	'wide gate'	ʊðʊ	'mouth'
	/u/	kuttul	'mountain'	lumu	'lemon'

Between the two harmony sets; [-ATR] and [+ATR], no co-occurrence is possible. But beyond ATR value, the static vowel harmony within roots display no co-occurrence restrictions, the vowels co-occur freely within each set. The combinations of $V_1 \neq V_2$ which were not found; [-ATR] $\epsilon_{-}\upsilon$, $\epsilon_{-}\text{ɔ}$ and $\upsilon_{-}\text{ɔ}$ and [+ATR] $u_{+}\text{o}$, may be due to the small amount of data. The vowel /a/ is manifested as a neutral

vowel regarding static vowel harmony. It can cooccur freely in both [-ATR] and [+ATR] roots in both first, V₁, and second, V₂, vowel position. The following examples are all in the plural.

(4)	V ₁		V ₂	
[+ATR]				
/i/	katila	'type of cereal'	tinafa	'girlfriend'
/u/	gawula	'shoulder'	kulda	'worm'
/e/	ɲasemuɟa	'oil treatment'	deelaɲa	'local war'
/o/	baðo	'root'	doma	'earring'
[-ATR]				
/ɪ/	ɟaɾɪ	'leopard'	mɪmma	'bee'
/ʊ/	tawʊɲa	'sore'	ʊɾjaɲɛ	'python'
/ɛ/	kale	'bird'	ɾɛɲga	'fly in water area'
/ɔ/	tagɔɪ	'giraff'	ɲollaɟa	'gums'

4.2 Word structure

4.2.1 Syllable structure

The syllable structure within nouns in Bale consists of open and closed syllables with both vowel initial and consonant initial syllables. The basic syllable types within nouns are:



The syllables occur in reduplicated forms or combinations in disyllabic and polysyllabic nouns. All vowels function in both syllable types. Geminated consonants and clusters occur intervocally, only simple consonants are found in word-initial and word-final position. Word-finally there is a preference for open syllables, within the data only 50 singular forms and 90 plural forms end in a closed syllable.

Among those forms only some consonants have been attested in the word-final position; /s/ /n/, /l/, /r/, /l m/, /ŋ/ and /ɲ/. Monomorphemic nouns can consist of a minimum of one syllable, (C)V. The following mono- and disyllabic nouns are monomorphemic:

(5)	Monosyllabic nouns:	Disyllabic nouns:
	V e 'man'	VCV ole 'rooster'

VC	εs	‘goat’	VCVC	edin	‘meat’
CV	go	‘day’	VCCV	alga	‘bed’
CVC	bur	‘ashes’	VCCVC	εgger	‘bush bug’
			CVCV	bolu	‘back of the head’
			CVCCV	borto	‘tree sp.’
			CVCCVC	buŋkur	‘cup’

4.2.2 Number

The number-marking systems within the Nilo-Saharan languages tend to be very rich and display three different types of number marking (Corbett 2000 p.156).

type A:		base	+	plural suffix
type B:	singular suffix	+	base	
type C:	singular suffix	+	plural suffix	

The three types of number marking are also found in Bale and both the singular and the plural can be overtly marked. Dimmendaal (2000 p.184) names the three number-marking types; A) plural marking, B) singulative and C) replacement. Nouns with plural marking have a singular base, while the nouns with singulative marking have a plural base. Nouns which replace the markings in the singular and the plural, do not occur in a morphologically simple base form.

A	Plural marking:		lalaŋ	+	lalaŋ-ε	‘big bracelet’
B	Singulative:	kereja-gi	+	kereja		‘spiral’
C	Replacement:	mokko-ji	+	mokko-ja		‘tree’

4.3 Nominal suffixes

There are many different suffixes to indicate number in Bale. To begin with the singular suffixes; [i], [ðɪ]/[ði], [gi] and [jɪ]/[ji] will be examined. Followed by the plural suffixes; [ɛŋ]/[en], [ɛ]/[e], [ɔgɛ]/[ɔgɛ], [ði]/[di], [gɛði], [ɪ]/[i] and different –(C)a suffixes. Also the two genitive suffixes [ɔ]/[o] for singular and [u] for the plural will be looked at. For each suffix the behaviour of the vowel /a/ will also be examined.

4.3.1 Singular suffixes

The singular suffixes in Bale all contain the vowel [i] or [ɪ]. Around 60 nouns take the most productive singular suffix [i]. This singular suffix is only manifested in one form, [+ATR]. When the suffix is preceded by a root with [–ATR] vowels (6a-d), it triggers the root vowels to assimilate and become [+ATR], thus displaying a dominant suffix with harmony spreading from right to left. The

[+ATR] feature spreads even if the vowel /a/ occurs in between the suffix and the [-ATR] vowel in the root (6b). The suffix is in most cases preceded by a closed syllable (6b,c,e) and any final root vowel is deleted (6b,f,g). In other cases the final root vowel may have merged with the suffix (6a). But when the suffix follows an open syllable (6d,h) the suffix is realised in its variant form [ni]. The nouns in the following example are grouped according to the ATR value of the unaffixed stem, in these cases the plural.

(6)		[-ATR]			[+ATR]	
a.	sg.	oŋ-i	'ribs'	e.	sg. markiriŋ-i	'vegetable'
	pl.	oŋɪ			pl. markiriŋ	
b.	sg.	kuɖar-i	'boyfriend'	f.	sg. ɖorron-i	'hartebeest'
	pl.	kuɖarɔ			pl. ɖorronɔ	
c.	sg.	eker-i	'bed bug'	g.	sg. sigg-i	'bracelet'
	pl.	ɛkɛɾ			pl. siga	
d.	sg.	ruʃe-ni	'skin'	h.	sg. kulda-ni	'worm'
	pl.	ruʃɛ			pl. kulda	

A smaller number of nouns take a recessive singular suffix which has two forms; one [-ATR] [jɪ] form and its counterpart [+ATR] form [ji]. The latter only appears after [+ATR] root vowels. When the vowel /a/ comes in between the suffix and another root vowel, the other root vowel still controls what form the suffix takes (7b,e). Where the vowel /a/ is the only root vowel the suffix is realised in its [-ATR] form (7c).

