Orthography and Tone:  
Tone system typology and its implications for orthography development

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Introduction

- tone languages and tone orthography,
- tone orthography,
- tone typology in African tone languages:
  - languages with ‘stable’ tone and
  - languages with ‘changeable’ tone,

Tone languages and tone orthography

Words consists of consonants, vowels, and tonal melodies, each of which may serve to indicate minimal distinctions, both in the lexicon and in the grammar of the language.

In the past, there has been much resistance to representing tone in the orthography, for several reasons:

- It is a feature not found in French, English, Spanish, Portuguese – the present-day official and former colonial languages of many African countries,
- It is certainly not an easy matter to analyse the tone system of a language in preparation for developing a tone orthography,
- Most people have a natural supposition that an orthography which looks more difficult – i.e. with many diacritic signs – is automatically harder to read.

In fact, tone is an important feature, often neglected by linguists as well as native speakers of a tone language, who find consonants and vowels more ‘concrete’, and who have – certainly in the past – done everything to avoid marking tone in a practical orthography, with the justification that ‘the context will make it clear to the reader’.

Tone orthography, therefore, does not stand by itself. A prerequisite for making decisions for an adequate tone orthography is an analysis of the tone system. At the same time, a tone orthography needs to be accompanied by a well thought-through methodology for awareness raising of tonal contrasts and for teaching people to read with the symbols chosen to mark tone in a language.

I consider as analytical prerequisites for developing a tone orthography:

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• the tone system:
  - the number of contrastive level tones of the language,
  - the existence of distinctive rising and/or falling tones,
  - the tonal melodies belonging to the basic lexical morphemes: noun and verb roots.

• tonal processes:
  - the presence of absence of commonly-found tonal processes like H-spreading, H-shifting,
    Downdrift, Downstep, Polar tones, effects of Depressor Consonants.

• the functional load of tone:
  - tone has a heavier or lighter functional load according to the frequency with which it is
    used to make minimal contrasts of meaning - in the lexicon and in the grammar.

*Function of tone in the lexicon:*

YAKA (Bantu C.10, C.A.R.)

<table>
<thead>
<tr>
<th>mbókà</th>
<th>village</th>
<th>bú</th>
<th>canoe</th>
</tr>
</thead>
<tbody>
<tr>
<td>mbóká</td>
<td>fields</td>
<td>6ú</td>
<td>tribe</td>
</tr>
<tr>
<td>mbóká</td>
<td>civet cat</td>
<td>6ù</td>
<td>hole</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6ű</td>
<td>eagle</td>
</tr>
</tbody>
</table>

LENDU (Central-Sudanic, D.R.Congo)

*Function of tone in the grammar:*

ALUR (Nilotic, D.R.Congo / Uganda)

| à-mákò | I have taken |
|à-má’kó | I habitually take |
|á-mákò | I will take |
|á-1má’kó | I am taking |

*Tone orthography*

Several systems of representing tone in an orthography have been used over time and in different parts of the world, where a tone orthography has been designed according to the ‘phonemic principle’ – a one-to-one match between the symbol and the toneme.

• Accents
• Punctuation marks
• Numbers
• Unused consonant letters
I will first of all exemplify the first two of these strategies as used to represent contrastive tones, i.e. the symbols chosen are pitch-related. However, any one of these strategies could also be used to mark grammatical contrasts, as will be seen after the discussion on typology of African tone systems. The difference is of crucial importance for the teaching methodology.

1. Accents

The most frequent is accent marks, roughly as used in the IPA:

- acute accent: á é é í ó ó ú high tone
- grave accent: à è è ì ó ó ù low tone
- circumflex: ã ē ē ì ò ò ù rising tone
- wedge: â è è ì ò ò ù falling tone
- no accent: a e e i o o u

In a two-tone system, either the L or the H tone can be left without accent. Most frequently, in such languages, the H tone is marked and the L is marked by the absence of an accent. In three-tone languages, generally the M tone is marked by absence of an accent.

In fact, particularly in francophone countries, speakers of the language may themselves suggest using accents when they realise that tone has a distinctive function.

Occasionally, different accents are used, e.g. when the circumflex is used for H tone, as is done in YAKA (Bantu C.10, spoken in C.A.R.), where the choice of tone marks had to conform to the system used in the widely-known lingua franca Sango, by using a circumflex for H tone. It may not be elegant for a linguist, but it works.

The following are some example sentences from YAKA, which has two tone levels: H, marked by a circumflex, and L, unmarked. Rising tones are marked by a doubling of the vowel (since the language does not have contrastively long vowels), with a H-tone symbol on the second vowel:

< āá > = /ā/; falling tones are similarly written on two vowel symbols: < āâ > = /ā/. 

