

ORTHOGRAPHIES IN A RAPIDLY CHANGING WORLD: NEGOTIATED COMPROMISES BETWEEN SEVERAL PARTIES¹

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1. INTRODUCTION

The point of this paper is that orthography development for unwritten African languages in the 21st century requires input from two major fields of study: linguistics and the aspect of learning psychology related to literacy. The second assumption this paper is built on is that orthography development is not straightforward; it always involves compromises.

In the past, writing systems had a chance to develop over centuries, as people tried to communicate in writing, and finding writing rules, which worked for them and their limited readership. Some African writing systems were initiated over twenty centuries ago. Egyptian hieroglyphs are even older than that, approximately dating from between 3000 BC and 400 AD

(http://scriptsource.org/cms/scripts/page.php?item_id=script_detail&key=Egyp). Other ancient examples are Ethiopic, Tifinagh, and Vai. Most were unique inventions (http://scriptsource.org/cms/scripts/page.php?item_id=entry_detail&uid=dvm6v7yblj).

In the 21st century, however, the world of literacy has changed dramatically from the time of clay tablets and styluses. A select few readers were taught to read then. This is the age of EFA (UNESCO'S Education for All, 2000-2015) literacy goals for the masses. Book publishing is proliferating for minority language groups, even on laptops and cellphones. (<http://www.nbcnews.com/tech/mobile/mobile-phones-promote-literacy-poorest-countries-un-report-n88151>). This means that the world's unwritten or unstandardized writing systems will require focused and time-sensitive attention from two disciplines: linguistics and the aspects of learning psychology that are related to literacy. Standardization takes time: orthographies develop in stages as literature is developed and used (Karan, 2014). So how can the process be expedited, while the potential readership, speakers of the unwritten language, have yet to possess advanced reading skills? We no longer have time to develop orthographies over centuries.

This paper describes the roles of linguists, educators and the major stakeholders, as well as the orthography users. It also describes the elements of language which compete for representation in African writing systems. Section 2 defines orthography outcomes while section 3 describes the process of orthography development; section 4 sheds light on the work of the linguist and the literacy consultant; section 5 discusses the tension between linguistic analysis and readability, and the paper is concluded in section 6.

2. DEFINING ORTHOGRAPHY

Orthographies are not just codes representing speech sounds. They are visual, graphic and yet abstract representations of people's speech. Most orthographies attempt to convey meaning both at the level of the individual phoneme, and at the morpheme, word, and sentence levels (because they include spelling and punctuation rules). Regardless of script choice, they consist of two elements:

- (i) Symbols (in most cases, alphabets)
- (ii) Writing rules which determine the representation of segmental and supra-segmental linguistic features, which ensure comprehension and make writing possible for speakers of the language.

These elements, both the symbols and the writing rules, cannot be represented arbitrarily. They should reflect the linguistic features of a language, making linguistic analysis fundamental to orthography development (Schroeder, 2008: 4). Writing rules also require linguistic input from both morphology and phonology, because readers need to recognize grammatical indicators which instantly convey meaning to

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readers, as well as the sounds of speech.