(7)		[-ATR]			[+ATR]	
a.	sg.	ɖuma-jɪ	'earring'	d.	sg. baɖo-ji	'root crops'
	pl.	ɖuma			pl. baɖo	
b.	sg.	ɪmma-jɪ	'hair'	e.	sg. ʃita-ji	'cabbage'
	pl.	ɪmma			pl. ʃita	
c.	sg.	bawra-jɪ	'cassava'	f.	sg. bogu-ji	'coffee'
	pl.	bawra			pl. bogu	

A handful of nouns have been attested taking another recessive singular suffix with the [–ATR] form, [ðɪ], and its [+ATR] counterpart form [ði]. The latter is realised when following [+ATR] root vowels (8e,f). The final root vowel may be replaced as the suffix is added to the root (8e), in other cases the root remains unchanged (8b,c). In two cases the singular suffix is replaced with another suffix in the plural (8a,f). In roots where the vowel /a/ is the only vowel, the suffix is often realised in its [–ATR] form (8c) except in one case where the [+ATR] form has been attested (8f). The following examples are grouped according to their ATR value in the singular.

(8)	[–ATR]		[+ATR]				
a.	sg.	mɛ-ðɪ	‘knee cap’	d.	sg.	ʃoʒa-ði	‘Guinea fowl’
	pl.	mɛttɛn			pl.	ʃoʒoʒa	
b.	sg.	ɪŋa-ðɪ	‘louse’	e.	sg.	ʃɪnno-ði	‘cabbage’
	pl.	ɪŋa			pl.	ʃɪnna	
c.	sg.	babaja-ðɪ	‘papaya’	f.	sg.	nagga-ði	‘merchant’
	pl.	babaja			pl.	naggatɛn	

There is one case where there is a [+ATR] [ði] displayed in the singular, making [–ATR] vowels undergo alternation into [+ATR]. This case could not display the recessive suffix [ðɪ]/[ði] as the root vowels assimilate to the suffix. But whether it is a variant form of another suffix e.g. the dominant suffix [i], or not has not been determined.

(9)	a.	sg.	oʃo-ði	‘mushroom’
		pl.	ɔʃo	

A handful of nouns have been attested taking a suffix [gɪ], only manifested in a [+ATR] form. Only one noun displays a [–ATR] form which is replaced with a [+ATR] in the singular (10a). That case also has an alternate plural form, where the singular suffix is replaced with a plural suffix, where the root does not change value of ATR. All other nouns have a [+ATR] unaffixed stem in the plural (10b-d). Also a root where the vowel /a/ is the only vowel display this [+ATR] suffix (10b). The number of nouns displaying this suffix is too small to be able to determine whether it is an independent suffix or an allomorph of another suffix e.g. [i].

(10)	a.	sg.	tɪrno-gɪ	‘gums’	c.	sg.	kofo-gɪ	‘termite’
		pl.	tɪrɪnɛn /tɪrnoʒa			pl.	kofo	

b.	sg.	halla-gi	‘finger’	d.	sg.	lijo-gi	‘mosquito’
	pl.	halla			pl.	lijo	

4.3.2 Plural suffixes

A very productive plural suffix is the [ɛn]/[en]. It is a recessive suffix with two forms, one [–ATR] form and its counterpart form [+ATR]. The latter is realised when the preceding root-vowels are [+ATR]. Around 70 nouns take the [ɛn] form and around 20 nouns take the [en] in the plural. The suffix [ɛn]/[en] follows closed syllables in most cases and any preceding root final vowel is deleted (11a,b,e,d). When following an open syllable the plural suffix [ɛn]/[en] is realised as two variant forms: [ɲɛn] (11c,d) and its counterpart [ɲen] (11g,h), where the latter appears when preceded by a [+ATR] vowel. Some examples (11c,d) display a [+ATR] singular form which make the plural suffix look like a [–ATR] dominant suffix. Instead these examples manifest a singular form that has been changed by a [+ATR] floating feature (see section 4.3.3). The examples are grouped according to the ATR value of the plural.

(11)		[–ATR]		[+ATR]			
a.	sg.	ɲɔɾɲɔ	‘roasted cord’	e.	sg.	okondu	‘pumpkin’
	pl.	ɲɔɾɲ-ɛn			pl.	okond-en	
b.	sg.	dɔlmɛ	‘frog’	f.	sg.	kolifi	‘spoon’
	pl.	dɔlm-ɛn			pl.	kolif-en	
c.	sg.	ʃargi	‘clothes’	g.	sg.	olli	‘sugar cane’
	pl.	ʃargɪ-ɲɛn			pl.	olli-ɲen	
d.	sg.	horo	‘tempel’	h.	sg.	muzu	‘banana’
	pl.	hɔɾɔ-ɲɛn			pl.	muzu-ɲen	

A number of nouns display plural forms where the vowel /a/ is the only preceding vowel. The nouns where the vowel /a/ is the only root vowel in both the singular and the plural manifest the suffix in its [–ATR] form [ɛn] and its variant form [ɲɛn] (12a,b). All nouns that take the [+ATR] form [en] display a [+ATR] vowel in the singular (12d-f). The nouns in 12c and f display the same vowels in the singular but different forms of the suffix in the plural. The following examples are grouped according to their ATR value in the plural:

(12)		[–ATR]		[+ATR]
------	--	--------	--	--------

a.	sg.	saballa	'shoulder'	d.	sg.	gaati	'wood'
	pl.	saball-εn			pl.	gaat-en	
b.	sg.	hara	'road'	e.	sg.	nanni	'blacksmith'
	pl.	hara-ηεn			pl.	nann-en	
c.	sg.	gangu	'path'	f.	sg.	dambu	'tobacco'
	pl.	gangu-εn			pl.	damb-en	

In several cases consonant alternations take place in the plural formation with the suffix [εn]. In some cases the consonant change from voiced to voiceless (13a,b), some cases display consonant gemination (13c), or a consonant is inserted before the suffix (13e,f) and the preceding vowel deleted (13d), in other cases there is a change in the place (13h) or manner (13g) of articulation. Also among these cases the [+ATR] counterpart form [en] is manifested when preceded by a [+ATR] root (13h). The examples (13a-e) that display a [+ATR] singular form and a [-ATR] plural, manifest a singular form that has been changed by a [+ATR] floating feature (see section 4.3.3).