Dzûlulû dzâkûâ mû dzabuka.
Ndzêmbi adzêe mû ndzaâ ya mbôka.

In AVOKAYA and several other three-tone languages of the Moru-Ma’di subgroup of Central-Sudanic, spoken in D.R.Congo, Uganda, and Sudan, the tilde was chosen for a L tone (Kilpatrick 2004:91) – as a mnemonic device to make the people think of a snake crawling on the ground.
The tilde is indeed quite different from an acute accent, used for H tone, more so than a grave and an acute accent, which is probably advantageous for reading.

The accents are normally placed on the nucleus of the syllable, which in most cases is a vowel. However, there are also syllabic consonants which need tone marking in the orthography, like e.g. in **LYELE** (Gur, Burkina Faso), where the 2sg and 3sg pronouns consist of a syllabic nasal and are differentiated by tone alone, or in **LENDU** (Central-Sudanic, D.R.Congo), which has vowelless syllables, and where the nucleus of the syllable consists of a continuation of the onset consonant or of the last part of the initial consonant cluster.

<table>
<thead>
<tr>
<th>LYELE</th>
<th>LENDU</th>
</tr>
</thead>
<tbody>
<tr>
<td>ń 2sg</td>
<td>zỳ stomach ndrì goat</td>
</tr>
<tr>
<td>ń 3sg</td>
<td>sssì bow tsstss banana</td>
</tr>
</tbody>
</table>

A system of marking tone by accents can be used for any type of language, for both long and short words. It is somewhat limited in the number of levels it can handle, unless one introduces double acute accents < ŋ > and double grave accents < ù > for extra H and extra L tones. This type of system has been readily accepted in countries where French is the official language, since three of the four diacritics are used in the French orthography, albeit with a different function.

2. *Punctuation marks*

Punctuation marks preceding and/or following the word may be used for marking tone in the orthography as follows: level tones are indicated by a punctuation mark preceding the syllable; combinations of these punctuation marks can be used for contour tones, rising and falling. This system was first introduced by Bolli (1978) and later applied to other languages in Côte d’Ivoire, like **ATTIÉ**, which has four contrastive tone levels.

"na extra-high tone -na' low-high rising tone
'na high tone na' mid-high rising tone
na mid tone "na- extra-high-low falling tone
-na low tone 'na- high-low falling tone
=na extra-low tone na- mid-low falling tone

Even though this system may look a bit unusual, it has several advantages:

- the punctuation marks are more distinctive from each other than the accents, which is easier for the learner,
• this system is very useful for languages with more than three tone levels: the complete set can handle five levels, which is, in fact, the maximum found in Africa,
• different rising and falling tones can be represented by combinations of the level-tone symbols, one preceding and one following the word.

3. Numbers
Superscript numbers were used in Latin-American languages for a time, both for tone analysis and for orthographic purposes, with very limited success.

4. Unused consonant letters
These have sometimes been suggested for marking tone, or a particular incidental tone contrast.

A typology of African tone systems
From my experience with languages from all four language phyla in Africa, I propose that a broad typological division can be made into two main types of languages, with major repercussions for tone-orthography development, namely:
• languages with ‘stable’ tone, and
• languages with ‘changeable’ tone, in which various tonal processes operate, so that tones change based on the tonal context.

Languages with ‘stable’ tone
The first group consists of languages with ‘stable’ tone. The tonal melody of words in isolation remains the same in whatever tonal context the word may occur, i.e. there are no tonal rules which change tones in context. The tonal melody of a word may change for grammatical reasons, unrelated to the tonal environment of the word. In some languages, singular and plural nouns are differentiated by tone alone, locative marking may be done by tone alone, various tense/aspect paradigms may differ by tone alone. Such tonal changes most often have to be analysed as tonal replacement, or as a floating tone attached to the tonal melody of the lexical morpheme. In context, these are not changed by their tonal environment.

NDRULO (Lendu subgroup of Central-Sudanic, Uganda)

kpà kpá husband(s)
ddùw ddúw son(s)
nja njá uncle(s)
wey wéy sister(s)-in-law

FUR (Nilo-Saharan, Sudan)
Languages with ‘changeable’ tone

The second group consists of languages with ‘changeable’ tone, in which tonal processes operate in various ways: one and the same word may appear with various tonal shapes based on the tonal context. Widespread tonal processes are H-spreading, with often subsequent Downstep, H-shifting, and others.

