Designing Optimal and Supradialectal Orthographies

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1.0 Introduction

The terms "optimal" and "supradialectal" in reference to orthographies are borrowed from Halle and Chomsky (1991:48-54).   They claim that English orthography is optimal because it reflects closely the abstract underlying representation of the language. They also note that it is supradialectal because it meets the needs of multiple dialects of English around the world. The goal of this presentation is to investigate further the characteristics of optimal and supradialectal orthographies with the purpose of proposing an orthographic approach that can be used to write African languages. Such an approach should meet both the optimality constraint and the supradialectal criterion.   Given the complexity of issues involved in designing an orthography, a multidisciplinary approach such as the one represented in Diagram 1 below will be used:
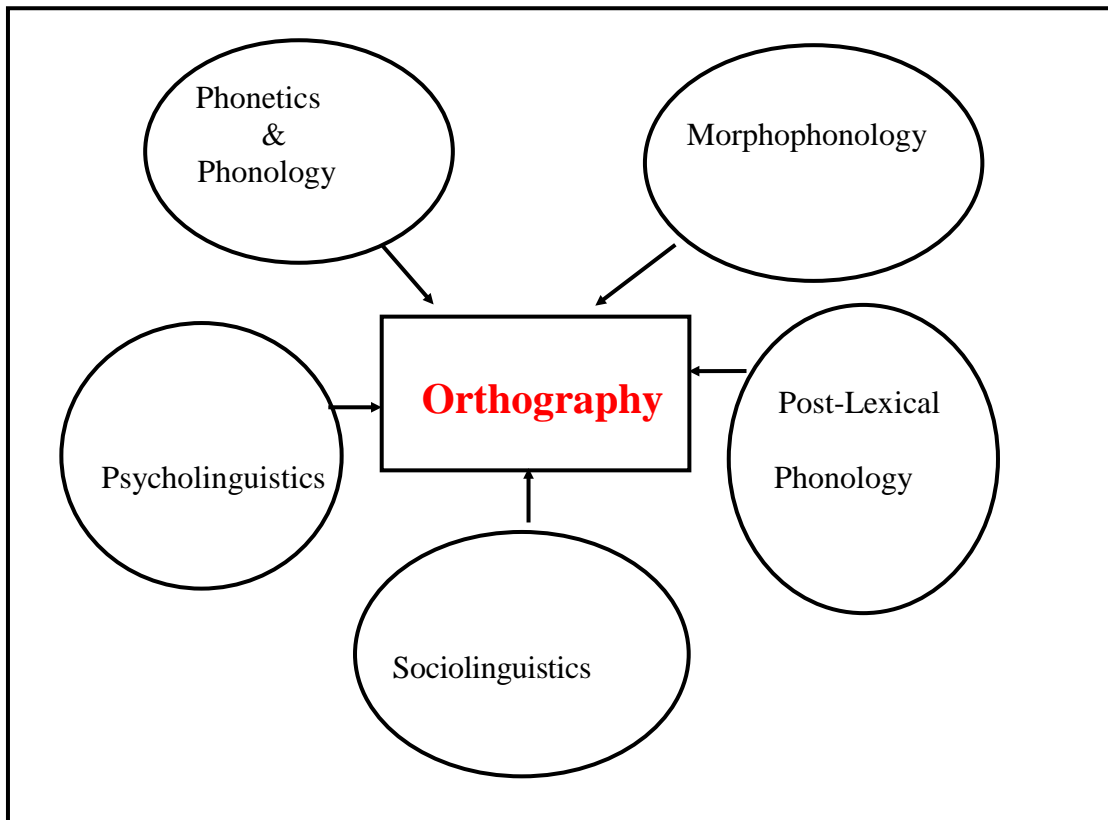

Diagram 1: Overall Architecture

The discussions in this paper assume that a preliminary and somewhat exhaustive analysis of the phonetic, phonological, and morphophonological components of the language being reduced to writing has been made.

2.0 The Unification or Dialectalization of African Languages

It is a sociolinguistic truism that all languages have dialectal variations. These variations have led to two orthographic options: the hegemonic and the supradialectal. For the most part, the orthographies of languages currently being reduced to writing follow the hegemonic option. The hegemonic model is best represented by the following quote from Wiesemann (1989:17-8):

> In developing a written system, it is important to *choose one* of the several dialects as `reference dialect,' the norm to be written. The speech variety chosen for this usually has some kind of prestige because many people speak it, because it is used in church, or in administrative functions, because it is spoken in the city or because an important person speaks it. Another reason why a special speech is chosen might be its intercomprehension with other dialects. (Italics added for emphasis)