(13)	a.	sg.	beeḏa	'blood'	e.	sg.	jo	'excrement'
		pl.	bε-t-εn			pl.	jɔ-ḏ-εn	
	b.	sg.	dogun	'bread'	f.	sg.	υηa	'a day for rest'
		pl.	dɔ-k-εn			pl.	υηa-t-εn	
	c.	sg.	bolu	'back of the head'	g.	sg.	ηɔs	'wind'
		pl.	bɔ-ll-εn			pl.	ηɔ-t-εn	
	d.	sg.	ira	'milk'	h.	sg.	guf	'ape'
		pl.	ir-t-εn			pl.	gu-j-en	

The plural suffix [ε]/[e] is another recessive suffix that harmonises with the ATR value of the root, and therefore has two forms: one [-ATR] form [ε] and its counterpart form [e], which is manifested when the preceding root vowels are [+ATR]. When the root final syllable is open the suffix is realised in its variant form, [jε] (14d), and its counterpart [je] (14j). In other cases the consonant /g/ is visible before the suffix [ε]/[e] (14e). But the same nouns also display the consonant /g/ in the singular, when another suffix is added to the root, and reveal that the consonant rather belongs to the root than to the plural suffix (see example 33). When the suffix is preceded by a root where the vowel /a/ is the only root vowel, it takes the [-ATR] form [ε] (14c) and its variant [jε] (14d). The nouns in following example are grouped according to their ATR value in the plural:

(14)	[-ATR]		[+ATR]				
a.	sg.	bɛlbɛl	'butterfly'	f.	sg.	siggir	'donkey'
	pl.	bɛlbɛl-ɛ			pl.	siggir-e	
b.	sg.	ʊrjaŋ	'python'	g.	sg.	semun	'reed buck'
	pl.	ʊrjaŋ-ɛ			pl.	semun-e	
c.	sg.	lalaŋ	'bracelet'	h.	sg.	buŋkur	'cup'
	pl.	lalaŋ-ɛ			pl.	buŋkur-e	
d.	sg.	baŋka	'machete'	i.	sg.	ulugi	fish
	pl.	baŋka-je			pl.	ulug-e	
e.	sg.	joɔ	'oryx'	j.	sg.	koko	'grandmother'
	pl.	joɔg-ɛ			pl.	koko-je	

In two cases where the vowel /a/ comes in between the [+ATR] root vowels and the plural suffix [ɛ]/[e], the suffix is realised in its [-ATR] form. In other words the vowel /a/ blocks [+ATR] root vowels from spreading from the left to the right.

(15)	a.	sg.	kijaŋ	'crocodile'	b.	sg.	kukuba	'clothing'
		pl.	kijaŋ-ɛ			pl.	kukuba-je	

Many kinship terms in Bale follow a different system of plural suffixation, taking a plural suffix [ɔɣɛ]/[ɔge]. The suffix was attested both with an implosive /ɣ/ (16a,b) and with a plosive /g/ (16c,d). Because it is a vowel-initial suffix it is preceded by a closed syllable. Any final root vowel is either deleted (16a,c) or a consonant is inserted preceding the suffix (16d). In one case the preceding root consonant alternates in both manner and place of articulation (16b). The [ɔɣɛ]/[ɔge] suffix was only attested in a [+ATR] form [oge] in one case; in the word for 'mother' (16f), but with only one form, unspecified concerning number. Note that not all kinship terms take this suffix in the plural (14j, 16g,h, 22c, 24g).

(16)	a.	sg.	ɣɔðɔne	'brother'	e.	sg.	baba	'father'
		pl.	ɣɔðɔn-ɔɣɛ			pl.	maðɔɪ-gɛ	

b.	sg.	arðɛnɛ	'son in law'	f.	sg. / pl..	mad̩z̩id̩z̩-oge	'mother'
	pl.	arðɛ-ð-ɔɣɛ					
c.	sg.	ɲɔnɛ	'sister'	g.	sg.	matigo	'mother'
	pl.	ɲɔn-ɔɣɛ			pl.	matigoʃa	
d.	sg.	d̩z̩id̩z̩i	'grandfather'	h.	sg.	jaja	'mother'
	pl.	d̩z̩id̩z̩i-n-ɔɣɛ			pl.	jajaja	

A small number of nouns were attested taking a plural suffix [ɪ]/[i]. This suffix too alternates with the ATR value of the preceding root and therefore has two forms; one [-ATR] [ɪ] and one counterpart [+ATR] form [i], which is realised when following [+ATR] root vowels. Because the suffix consist of a single vowel, the final root vowel is in some cases deleted (17a) only one case display a final consonant in the singular which is deleted in the plural (17b). In other cases the suffix follows open syllables (17c,f-h). Nouns where /a/ is the only root vowel take the [-ATR] form [ɪ] (17c). The following examples are grouped according their ATR value in the plural:

(17)		[-ATR]			[+ATR]		
a.	sg.	ɯrsa	'dog'	e.	sg.	rum	'clothes'
	pl.	ɯrs-ɪ			pl.	rum-i	
b.	sg.	tagɔn	'giraff'	f.	sg.	dunnu	'water buck'
	pl.	tagɔ-ɪ			pl.	dune-i	
c.	sg.	ʃammɛn	'hartebeest'	g.	sg.	luʃa	'weapon'
	pl.	ʃammɛ-ɪ			pl.	luʃe-i	
d.	sg.	ʃar	'leopard'	h.	sg.	kura	'ball'
	pl.	ʃar-ɪ			pl.	kure-i	

Only two nouns display an allomorph to the suffix [ɪ]/[i], realised as [jɪ]. This allomorph has only been attested in its [-ATR] form preceded by open syllables. Both nouns in the following example end in /a/. Within the [+ATR] root (18b) the vowel /a/ blocks the root vowels from spreading their feature, from the left to the right, to the recessive plural suffix.