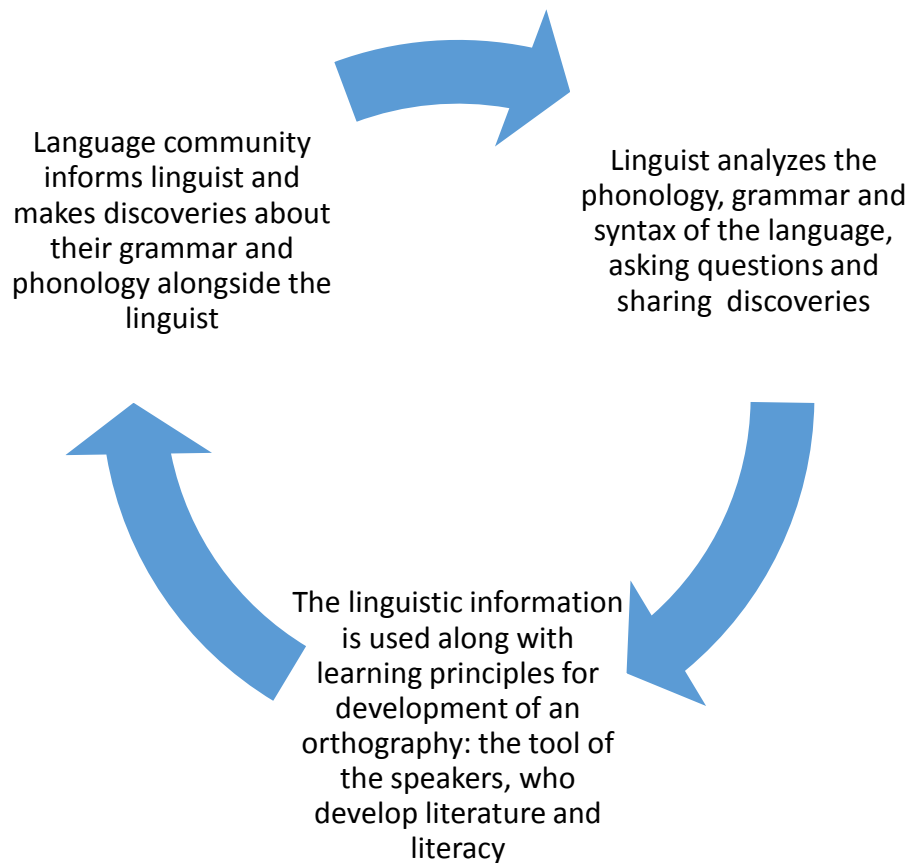
3. ORTHOGRAPHY DEVELOPMENT: A PROCESS

For the development of a sound orthography the following foundational assumptions have to be applied (adapted from Schroeder 2008: 7):

- (i) Community ownership/involvement at every stage of the orthography development process, not only to develop orthographies which are accepted by local communities, but to encourage local understanding of the rationale behind orthography decisions.
- (ii) The centrality of linguistic analysis to orthography development, inclusive of phonology, morphophonemics, grammar and discourse (since these aspects of a spoken language overlap and influence one another on the surface, they will seem to compete with one another for prominence in a writing system).
- (iii) Mother-tongue speakers' perception, visual and auditory, should play a significant role in orthography decisions. That perception can be developed and enriched for those who take part in the orthography development process.
- (iv) Orthography-in-use has to be the goal, as well as the means for constant feedback and evaluation.

In the next section below we turn our attention to the interdisciplinary nature of the orthography development process, and the interdependence of the parties involved.

4. INTERDEPENDENCE BETWEEN LITERACY/EDUCATION, SPEAKER PERCEPTION AND LINGUISTICS



Orthography development begins with a language community. Speakers of the relevant language present the linguist with raw language data. The linguist, working with them, starts the analysis of their speech. The analysis then, alongside the speakers' perception of their phonology and grammar, contributes to the development of their orthography. The established orthography will empower the language community to develop literacy and literature for the community. The specific contributions of linguists and literacy specialists are listed below.

The tasks for linguists are:

- (i) identify sounds which make a difference in the meanings of words, phrases and sentences, leading to a phonemic inventory of the language;
- (ii) list all possible syllable structures and their occurrence restrictions within words;
- (iii) identify both affixes and grammatical words, paying the necessary attention to the role of tone in communication (since it can be morphemic).