EBRIE (Kwa, Coôte d’Ivoire)

á pó hrómêñ body – in áyí hrómêñ thing - in
á bë hrómêñ paddle – in ñtrò hrómêñ vegetables – in

Roberts (2011:94) cites the terminology others have used for these two types of tone systems: ‘immobile’ versus ‘mobile’ by Yip (2002). Mfonyam (1989) has used the term ‘dynamic’ for the systems with changes based on tonal processes. Bird (1999) has used the binary terminology ‘shallow’ versus ‘deep’ not only for the orthographic depth, but also for the tone system, whereby a ‘shallow’ tone system would match what I call a ‘stable’ tone system, and his ‘deep’ tone system would be a system with tonal processes, in which tones change according to tonal context.

Correlation with other phenomena

Having established this major typological division into two types of tone systems, we find some interesting correlations with other typological phenomena.

The languages with ‘stable’ tone are generally languages with
- more contrastive tone levels,
- shorter words,
- a heavy functional load of tone in the lexicon as well as in the grammar.

The languages with ‘changeable’ tone are generally the languages with
- less contrastive tone levels,
- longer words,
- a much lighter functional load of tone in the lexicon, but, amazingly enough, often an equally heavy functional load of tone in the grammar.

Group 1 contains a few 2T languages, quite a few 3T languages, and all 4T and 5T languages that I have encountered. Many of these languages are isolating, and highly monosyllabic CV, or CVC, though some have disyllabic roots, VCV, or CVCV. Some have none or hardly any segmental morphology. These languages generally don’t have a system of noun-class affixes. The number of tonal minimal pairs and sets in the lexicon is enormous, and, in addition to tense/aspect differences marked by tone alone, there are also lexical verb-tone classes. When learning to speak such a language as an outsider, one can learn the tones of nouns immediately with the segmentals, because the tones remain the same in every context.

Group 2 contains many 2T languages and a number of 3T languages (those with H-spreading and downstep). Most often, these languages are agglutinative, and have disyllabic roots, often accompanied by a noun-class prefix and/or suffix. Because there are more segmental variables in the word, tone generally does not have a very heavy functional load in the lexicon, though the grammatical function of tone can be very heavy. Many Bantu languages fall within this category, but also many others.

**Consequences for tone orthography and teaching methodology**

Having established these two major types of tone languages and seen the link with some other typological phenomena, one can now think about the consequences for tone orthography and tone-teaching methodology.

*Languages with ‘stable’ tone*

Languages in which tone has a heavy functional load will benefit from having more tone marked in the orthography than languages with a lighter functional load of tone. This means that in the first category, languages with ‘stable’ tone, more contrastive tone levels, shorter words, one option is to mark tone on every syllable. With respect to teaching the tone orthography, the tone marks, accents, or punctuation marks, need to be linked to *tone awareness* in the mind of the learner. Since tone is stable in such languages, this will also result in a ‘constant word image’, a concept that is considered important in orthography studies. As for grammatical tone changes, by replacement or addition of a floating tone, these will need to be marked the way they surface, because that is the point where the grammatical contrast becomes evident.

**LENDO (Nilo-Saharan, Central-Sudanic, D.R.Congo)**

The language has three level tones, one rising tone.
Tones are marked by accents, whereby the M tone is marked by absence of accent.
All verb roots and many noun roots are monosyllabic CV.
The following example uses the verb root *ra* ‘to go’.
The Past, Subjunctive, Present Continuous and Future are differentiated by tone alone. In addition, the pronominal forms for 1st and 2nd person are differentiated for number by tone alone. This gives rise to eight-way tonal contrasts as follows in the following example. This is valid for every verb in the language, though the tonal configurations on the paradigms are not necessarily the same, since there are four lexical verb-tone classes, which each their own tonal behaviour in the different T/A paradigms.

<table>
<thead>
<tr>
<th>1st person singular</th>
<th>2nd person singular</th>
</tr>
</thead>
<tbody>
<tr>
<td>I went</td>
<td>we went</td>
</tr>
<tr>
<td>I should go</td>
<td>we should go</td>
</tr>
<tr>
<td>I am going</td>
<td>we are going</td>
</tr>
<tr>
<td>I will go</td>
<td>we will go</td>
</tr>
</tbody>
</table>

\[
\begin{array}{ll}
\text{ma rà rá} & \text{mà rà rà} \\
\text{I went} & \text{we went} \\
\text{ma rá rá} & \text{mà rá rá} \\
\text{I should go} & \text{we should go} \\
\text{mà rà rà} & \text{mà rà rà} \\
\text{I am going} & \text{we are going} \\
\text{mà ra rá} & \text{mà ra rá} \\
\text{I will go} & \text{we will go} \\
\end{array}
\]