(18)	a.	sg.	kuka	'snake'	b.	sg.	dugwa	'umbrella'
------	----	-----	------	---------	----	-----	-------	------------

pl. kuka-jɪ

pl. duguwa-jɪ

There is also a small number of nouns attested where the suffix [ɪ] is preceded by a consonant -C-ɪ. When these roots combine with other suffixes, the same consonants appear in the singular too, demonstrating that they are root final consonants rather than variants of the suffix [ɪ] (see example 33). Again nouns where the vowel /a/ is the only root vowel take the [-ATR] form [ɪ] (19c).

- | | | | | | | | | |
|------|----|-----|----------|-----------|----|-----|--------|----------|
| (19) | a. | sg. | κεδε | 'gourd' | c. | sg. | αγα | 'tongue' |
| | | pl. | κεδεm-ɪ | | | pl. | αγαð-ɪ | |
| | b. | sg. | ξερε | 'leather' | | | | |
| | | pl. | ξερεmm-ɪ | | | | | |

The plural suffix [ði]/[di] has only a [+ATR] form. When preceded by a [-ATR] root it causes the vowels to assimilate and become [+ATR] (20a-c), thus displaying [+ATR] dominance spreading from right to left. When the suffix is preceded by an open syllable (20b,c,f) it is realised as [ði]. The suffix is realised as [di] when preceded by a closed syllable, and any final root vowel is deleted (20a,d,e) also the preceding consonant can alternate (20a,d). Only a small number of nouns were attested taking this suffix whereof all are body parts, but not all body parts take this suffix. The nouns in the following example are grouped according to their ATR value in the singular.

- | | | | | | | | | |
|------|----|-----|---------|-----------|----|-----|--------|------------|
| (20) | | | [-ATR] | | | | [+ATR] | |
| | a. | sg. | κεηα | 'stomach' | d. | sg. | ηυμα | 'forehead' |
| | | pl. | ken-di | | | pl. | ηun-di | |
| | b. | sg. | ιχ | 'chest' | e. | sg. | κυλα | 'tail' |
| | | pl. | ιχθ-ði | | | pl. | κυλ-di | |
| | c. | sg. | σινι | 'heart' | f. | sg. | ιηα | 'neck' |
| | | pl. | sini-ði | | | pl. | ιηα-ði | |

Two nouns display a suffix [geði], only manifested in a [+ATR] form. Both nouns display [-ATR] root vowels assimilating to the [+ATR] vowels of the suffix, as the harmony spreads from the right to the left. This suffix could be a variant of [ði]/[di] but because of the small number of nouns attested taking this suffix they are treated as two different suffixes.

(21)	a.	sg.	ʊðʊ	‘mouth’	b.	sg.	tʊtʊ	‘wide gate or door’
		pl.	udu-geði			pl.	tutu-geði	

Close to a 100 nouns display the suffix form $-(C)a$, the vowel /a/ in combination with different consonants. Since the vowel /a/ can co-occur with both [+ATR] and [-ATR] roots without undergoing any changes phonetically or phonologically, (see section 4.1), all the different $-(C)a$ suffixes are neutral regarding ATR value. Almost 40 nouns take the plural suffix [ʃa]. It is in most cases preceded by an open syllable (22a-c,e,g) but can be preceded by a closed (22f). It is in few cases realised as [ɛʃa] (22d) or the [+ATR] counterpart form [eʃa] (22h).

(22)		[-ATR]		[+ATR]			
a.	sg.	ʊlumɛ	‘ostrich’	e.	sg.	tegere	‘hip’
	pl.	ʊlumɛ-ʃa			pl.	tegere-ʃa	
b.	sg.	tɪlɔb	‘tear’	f.	sg.	kori	‘duiker’
	pl.	tɪlɔb-ʃa			pl.	kor-ʃa	
c.	sg.	ŋawun	‘niece, nephew’	g.	sg.	kotokoto	‘small fish’
	pl.	ŋau-ʃa			pl.	koto-ʃa	
d.	sg.	ɔ̄ʒaman	‘leg ornament’	h.	sg.	kidikidi	‘armpit’
	pl.	ɔ̄ʒaman-ɛʃa			pl.	kidikid-eʃa	

Other nouns take a suffix [ŋa] in plural. This suffix has been attested preceded by both an open (23a,c) or a closed syllable (23b,d).

(23)		[-ATR]		[+ATR]			
a.	sg.	kɪdʊ	‘river’	c.	sg.	ole	‘rooster’
	pl.	kɪdʊ-ŋa			pl.	ole-ŋa	
b.	sg.	ɔ̄r	‘mud’	d.	sg.	kuttul	‘mountain’
	pl.	ɔ̄r-ŋa			pl.	kuttul-ŋa	

Other variants of $-(C)a$ are only attested within one or two nouns and it is therefore not determined whether they display different suffixes or variants of the same. In some cases only the vowel /a/ is added in the plural (24d), and sometimes replaces the final root vowel (24h). There can also be a

change in the manner and place of articulation of the preceding consonant (24c). Three nouns (24b,e,f) display a consonant also in singular as the genitive suffix is added to the root see example (example 33).

(24)		[−ATR]		[+ATR]	
a.	sg.	kala	‘calf’	e. sg. ɲamu	‘leaf’
	pl.	kala-ta		pl. ɲamu-ta	
b.	sg.	mɛllɛ	‘axe’	f. sg. e	‘man’
	pl.	mɛllɛ-ka		pl. e-ɔ̃a	
c.	sg.	ɛs	‘goat’	g. sg. malu	‘uncle’
	pl.	ɛj-a		pl. malu-ɠa	
d.	sg.	ɛggɛr	‘bush bug’	h. sg. talamu	‘columbus monkey’
	pl.	ɛggɛr-a		pl. talam-a	