The tasks for literacy consultants and linguists together are:

- (i) identify the minimal number of graphemes (symbols for phonemes which represent meaning for speakers of the language);
- (ii) select and test grapheme choices, aiming for ease of recognition and maximum transfer from a language of wider communication;
- (iii) establish rules for writing word breaks (Eaton and L. Schroeder, 2012)

The tasks for literacy consultants with speakers of the language are:

- (i) propose graphemes to represent the elements of speech which are essential for written communication in the language;
- (ii) propose spelling rules which people can learn to follow;
- (iii) test people's ability to read with comprehension and fluency;
- (iv) study speakers' perception of a difficult-to-read sound, morpheme or syllable structure.

In order to convey this interdependence of disciplines, we have provided (in section 5) real, documented examples of African orthography issues, but our main characters, a linguist and a literacy expert, are fictitious.

5. OUT OF THE LINGUIST-LITERACY OFFICE

This section exemplifies the tension between strictly representing a language's phonology and representing visual recognition of meaning.

5.1. The linguist

Njeri is specialized in the domains of phonology, morphology and syntax. As a typical linguist in East Africa, she looks not only for surface sounds produced by Speaker A and Speaker B. She notes subtle variations in their speech, and looks for patterns that may indicate underlying rules that govern the speech and understanding of the language she studies. This helps her come up with a list of sounds that make a difference in the meanings of words, phrases and sentences in the target language, the *phonemes*.

She loves finding hidden patterns in the stream of speech, bringing to the light of day the beautiful complexity and functionality of its phonology. She delves into its subtle nuances, its unique selection of articulatory devices, the influences of neighboring sounds (in the stream of speech) upon one another, and the impact of morphemes upon the lower and higher strata of meaning in the language she lovingly studies. But can her phonological and morphological discoveries immediately result in a writing system for its speakers?

Of course, Njeri's list of isolated but meaningful sounds doesn't yet convey meaning to its potential readership. Njeri still has much to do in analyzing the language with her intense and loving scrutiny. She must observe how its phonemes tend to be joined together to form larger units of meaning, so she looks for the rules of the language which govern which sounds may be combined (and in what sequence) to form syllables and words.

As Njeri continues this process, she eventually posits **word breaks, affixation, sentence constituents, and discourse constituents** -- and by doing so she starts to feel the rhythm of the language! She tries to grasp the dynamics of suprasegmental influences upon sequences of consonants and vowels, such as nasalization and tone². Still, what Njeri writes and observes remains with her and the few native speakers who have assisted her in her quest for understanding.

When it's time for her to choose symbols that speakers of the language can use for reading and writing, she might benefit from input from another field. Here are some of the challenges she faces: She may find that they don't make some of the sounds in her list, except in slow speech. In rapid speech, they are dropped. The speakers are surprised to find those sounds represented on paper. The speakers never before were aware that their speech could be broken into separate words. They may suggest that Njeri put them all back into a long string of letters, or combine and break them differently. Of course, they have never read in their language before, so they, too, are very inexperienced at this. The speakers may have learned, from exposure to a neighboring language with a different sound system, to distinguish some sounds which really make no difference in meaning for them. There may be so many symbols on the page that would-be readers are frustrated or confused about.

So Njeri realizes that there is some tension, a conflict, between the grammar and the sounds of languages when they are written down and speakers have to read them. The following examples illustrate

² For Njeri it is as though a symphony plays in her mind, with several streams of melodies and rhythms, carrying the speech of the people, but the counterpoints of the different features influence what is produced by the others!

this tension. The Ngoreme language of Tanzania, part of Bantu E40 (Higgins, 2013:30) shows the multiple levels of Njeri’s analysis, and her recommended writing rules, which reflect phrase level phonology. She recognizes the “wordness” (meaning) of the associative marker in /abagabo ba/ and /omugeni/, in the example ‘*waganga wa mgeni*’ (the visitor’s doctors). In this example /ba/ represents the associative marker also translated as *of*, or *belonging to*:

(1) **Lexical level** **Phrase level** **Phonemic writing of slow speech**
 /ba omugeni/ → [bomugeni] → <ba omugeni>

On the lexical level the associative marker is a separate word, indicating possession. So the phrase *the visitor’s doctor* should be written with the associative marker /ba/ written fully, <ba>. It should show no influence from rapid-speech pronunciation. When it is spelled with word-final a, its grammatical function is instantly recognized by the reader. In rapid speech, on the phrase level, the two words seem to combine. The /a/ of /ba/ is assimilated to the first sound of the word /omugeni/, spoken together as /bomugeni/. Example (1) demonstrates the tension between writing the actual words (lexical level) and the phrase-level phonology, or rapid speech, of the language.