\textit{ATTIÉ} (Niger-Congo, Kwa, Coûte d’Ivoire)  
This language has four tone levels, plus a ML fall and a LH rise (marginal; outside the system). Tones are marked by punctuation marks, whereby M tone is marked by absence of any punctuation mark, ML is marked by a hyphen at the end of the word. All verb roots and many noun roots are monosyllabic CV. Every verb can be tonally inflected in five ways, as the following example shows. With five lexical verb-tone classes, there are five sets of possibilities. Two of them are presented below, with neutralisation of tonal contrasts in certain forms.

\[
\begin{array}{ll}
\text{ze} & \text{'ze} \\
\text{to go} & \text{to give} \\
\text{-han} & \text{-han} \\
\text{we have gone} & \text{we have given} \\
\text{ze} & \text{ze} \\
\text{we are going} & \text{we are giving} \\
\text{'han} & \text{'han} \\
\text{we ought to go} & \text{we ought to give} \\
\text{ze} & \text{ze} \\
\text{let us go} & \text{let us give} \\
\text{-han} & \text{-han} \\
\text{we didn’t go} & \text{we didn’t give} \\
\end{array}
\]

\textit{Languages with ‘changeable’ tone}

In the second category, languages with ‘changeable tone’, tone generally have a much lighter functional load in the lexicon, although the functional load of tone in the grammar may be extensive. If phonemic tone were written everywhere in such languages, tone could not be written in a consistent way on each word, since words are pronounced differently in different contexts. Readers normally link accents to pitch/tone levels – and cannot look at a certain written accent, e.g. a L tone, and then pronounce it with a H tone in a certain context. That does not give any orthographic stability. It would be better to establish a system of tone writing which is linked to the function of tone in the grammar. That way, tone is not marked in places with a light functional load, but only in places where tone has a contrastive function in the grammar.
principle, any of the above strategies may be used: accents, punctuation marks (including other special signs like a slash, plus sign, equal sign), numbers, unused consonant letters.

This approach may also be useful when dialects of a language are mutually intelligible, but have different tonal rules and realisations on contrastive structures. Representing particular grammatical constructions which are tonally contrastive by one special symbol marking the grammatical category may have great advantages.

Three examples:

In **SABAOT**\(^1\), a verb-initial Nilotic language spoken in Kenya, *case* is marked by tone. There are no regular patterns by which "subject tone" is derived from "object tone". (The tone of the word in isolation is normally the same as the tone used for object case.) A nominal subject follows the verb. However, a pronominal subject is incorporated in the verb form, in which case the noun following the verb is not the subject, but the object. The contrast is found in tonal melody on the noun. In the orthography, a nominal subject, on whatever tonal realisation, is marked by a colon.

\[
\begin{align*}
\text{kibakaac (V)} & : \text{kwaan (S)} & \text{/ kibakaac kwàån /} & \text{his father left him} \\
\text{kibakaac (V)} & \text{ kwaan (O)} & \text{/ kibakaac kwáán /} & \text{he left his father}
\end{align*}
\]

Another minimal tone contrast in this language is the difference between "we" and the indefinite pronoun "one". The latter is marked by a slash preceding the word, as follows:

\[
\begin{align*}
\text{kikiibat (V)} & \text{ mbareet (O)} & \text{ we ploughed the field} \\
/\text{kikiibat (V)} & \text{ mbareet (O)} & \text{ one ploughed the field, or: the field was ploughed}
\end{align*}
\]

The slash marks the "indefinite", whatever its surface phonemic tonal realisation determined by different factors.

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\(^1\) Sabaot data courtesy of I.A. Larsen.

*C. Kutsch Lojenga, LSA 2011*
A very interesting solution has been proposed for **BUDU** (Bantu, N.E. of D.R.Congo), which has three tense/aspect paradigms which differ by tone alone. Being an agglutinative language, verb stems may have two, three, or more syllables. The subject marker is prefixed to the verb. The tonal melodies differ according to the lexical tone class of the verb, the number of syllables in the stem, and the presence of absence of depressor consonants. In addition, there are quite a few tonal differences between the two main dialects.

The following system has been proposed and is being used to disambiguate these T/A paradigms:

A colon is inserted between subject prefix and verb stem to mark **Past**.

<table>
<thead>
<tr>
<th>Subject Prefix</th>
<th>Verb Stem</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>a:</td>
<td>pipo</td>
<td>[ ápípò ]</td>
</tr>
<tr>
<td>a:</td>
<td>bhibhiso</td>
<td>[ ábhìbhísò ]</td>
</tr>
<tr>
<td>a:</td>
<td>yokonokiso</td>
<td>[ áyòkònòkìsò]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>he finished</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a: pipo</td>
<td>[ ápípò ]</td>
<td></td>
</tr>
<tr>
<td>a: bhibhiso</td>
<td>[ ábhìbhísò ]</td>
<td></td>
</tr>
<tr>
<td>a: yokonokiso</td>
<td>[ áyòkònòkìsò]</td>
<td></td>
</tr>
</tbody>
</table>

An equal sign is inserted between subject prefix and verb stem to mark **Future**.