4.3.3 Other types of number marking

As seen in some of the preceding examples there are nouns with different ATR values in the singular and in the plural. Some nouns display a dominant suffix in the singular (cf. 6a-d) or in the plural (cf. 20a-c) causing the change of ATR value. But there are also nouns that manifest a [+ATR] singular and [−ATR] plural without displaying any dominant suffix causing the change (cf. 11c,d, 12c, 13a-e, 16d). And in addition to these around 40 nouns that take a [−ATR] plural form display a [+ATR] singular. Most of those nouns take a recessive suffix in the plural i.e. [ɛŋ]/[ɛn] and [ɛ]/[e] with one [−ATR] and one [+ATR] form. At first sight the [−ATR] plural suffixes i.e. [ɛŋ] and [ɛ] look dominant, as they would have changed a [+ATR] root into [−ATR] in the plural (cf. 11c,d, 12c, 13a-e, 25a-g). This cannot be the case, since not all [+ATR] singular forms are turned into [−ATR] in the plural (cf. 11e-h, 13h). As the same suffix cannot be considered both recessive and dominant, one must assume that the cases with a [+ATR] singular and a [−ATR] plural form are the result of morphophonology, having a [+ATR] floating feature, without any phonological material, to mark the singular. Also nouns without a suffix in the plural (25j) or with a neutral suffix (25i) display this [+ATR] floating feature as a singular marker. The [+ATR] floating feature spreads even if the [−ATR] root contain the vowel /a/ as the final root vowel (25c,d), displaying the vowel /a/ as transparent.

(25)		[+ATR] Floating feature as singular marker	
a.	sg.	irfe	‘bow’
	pl.	ɪrʃ-ɛn	
f.	sg.	ɲolo	‘moon’
	pl.	ɲolog-ɛ	

b.	sg.	baḏ̄z̄ur	'gourd split in two'	g.	sg.	itigo	'zebra'
	pl.	baḏ̄z̄ur-ɛn			pl.	itigo-jɛ	
c.	sg.	jira	'upper arm'	h.	sg.	leeḏe	'honey'
	pl.	jiɾ-ɛn			pl.	lɛtt-a	
d.	sg.	sira	'eland'	i.	sg.	go	'fire'
	pl.	sira-ɲɛn			pl.	go-ɲa	
e.	sg.	ɗokkol	'jackal'	j.	sg.	so	'leg'
	pl.	ɗokkol-ɛ			pl.	sɔ	

Other nouns that do not display either singular or plural suffixes may just add or alternate in a vowel (26d,f) or alternate in a consonant (26a), other nouns add a phoneme (26b,c) or replace a phoneme (26e);

(26)		[-ATR]		[+ATR]			
a.	sg.	keḏa	'tree sp.'	d.	sg.	orru	'child'
	pl.	kena			pl.	orro	
b.	sg.	kɔr	'sun'	e.	sg.	taɲa	'cow'
	pl.	kɔɲɔ			pl.	tina	
c.	sg.	ɔl	'village'	f.	sg.	was	'day'
	pl.	olyo			pl.	waso	

Some nouns appear to have almost identical forms like homophones, but may differ in tone (27a,b), or vowel length (27c) which have not been investigated.

(27)	a.	tina	'girlfriend' (sg)	c.	ɟammen	'hartebeast' (sg)
		tina	'cow' (pl)		ɟamɛn	'tin can' (sg)
	b.	sira	'eland' (sg)			
		sira	'waist band' (sg)			

Many nouns have been attested having different plural forms, often with the suffix [a] added to the singular form (28b-d).

- | | | | | | | | | |
|------|----|-----|----------------|---------|----|-----|-----------------|--------------------|
| (28) | a. | sg. | ɲawun | 'niece' | c. | sg. | kerʃi | 'udder' |
| | | pl. | ɲawu / ɲawuʃa | | | pl. | κεεε / kerʃiʃa | |
| | b. | sg. | kura | 'ball' | d. | sg. | ogolo | 'hook for fishing' |
| | | pl. | kurei / kurafa | | | pl. | ɔɔɔɛn / ogoloʃa | |

There is also a group of mass nouns (29a) and other nouns without any number marking (29b):

- | | | | | | | |
|------|----|-----|---------|----|------|-----------|
| (29) | a. | maa | 'water' | b. | εδευ | 'quarrel' |
|------|----|-----|---------|----|------|-----------|

Other nouns are combined with another word when forming the plural:

- | | | | | | | | | |
|------|----|-----|-----------|---------------|----|-----|----------|---------|
| (30) | a. | sg. | ɲaje | 'wife, woman' | c. | sg. | aʃalle | 'peace' |
| | | pl. | eza ɲaje | | | pl. | ɪɛ ʃalle | |
| | b. | sg. | maɖʒɛ | 'man' | | | | |
| | | pl. | eza maɖʒɛ | | | | | |

4.3.4 Genitive suffixes

Not only plural and singular suffixes were found in Bale but also two genitive suffixes. The genitive suffix taken by nouns in the singular is recessive. It has one [-ATR] form [ɔ] and a counterpart form [+ATR] [o], which is realised when following [+ATR] root vowels. It is sometimes realised as [jɔ] and its counterpart [jo] (31b,e) when following an open syllable, but not always (31c). The genitive suffix for the plural only displays one [+ATR] form, [u]. When the genitive suffix for the plural is preceded by a [-ATR] root (31a-c), the suffix causes the root vowels to assimilate and become [+ATR], thus displaying a dominant suffix spreading its [+ATR] feature from the right to the left. The plural genitive marker is sometimes realised as [nu] (31d,f) when following an open syllable, but not always (31e). The nouns in the example are grouped according their ATR value in the singular.

- | | | | | | | | | |
|------|----|-----|-----------|---------|----|-----|----------|----------|
| (31) | | | [-ATR] | | | | [+ATR] | |
| | a. | sg. | ɖɔr-ɔ | 'mud's' | d. | sg. | bur-o | 'ashe's' |
| | | pl. | ɖɔrɔɲɔg-u | | | pl. | burɲa-nu | |

b.	sg.	saballa-jo	'shoulder's'	e.	sg.	kugommi-jo	'coco nut's'
	pl.	saballen-u			pl.	kugummo-u	
c.	sg.	tɪla-ɔ	'porridge's'	f.	sg.	kellej-o	'rabbits's'
	pl.	tilen-u			pl.	kelleja-nu	

Roots where the vowel /a/ is the only vowel take the [-ATR] form of the genitive suffix in singular (32a). Where the vowel /a/ is not the only root vowel but comes in between any [+ATR] root vowel and the recessive suffix, the suffix takes a [-ATR] form (32d-f), displaying the vowel /a/ blocking [+ATR] feature spreading from the left to the right. When the vowel /a/ is present in the plural form, often as a plural suffix, and thus comes in between the dominant genitive suffix [u] and the [-ATR] root vowels, it blocks the [+ATR] dominant genitive suffix [u] from spreading its feature to any [-ATR] root vowels (32a-c), from the right to the left. The following nouns are grouped according to their ATR value in the singular unaffixed stem.