So what is the cause of the tension, which was demonstrated in example 1. For any given language, phonological and grammatical analyses are a first step toward language development and preservation. In a sense, developing an orthography is an attempt to develop a system for speaking that is created in the absence of a speaker from his/her intended audience.

What the above example illustrates is that writing cannot always represent speech completely, and since it is usually *visual*, rather than spoken, it might only represent speech imperfectly. In most cases, it can only attempt to represent the stream of speech sequentially (something it cannot completely achieve). Somehow, the writing system has to represent more than a series of sounds: it has to communicate meaning too and that is where the tension between grammar and speech can lie.

But something is missing in Njeri’s story. She doesn’t know how each sound or each word/morpheme is perceived by native speakers. Therefore, she may not know that spelling a small but very important grammatical word will actually facilitate fluent reading. When she uses her phonological data as the basis for spelling rules for Ikizu (in the Kuria E.40 branch of Bantu) noun phrases, she comes up with spellings like these below. (The parentheses show the slow-speech pronunciation of each 2nd noun.)

noun class	1 st noun	associative	2 nd noun
1/1a	umuryakari	wa	(a)baana
2/2a	abaryakari	be	(e)kesebe
3	umuri	gwi	(i)nyumba
4	imiri	ji	(i)ngiri
5	iriitu	ryo	(o)bore
6	amaatu	gu	(u)mwana
7	ekesebe	chu	(u)mugundu
8	ebesebe	bya	(a)baana

This table
noun
in which

9...	engwe	ye	(e)kesebe
20	ugutu	gwa	(a)baana

shows
phrases
one noun

is followed by an associative, then another noun. In rapid speech, the final vowel of the associative marker always elides. The only vowel people can hear is the one at the beginning of the second noun, its pre-prefix. This is shown in parentheses. In the writing rule shown, the pre-prefix is removed from the second noun and appears at the end of the associative.

By establishing such a writing rule, Njeri was only thinking about sounds of rapid speech, or phrase-level phonology. This spelling decision can restrict reading fluency and comprehension for normal and advanced readers. Writers of the language will remove the augmentative from the front of each second noun it precedes and place it where the /a/ of the associative marker was. The associative markers now have myriad forms, and all of the second nouns, normally appearing without vowels at the beginning, e.g., <ba ekesebe> and <wa abaana>, look like this: <be kesebe> and <wa baana>. Readers may be slow to recognize both the nouns in the second column and the associative markers in the middle of the Ikizu noun phrases, because the associative markers are not recognizable from their word-final vowel, and the second nouns' vowel prefixes have been moved to the end of the associatives. Readers may have a problem in comprehending that this noun phrase is an associative noun phrase, which will slow down readability.

5.2 The literacy consultant

To solve the above tension shown with the associative marker of Ikizu, Njeri needs the input of the literacy consultant. In order for people to read any language, they will have to learn to attend to some aspects of their language they never before noticed and that goes beyond linguistics. Some adjustments may be required for reasons of spelling. How can Njeri learn all their perceptions of their speech/meaning? She is out of her element now.

Omonge, the literacy consultant, has a few tools up his sleeve. He brings with him a background of study in learning theory, auditory/visual discrimination, testing of perception, applied linguistics, and teaching methodology. He is ready to apply Njeri's analysis of the language to the development and testing of an orthography. He is prepared to work with speakers of the language as they put their speech into writing.