<table>
<thead>
<tr>
<th>Subject Prefix</th>
<th>Verb Stem</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>a =</td>
<td>pipo</td>
<td>[ ápípó ]</td>
</tr>
<tr>
<td>a =</td>
<td>bhibhiso</td>
<td>[ ábhìbhísó ]</td>
</tr>
<tr>
<td>a =</td>
<td>yokonokiso</td>
<td>[ áyòkònòkìsó ]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>he will finish</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a = pipo</td>
<td>[ ápípó ]</td>
<td></td>
</tr>
<tr>
<td>a = bhibhiso</td>
<td>[ ábhìbhísó ]</td>
<td></td>
</tr>
<tr>
<td>a = yokonokiso</td>
<td>[ áyòkònòkìsó]</td>
<td></td>
</tr>
</tbody>
</table>

The **Present** is marked by the absence of any special symbol:

<table>
<thead>
<tr>
<th>Verb Stem</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>aipo</td>
<td>[ ápípò ]</td>
</tr>
<tr>
<td>abhibhiso</td>
<td>[ ábhìbhísò ]</td>
</tr>
<tr>
<td>ayokonokiso</td>
<td>[ áyòkònòkìsò]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>he is finishing</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>aipo</td>
<td>[ ápípò ]</td>
<td></td>
</tr>
<tr>
<td>abhibhiso</td>
<td>[ ábhìbhísò ]</td>
<td></td>
</tr>
<tr>
<td>ayokonokiso</td>
<td>[ áyòkònòkìsò]</td>
<td></td>
</tr>
</tbody>
</table>

The teaching of tone marked for grammatical contrasts will have to focus on **awareness raising** of different **grammatical notions**, in this case Past – Present – Future.
The third example comes from **SHIMAKONDE**\(^2\), one of the Makonde speech varieties, Bantu, spoken in Northern Mozambique. This language has a 2T system, with many different morphotonomological rules determining the phonemic realisation of tones on the surface. Solutions have been worked out for each of these - by using accents and an unused consonant letter.

The linguist who worked in this language for many years says: “Minimal tone contrasts are the heart and soul of the verbal system”. Having followed this project for many years, I fully agree.

The language has two main aspectual prefixes – *ndi-* ‘perfective’, and –*nda-* ‘imperfective’. With each of these, there are two paradigms differentiated by tone alone: Past versus Anterior in the Perfective, and Present versus Future in the Imperfective. In the orthography, tone is marked on only one form of a minimal pair. The orthographical marking and the phonemic realisations are presented side by side. Examples from Leach (2010:182)

\[
\begin{array}{ll}
\text{vandítukuta} & [\text{vándítukúúta}] \quad \text{they ran} \\
vandítukuta & [\text{vandítúkuúta}] \quad \text{they have run} \\
vandátukuta & [\text{vándátukúúta}] \quad \text{they run} \\
vandatukuta & [\text{vandatúkuúta}] \quad \text{they will run} \\
\end{array}
\]

H tone is marked by an acute accent on the essential syllable, precisely where the contrast is located.

The second issue concerns the use of a silent /h/ in independent negative verbs. This is added to the L-tone negative prefix a-, which is optionally, and most commonly not realised in speech. The important part is its L tone, which is marked here by /h/, used as a tonal marker.

\[
\begin{array}{ll}
vapali & \text{‘they are present’} \quad [\text{vápáali}] \\
havapali & \text{‘they are not present’} \quad [(a)vapaálí] \\
\end{array}
\]

\(^2\) Shimakonde data courtesy of M.B. Leach

*C. Kutsch Lojenga, LSA 2011*
I propose that languages with ‘changeable’ tone first of all try to find solutions along the lines of the three languages cited here, in order to disambiguate grammatical contrasts. This is an approach which is still in its infancy, though.

Developing a methodology for teaching these two radically differing types of systems is yet another challenge. Different approaches have to be worked out for people who are already literate in a language of wider communication and for those who are in the preliterate stage. Each approach needs to include awareness raising of tone by lexical tonal contrasts, and/or focussing on the grammatical tone contrast.

References

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1 Sabaot data courtesy of I.A. Larsen.
2 Shimakonde data courtesy of M.B. Leach