(32)			[-ATR]				[+ATR]
a.	sg.	laŋgara-jo	'wooden spatula's'	d.	sg.	kijaŋ-ɔ	'crocodile's'
	pl.	laŋgara-ja-nu			pl.	kijaŋ-eð-u	
b.	sg.	ɔŋɔl-ɔ	'elephant's'	e.	sg.	bura-ɔ	'egg's'
	pl.	ɔŋɔla-nu			pl.	bura-u	
c.	sg.	dagʊɛ-jo	'waist's'	f.	sg.	ɔeela-ɔ	'local war's'
	pl.	dagʊɛ-ja-nu			pl.	ɔeela-ja-nu	

In the suffixes examined through the preceding sections, there have been some nouns that manifest a consonant as a suffix is added to the root (cf. 14e, 19a-c, 24b,c,f, 25f). The following example shows the same nouns with the genitive suffixes added to the singular and the plural. Showing that the same consonants which seem to be 'inserted' before the plural suffix rather belong to the root, as also the singular display the same consonant when the genitive suffix follows.

(33)	a.	sg.	ŋolog-o	'moon's'	e.	sg.	mɛllɛg-ɔ	'ax's'
		pl.	ŋɔlɔg-ɛ-ðenu			pl.	mɛllɛka-nu	
	b.	sg.	ŋɔɔg-ɔ	'oryx's'	f.	sg.	ŋamʊð-ɔ	'razor blade's'
		pl.	ŋɔɔg-ja-nu			pl.	ŋamʊta-nu	
	c.	sg.	kɛdɛm-ɔ	'gourd's'	g.	sg.	eð-o	'man's'

	pl.	kedem-i-nu		pl.	eð-u		
d.	sg.	ʃεεmm-ɔ	‘leather’	h.	sg.	aʎað-ɔ	‘tongue’s’
	pl.	ʃeremm-i-nu		pl.	aʎað-i-nu		

4.4 Summary nominal suffixes

The preceding sections have demonstrated the different plural and singular suffixes and also the genitive case suffixes in Bale. The different suffixes have been determined as recessive or dominant suffixes. Also the behaviour of the vowel /a/ have been examined. Not all suffixes have been attested following a root where the vowel /a/ is positioned in between the suffix and the root vowels and could therefore not be determined whether it behaves as transparent or opaque in those cases. Table 1 summarises the data so far.

Table 1 Summary of different nominal suffixes in Bale.

<i>Suffix</i>	<i>Allomorphs</i>	<i>Function</i>	<i>The vowel /a/</i>	<i>Recessive</i>	<i>Dominant</i>
i	ni	singular	transparent		X
ɟɪ/ɟi		singular	transparent	X	
ðɪ/ði		singular	–	X	
[+ATR] floating feature		singular	transparent		X
εn/en	ɲεn,ɲen	plural	–	X	
ε/e	ɟε,je	plural	opaque	X	
ɔɣε/ɔɣε	oge	plural	–	X	
ɪ/i	ɟɪ	plural	opaque	X	
ði/di		plural	–		X
geði		plural	–		X
(C)a	ʃa,ɲa,ta,ka,ɣa,ð	plural	neutral	neutral	neutral
	a				
ɔ/o	ɟɔ,jo	genitive	opaque	X	
u	nu	genitive	opaque		X

There are both recessive and dominant suffixes in Bale. The dominant suffixes never change in their value of ATR. All the dominant suffixes are [+ATR] and when following a [–ATR] root they cause the root vowels to assimilate and become [+ATR], thus displaying [+ATR] feature spreading from the right to the left. All recessive suffixes have both a [–ATR] and a [+ATR] form, where the [+ATR] form only manifests when following a [+ATR] root, thus displaying [+ATR] feature spreading from the left to the right. A number of cases display a [+ATR] singular and a [–ATR] plural, with the [–ATR] form of recessive suffixes. These cases have singular forms that are changed into [+ATR] by a [+ATR] floating feature without any phonological material visible.

The vowel /a/ does in most cases behave transparent regarding harmony spreading (cf. 6b, 7b,c,e, 8c, 12a-c, 14c,d, 17d, 19c, 25b,c). But the vowel /a/ has also in a number of cases been attested blocking [+ATR] root vowels from spreading left-to-right to a recessive suffix (cf. 15, 18, 32d-f). The vowel /a/ has also been attested blocking a [+ATR] dominant suffix from spreading right-to-left to the [-ATR] root vowels (cf. 32a-c).

5 Discussion

5.1 Plural, singular and genitive suffixes

The recessive suffixes and their allomorphs always alternate to the value of the root, having two forms; one [-ATR] and its counterpart [+ATR], where the latter only manifests itself when following [+ATR] root vowels. The [-ATR] form follows [-ATR] root vowels and roots where the vowel /a/ is the only vowel. All the dominant suffixes are [+ATR] and display a [+ATR] dominance with featural asymmetry. No case has been found displaying a [-ATR] dominant suffix causing [+ATR] root vowels to assimilate and become [-ATR]. The nouns that manifest a [+ATR] singular and [-ATR] plural without displaying any dominant suffix causing the change (cf. 11c,d, 12c, 13a-e, 16d, 25) look like having a [-ATR] dominant suffix in the plural (cf. 25a-g). But since not all nouns with a [+ATR] singular form take the [-ATR] form of the suffix (cf. 11e-h) one cannot consider the suffix nor the [-ATR] feature to be dominant. Instead the singular forms are analysed as having a [+ATR] floating feature. A [+ATR] vowel must be assumed to have been present historically but may have been deleted, leaving no visible suffix but the marked feature's effect on [-ATR] roots.