Omonge recommends that word-level spelling be the guide for readers and writers, so they will be recognized by their consistent appearance³. Not only does word-level spelling facilitate consistency of appearance for both the associatives and the nouns, but it will make instant recognition of meaning possible. Omonge suggests the following:

noun class	1 st noun	associative	2 nd noun
1/1a	umuryakari	wa	abaana
2/2a	abaryakari	ba	ekesebe
3	umuri	gwa	inyumba
4	imiri	ja	ingiri
5	iriitu	rya	obore
6	amaatu	ga	imwana
7	ekesebe	cha	umugundu

³ As Constance Kutsch Lojenga says, nouns and verbs "should be written consistently in their complete form" (2014: 88).

8	ebesebe	bya	abaana
9...	engwe	ya	ekesebe
20	uguutu	gwa	abaana

Much of Omonge’s success will hinge upon the quality of Njeri’s linguistic analysis, and the attention he pays to: a) surface and underlying word structures like those in the example above; b) co-occurrence restrictions; c) elements which cannot be isolated in speech; d) supra-segmentals (to be explained in section 5), and e) discourse elements (not tackled in this paper).

Omonge is equipped to investigate the perceptions of the Ikizu people, visually and auditorily, as they impact the writing of their language. He will, with the help of Njeri and interested future users, assess which aspects must be represented graphically, and which can be ignored.

Omonge, Njeri and the users of the orthography must address the following orthography concerns: symbols already used in a language of wider communication, and their relative “fit” to the phonology of the language; spelling conventions which are fairly intuitive for people; how to handle changes in the sounds within syllables and words in certain environments; providing visual contrasts which facilitate (rather than impede) recognition of phonemes; syllables, words and phrases; people’s degree of *awareness* of certain elements of their language which will need to be written; dialectal variations in pronunciation; ease of handwriting and spelling the language; the changed appearance of some morphemes in certain environments and whether the changes affect comprehension/word recognition; best spellings of words borrowed from other languages; and the typical pressure the literacy consultant and the linguist will be under to make the language’s written form look like the language of wider communication, regardless of its unique sound system.

Omonge must attend to the following linguistic considerations in developing literacy materials with the orthography users: phonemes, suprasegmentals, word breaks, sentence constituents, syllable structure, affixation, and discourse elements, as mentioned earlier. This is now the time when all of Njeri’s passionate efforts will bear fruit. Omonge will use her documented research in developing dictionaries, primers and other literacy materials, in teacher training, and in helping people practice their spelling rules as they write their own literature.

Both Omonge and Njeri notice that one seemingly simple orthography rule has an effect on spelling patterns for the rest of the language. When Njeri chose to write the noun phrases with elided augments (pre-prefixes) and to replace the lexical-level vowel of the associatives with those noun pre-prefixes, she was actually advocating this approach to the writing of many other grammatical words, such as conjunctions of the same language. Because people’s perception of their language is directly affected by their writing system, they will naturally apply the spelling rules for associatives and noun class pre-prefixes to other words as well.

This being the case, the speaker would apply the rule that a noun’s pre-prefix can be deleted and “moved” to the previous word, to other aspects of its orthography. This actually was the case for Ikizu, the example language used above. The result of this cognitive transfer ended up in a variety of spelling rules for conjunctions, such as <na> ‘and’. Now <na> has a variety of spellings, the four forms being: <na, no, ne, ni> (Stegen, 2013: 25). From a literacy viewpoint, this spelling rule will slow reading fluency, because the immediate recognition of meaning is lost. Readers will not recognize that the other forms of /na/ still mean *and*, seeing the many spellings of /na/ in the language:

- <na baatu> ‘na watu’ (and people)
- <ne ngoko> ‘na kuku’ (and chicken)
- <ni bisubi> ‘na viini’ (and egg yolks)
- <ni miri> ‘na mizizi’ (and roots)