Bale display dominant harmony with the [+ATR] feature clearly dominant within the suffixes, [i], [ði]/[di], [geði] and [u]. The recessive suffixes that display two forms, [ðɪ]/[ði], [jɪ]/[ji], [ɛn]/[en], [ɛ]/[e], [ɔgɛ]/[ɔgɛ], [ɪ]/[i] and [ɔ]/[o], must have an underlying form with the same value of ATR. Since the same feature cannot be considered dominant in some suffixes and recessive in other suffixes, the underlying form of the recessive suffixes must be the [-ATR] form, which is realised in its [+ATR] counterpart, allomorph form when preceding root vowels are [+ATR]. The vowel harmony system in Bale therefore displays a [+ATR] feature dominance not only within suffixes but also within roots, as [+ATR] roots cause the [-ATR] suffixes to assimilate and manifest in their [+ATR] counterpart form. The data presented in this paper display one [+ATR] dominant singular suffix, [i] and two [-ATR] recessive suffixes, [ðɪ] and [jɪ]. There are two [+ATR] dominant suffixes, [ði]/[di] and [geði] and four [-ATR] recessive suffixes: [ɛn], [ɛ], [ɔgɛ]/[ɔgɛ], [ɪ], among the plural suffixes. Of the two genitive suffixes the singular suffix is recessive [ɔ] and the plural is dominant [u].

Table 2 Nominal suffixes in Bale.

<i>Suffix</i>	<i>Allomorphs</i>	<i>Function</i>	<i>Recessive</i>	<i>Dominant</i>
i	ni	singular		X
jɪ	ji	singular	X	
ɔ̃ɪ	ɔ̃i	singular	X	
[+ATR] floating feature		singular		X
ɛn	ɛn, ɲɛn, ɲɛn	plural	X	
ɛ	e, jɛ, je	plural	X	
ɔgɛ/ɔgɛ	oge	plural	X	
ɪ	i, jɪ	plural	X	
ɔ̃i/di		plural		X
geɔ̃i		plural		X
(C)a	ʃa, ɲa, ta, ka, gɔ̃a, ɔ̃a	plural	neutral	neutral
ɔ	o, jɔ, jo	genitive	X	
u	nu	genitive		X

This paper confirms earlier analysis (Yigezu & Dimmendaal 1998, Dimmendaal 2000) that there is a rich number marking system in Bale just as in many Nilo-Saharan languages (see section 4.2.2). But it is not always simple to find what type of marking each noun takes, since there are consonant alternations and suffix replacement (cf. 8a). Where there are different markings and a change in the value of ATR (cf. 25) one must assume that the [-ATR] is the underlying form or base that changes into [+ATR].

As mentioned in section 2.3.2, it has been suggested that there is a strong tendency among vowel harmony languages applying harmony spreading right to left. In Bale there is no such tendency. Since there are more recessive, root controlled suffixes than dominant suffixes there is rather a tendency of rightward harmony spreading than leftward.

Some of the suffixes treated in this paper are also mentioned by Yigezu and Dimmendaal (1998). The different -(C)a suffixes where the consonant is a non-nasal e.g. [ʃa] (cf. 22), [ta], [gɔ̃a] and [ka] (cf. 24), with the consonant present only in the plural, could be due to that the consonant lost its position root-finally but is restored in intervocalic position as a suffix is added to the root (p.292). Some of those nouns taking a non-nasal -(C)a suffix do display a consonant also in singular when the genitive suffix follows the root (cf. 33b,e,f). The consonant in the singular and the plural may differ (33e,f) but still it displays that there is a root-final consonant, rather than allomorphs to the same suffix. The nouns which take the plural suffix [ʃa] display the semi-vowel [j] in the singular when followed by the genitive singular suffix (cf. 31f, 32a,c) and could be a realisation of a root final consonant [ʃ] (Dimmendaal 2000 p.196). In this analysis, [jɔ̃] is treated as an allomorph to the genitive suffix [ɔ̃] since not all [jɔ̃]/[jo] display a [ʃa] in the plural (31e). Dimmendaal (2000 p.189) gives examples where word-final stops are still present in other closely related languages i.e. Didinga and Murle. The suffix [ɲa] (cf. 23) is not only present in Didinga and Murle but is a widespread suffix among Surmic

languages (p.191). [ʃa] which is the most productive suffix among the different –(C)a suffixes, has become an alternate form for nouns that also take other suffixes in the plural (cf. 28). And Dimmendaal (2000 p.196) describes the suffix as a basic form among the alternative plural forms in Bale. That there are lost consonants word-finally in Bale has also been attested with the suffixes [ɛ] and [ɪ] (cf. 14e, 19a-c, 25f). At first sight the different consonants inserted before the suffix may look like allomorphs of the same or different suffixes. But as the same roots were followed by the genitive suffix the consonant was also displayed in the singular (cf. 33). Which demonstrates that the consonant is part of the root rather than the suffix. Not only roots but also suffixes may have lost a consonant which is restored intervocally either at morpheme boundaries or word boundaries and Dimmendaal (2000 p.190) mentions that the suffix, [geði] (cf. 21), could be historically related to another dominant suffix, one which is analysed as [ði]/[di] within this paper. Since there are only very few cases attested taking the suffixes, [ði]/[di] and [geði] within the data for this paper, they are treated as separate suffixes for the time being.

The singular suffix [i] (6) and its allomorph [ni] (6f), is a dominant suffix. The singular suffix [gi] (10) is only attested in a [+ATR] form and could be a variant of the dominant suffix [i]. The number of nouns that manifest the suffix [gi] is too small to determine its relation to other dominant singular suffixes. That is left for other studies to establish.

Yigezu and Dimmendaal (1998 p.287) have suggested height assimilation in Bale. That has not been found within the data presented in this paper. The four co-occurrences of vowels $V_1 \neq V_2$ that were not found; [-ATR] ϵ_u , ϵ_o and u_o and [+ATR] u_o may be due to the small amount of data. Further studies and more data would reveal if there is height assimilation in addition to ATR harmony in Bale. Other things may differ between the data presented in this paper and the data presented by Yigezu and Dimmendaal (1998) and Dimmendaal (2000) since the informants for this paper may have been speakers of another dialect.

5.2 The Behaviour of the Vowel /a/ in Bale

This paper confirms the earlier analysis by Yigezu & Dimmendaal (1998 p.287) that the vowel /a/ in Bale; “never alternates or shifts harmony class within roots or suffixes” and that it does not have a [+ATR] counterpart. Just as in most nine vowel languages the vowel /a/ can co-occur freely with both [-ATR] and [+ATR] vowels without undergoing any change phonetically or phonologically (see section 2.3.3) and it has therefore been analysed as neutral. Roots where the vowel /a/ is the only vowel have been attested with both dominant and recessive suffixes. But as mentioned in section 2.3.3, recessive suffixes, are typically realised in their [-ATR] form in this context. This is generally the case in Bale (cf. 6b, 7b,c,e, 8c, 12a-c, 14c,d, 17d, 19c, 25b,c). There are a few suffixes that not only manifest their [-ATR] form but also their [+ATR] form when following a root where the vowel /a/ is the only vowel (cf. 8f, 12d-f). The nouns in the example 12d-f, all display a [+ATR] vowel in the singular that may have caused the recessive suffix [ɛn]/[en] to manifest in its [+ATR] form. If one considers the singular as the base, applying the plural number marking, the root would not only consist of the vowel /a/ but also of a [+ATR] vowel which would cause the recessive suffix to assimilate to the value of the root. The [+ATR] final root vowel could then have been deleted and left the root only displaying the vowel /a/ followed by the [+ATR] form of the recessive suffix. But there is another noun (12c) which also displays a [+ATR] vowel in the singular but then the [-ATR] form of the same

recessive suffix is manifested in the plural. That noun could manifest another type of number marking, applying the replacement marking, with a [+ATR] vowel replacing the [-ATR] plural suffix in the singular. The cases mentioned are very few in number and one can only speculate what the underlying root form is. One would have to investigate if there are other recessive suffixes that are manifested in their [+ATR] form when following those same nouns and other nouns with the vowel /a/ as the only root vowel.

The fact that the recessive suffixes typically, though there are exceptions, are manifested in their [-ATR] form when following a root where the vowel /a/ is the only vowel, could be a reason to consider it a [-ATR] vowel that just lacks a [+ATR] counterpart. But the vowel /a/ is neutral in static vowel harmony, displaying no co-occurrence restrictions within roots. Therefore, though the vowel /a/ has not lost its phonetic or phonological [-ATR] value it is considered a neutral vowel.

It has earlier been suggested (Yigezu & Dimmendaal p.287) that the vowel /a/ in Bale behaves as “transparent rather than opaque” (p.287). The vowel /a/ does in most cases behave as a transparent vowel not blocking [+ATR] vowels from spreading, either rightward or leftward (cf. 6b, 7b,e). But there are exceptions. Recessive suffixes have been attested in their [-ATR] form when following a [+ATR] root as the vowel /a/ comes in between the [+ATR] root vowel and the recessive suffix (cf. 15, 18, 32d-f). The vowel /a/ is in those exceptions behaving as an opaque vowel, blocking [+ATR] root vowels from spreading left-to-right to a recessive suffix. There does not seem to be any clear principle accounting for when /a/ is opaque and when it is transparent. Since there is only a handful of examples where /a/ has been attested blocking [+ATR] root vowels from triggering a [-ATR] suffix to undergo alternation (cf. 15, 18, 32d-f), one would have to look at more data in order to examine further to establish a pattern.

The only dominant suffix that has been attested blocked by the vowel /a/, is the plural genitive suffix [u] and its allomorph [nu]. The suffix is not added a root but to a plural form and it is when the plural suffix contains the vowel /a/ e.g. -(C)a, that the [+ATR] dominant suffix is blocked from spreading right-to-left to the [-ATR] root vowels (cf. 32a-c). One would have to look at more data and other suffixes in order to study if there are any other dominant suffixes that are blocked by the vowel /a/ positioned either in the root or in a preceding suffix. For further research one would also need to study the behaviour of the vowel /a/ within verbs.

6 Conclusion

This study confirms the earlier analysis (Yigezu & Dimmendaal 1998) that Bale has a nine vowel system. The nine contrastive vowels in Bale occur within two harmony sets [-ATR] and [+ATR], where /a/ occurs within both sets and lacks a [+ATR] counterpart and is therefore analysed as neutral regarding ATR value. The nouns and their suffixes that have been examined in this paper display ‘dominant harmony’ where the [+ATR] feature is dominant which has been attested in many other Nilo-Saharan languages of East Africa (see section 2.3.1). Both dominant, [+ATR], and recessive, [-ATR] suffixes have been found in Bale. [+ATR] vowels are dominant whether they occur within the root or the suffix, and trigger [-ATR] vowels to assimilate, both within roots and suffixes. Bale displays bi-directional feature spreading, both leftward and rightward, across morpheme boundaries. A number of nouns display a [-ATR] plural form and a [+ATR] singular form without any visible dominant suffix causing the change. The change in the value of ATR is a way of marking the singular and must be caused by a [+ATR] floating feature without any phonological material. In most cases the

[+ATR] spreads its feature throughout the whole word, except in some cases where the vowel /a/ comes in between the [+ATR] vowels and the [-ATR] vowels and blocks [+ATR] vowels from spreading. Bale being a dominant language is not an exception to the tendency of manifesting [+ATR] as the most typical feature among dominant languages (see section 2.3.1).

This paper has examined the ATR harmony as manifested across morpheme boundaries within nouns and their suffixes in Bale. Due to the small amount of data, some suffixes will have to be studied further in order to determine their ATR harmony behaviour. This study did not focus on why certain nouns take a certain suffix or a certain type of number marking, that have to be examined further. One should also examine the languages closely related to Bale e.g. Didinga and Murle, to see if there are any cognates. For further studies one should study how other nominal suffixes behave regarding ATR harmony and see if there are any dominant prefixes that spread rightward in Bale. And also whether a dominant suffix, or dominant [+ATR] vowels in the root, would spread to any prefix preceding the root. Further one should also examine the ATR harmony as manifested within verbs and other word classes. Since there are both vowel initial and vowel final words in Bale ATR harmony may also manifest across word boundaries. This analysis is a beginning of describing the ATR harmony in Bale, but it did not focus on vowel length, tone or consonants, all these areas will have to be covered in further research in order to understand how ATR harmony is manifested.

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