There is also another Ikizu grammatical word, /ni/. It is a copula. Because the conjunction now sometimes looks just like the copula, an additional spelling rule has to be developed: the copula usually precedes a verb, so it will always be written conjunctively with the word which follows it, but with a hyphen (Stegen, 2013). It loses its “wordness” a bit, and also appears in three different forms to reflect phrase level vowel changes. One set of examples follows:

<wurya ni-muutu> ‘yule ni mtu’ (that is a person)
<gurya ni-muri> ‘ule ni mzizi’ (that is a root)
<yirya ne-ngoko> ‘ile ni kuku’ (that is a chicken)

Now, the simple word *ni* has three different appearances when it is written. Neither the linguist nor the speakers of the language, who have never read their language before, realize the effect this spelling rule will have on their reading speed and comprehension, but Omonge does. He suggests a solution, just like the one for the spelling of the associatives, providing a consistent appearance for conjunctions and also a consistent appearance for succeeding nouns, leaving their prefixes and pre-prefixes attached. He knows that after only a few hours of practice in reading, readers will recognize both words and read with speed and naturalness.

The conclusion is that the Bantu conjunction should probably always be written as one word, because virtually every person tested or interviewed is aware of its underlying, lexical-level form: <na>, and because of its mobility and substitutability in a sentence (Kutsch Lojenga 2014: 92-93; Eaton and Schroeder 2012: 230). Even if people drop its /a/ sound in rapid speech, when it always precedes a noun, Ikizu speakers’ awareness of /na/, meaning *and* remains. People reading aloud will quickly learn to pronounce it naturally, if it is written uniformly as <na>. For example, Ikizu speakers would immediately recognize both the conjunction <na> and the nouns which follow it with this spelling rule:

<na abaatu> ‘na watu’ (and people)
<na engoko> ‘na kuku’ (and chicken)
<na ibisubi> ‘na viini’ (and egg yolks)
<na imiri> ‘na mizizi’ (and roots)

After proposing these simplifications to the writing system, Omonge will train readers and writers for at least a year, giving them lots of practice. Then he’ll test their spelling ability and their fluency and comprehension, to see if these rules have helped them. He will observe their reading and ask them what they struggle with as they read. Areas in which readers struggle will be clues to him: something like a phonemic contrast is under- or over-represented, something does not match their perception of a word, a syllable, a melody, or a morpheme.

What works for most new orthographies all over the continent is a simple principle both linguists and literacy consultants must apply: following phonological rules on the lexical (word) level, because it most closely matches people’s understanding of their language: both its sounds and its meaning (Snider 2014: 28).

Both the linguist and the literacy consultant know that orthographies are compromises on many levels. They need to ensure that both sound and meaning are accessible visually. An example of the struggle for dominance between representing meaning (the morphology of the language) and the sounds (phonology) is the following example from the Tharaka language (E.57). Readers, highly aware of the phonemes of their language, will benefit from seeing their phonology represented as closely as possible *within* words. An example in which phonology (sounds) trumps morphology (meaning) in spelling is the Tharaka word *talkative*, /yoogu/.

Its prefix is /ya/, but when /a/ is followed by /o/ in the root, Tharaka phonological rules dictate the pronunciation [yoogu] (Kithinji et al. 1999: 6). The spelling of the word matches its pronunciation although the appearance of the prefix is altered from the morphological /ya/ to the morphophonological /yo/, because when two different vowel phonemes adjoin across morpheme boundaries, the first one assimilates to the sound of the second one. This rule works for Tharaka readers, because the speakers are aware of this word-internal change and expect to see it written (see Kutsch Lojenga 2014: 86-87). Writing word-internal changes which mask the morphemes in a word, but which acknowledge the speakers’ awareness of the change, is something they will usually insist upon. This is writing on the lexical level, because of the morphophonological rule motivating it.

5. PHONEMIC CONTRASTS VS. FACILITATING LEARNING

The Maa languages of Tanzania and Kenya are Nilotic languages, and the conflicts between representing

their phonology and their morphology are quite different. Here the linguist and the literacy consultant have to solve the problem of the conflict between representing all phonemic contrasts and the psycholinguistic factors which facilitate learning, as in the following example from Maa.

Maa has nine contrastive vowel phonemes, which Njeri wants to write: /a, e, ε, i, i, o, ɔ, u, ʊ/ (Payne 2012). This is not the end of the Maa vowel inventory, however. Virtually every one of these vowel phonemes can be combined with every other, in one syllable. Diphthongization, or loss of syllabicity between adjoining vowels which makes the combination a syllable nucleus, happens when a high vowel, either /i/ or /u/, adjoins another-vowel. Njeri's list of phonemic vowel contrasts is now very large indeed, including these most frequent diphthongs: /ie/, /io/, /ei/, /eu/, /ui/, /uε/, /uo/, /oi/, /au/, /ai/, /ei/, and /ia/.

For the literacy consultant, this means an inventory of thirty-one vowel symbols that Maasai readers will have to master---but that is not all. Another linguist discovers that tone has great importance in Maasai communication (Kent Rasmussen, personal communication 2012). Maasai parents actually do not mention the under-differentiation of their nine vowel contrasts in the Maasai Bible. What they complain about to the linguist is their children pronouncing their melodies incorrectly, and the fact that they (the adults) cannot understand what they "read" in the Bible.

So when a group of Maasai community representatives met to discuss their orthography in 2012 (Trudell and Adger 2013: 7), they voted in favor of high and low tone being distinguished, with high tone written with an accent mark above each vowel. The community voted in favour of tone representation over the representation of the phonemic vowel inventory. They decided that their nine vowels would be written as five, like Swahili. The decision made both Njeri and Omonge a bit sad, but Omonge realized that if they had not decided to under-differentiate the nine-vowel contrast, the first and second-grade Maasai children would still be learning their vowel symbols well into grade 3, because they would have been faced with complex symbols indeed, because tone marks were added above them, resulting in 62 vowel graphemes they must recognize. The literacy consultant saw the value of under-differentiating the vowel contrasts in this unique case. Both of them, Njeri and Omonge, as well as the community, felt that tone should be given priority in their writing system.

In summary one can say that African writing systems must represent the most important features of both linguistic analysis and learning abilities, and this requires not just linguistic analysis but testing, at various stages of orthography development, of the effectiveness of the spelling rules. Are readers struggling to understand what they decode? Can they read fluently after a year of practice, or is it slow going still? Do they have to reread some words or phrases and do they alter their pronunciation?

Successful orthographies, like good marriages, are always the result of some compromise between readability and representation of the linguistic features of a language. Being visual, writing systems cannot represent the sounds of speech perfectly. For the users to easily access the most important features of their language in writing, orthographies should always be developed with the following in mind:

- (i) linguistic analysis of phonology and grammar;
- (ii) development of readers' and writers' materials; and
- (iii) testing of readers' comprehension and fluency.

6. CONCLUSION

This paper has demonstrated the tension between two linguistic disciplines in developing an orthography. A purely phonemic writing system can hide some morphological features, as shown in several Bantu noun phrases for the Ikizu language (Kuria E.40). A writing system that is purely phonemic and represents only grammar can also overly complicate reading if the representation of both (phonemes and grammatical features) results in 62 vowel symbols (including the high tone mark), as in the Maa example. On the lexical level (within words), we have shown how prioritizing phonology over grammar, may mask affixes, as in the case of Tharaka (E.57).

Readability considerations complicate but also clarify the orthography picture in these examples. They are extremely important for the users, so that they can read with both fluency and comprehension. There must be some compromise between the two fields of study, illustrated here with fictitious

characters: a linguist and a literacy consultant. Balancing, or compromising, the discoveries of both can result in the development of effective writing systems.

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