Nearly three decades of application of the hegemonic model has led to the proliferation of dialectal orthographies. It is not uncommon today to see parallel orthographies for the same African language. This situation prompted Gilbert Ansre a decade or so ago to ask this very penetrating question: "Are we unifying or dialectalizing African languages?" Anyi, a Kwa language spoken mostly in eastern Cote d'Ivoire, can be used to illustrate this trend. There are at least four parallel orthographies currently being used by the Bona, Indenie, Morofou and Sanvi dialects of Anyi. With a little bit of imagination and good will, all these dialects could use a single orthography. The same is true for dialects of the same language spoken across national boundaries. For instance, the dialects of Moba spoken in both Togo and Ghana could benefit from a single orthography. Similarly, Kabyè and Lopka could benefit from a single orthography. A single orthography could be envisaged for scores of other languages/dialects because in most of these cases the speakers have no difficulty whatsoever understanding each other in oral communication.

2.1 The Supradialectal/Optimal Model

In his reflections on how Generative Phonology might apply to orthography, Chomsky (1970:282) made a remarkable statement that has gone virtually unnoticed by linguists designing orthographies for unwritten languages. He stated that "differences in phonological rules are irrelevant, since orthography corresponds to a deeper level of representation than (broad) phonetic." In *Sound Patterns of English*, Chomsky and Halle (1991:48-49, 54) elaborated further on this statement by arguing repeatedly that English orthography is optimal because it reflects closely the abstract underlying representation. They justify their claim as follows:

> It should be observed that *different dialects may have the same or very similar system of underlying representations*. It is a widely confirmed fact that underlying representations are *fairly resistant to historical change*, which tends, by and large, to involve late phonetic rules. If this is true, then the same system of representation for underlying forms will be found over stretches of space and

time. *Thus a conventional orthography may have a very long useful life, for a wide range of phonetically divergent dialects …* Clearly, reading will be facilitated to the extent that the orthography used corresponds to the underlying representations provided by the grammar G. *To the extent that these correspond, the reader can rely on the familiar phonological processes to relate the visual input W to an acoustic signal. Thus one would expect that conventional orthography should by and large, be superior to phonemic transcription, which is in general quite remote from the underlying lexical or phonological representation and not related to it by any linguistically significant set of rules.* On the other hand, for an actor reading lines in a language that he does not know, phonemic transcription[2] should be much superior to conventional orthography, since it can be read without comprehension, whereas conventional orthography, being close to the linguistically significant system underlying ordinary speech, can be read only when the surface structure (including the internal structure of words) is known, that is, when the utterance is to some degree understood.

(Italics added for emphasis)

3.0 Overview of Orthographic Models

Before embarking on a full exposition of the benefits of a supradialectal orthography for African languages, we must first define the main orthographic models within which world languages have been classified. Orthographic models fall into three the three main patterns, as shown by Diagram 2 below:

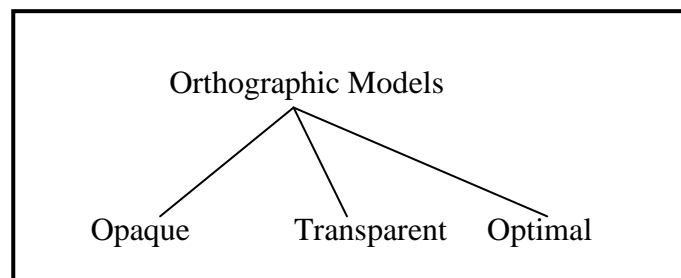Orthographic Models

Opaque   Transparent   Optimal

Diagram 2: Classification of Orthographic Models

An opaque orthography is an orthographic model in which there is no one-to-one correspondence between the graph and the phone. English and French are often cited as the prototype of opaque orthographies. It is widely accepted that the process of reading in such orthographies are cognitively taxing because the reader has to compute and apply many phonological rules to the written form before arriving at the correct phonetic realization. In opaque models, it is not uncommon for a single grapheme to have many different phonetic realizations. A case in point is the various pronunciations of the grapheme <t> in English, as found in the following words:

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[2] Halle and Chomsky and other writers tend to use "phonemic transcription" and "phonetic transcription" synonymously.

N0	**Spelling**	**Pronunciation**
1.	<tattoo>	[tʰætʰu]
2.	<stop>	[stɑp]
3.	<better>	[bɛɾɚ]
4.	<bet>	[bɛt̚]
5.	<cautious>	[kɑʃəs]
6.	<fasten>	[fæsə̃n]
7.	<bitten>	[bɪʔn]

Table 1: The Grapheme <t>

For a person or a machine to pronounce <t> as an American, many phonological rules must be applied to the underlying phoneme /t/. The reading aloud process in opaque orthographies can be summarized graphically as follows:

Graphemic Representation

↓

Phonological Rules
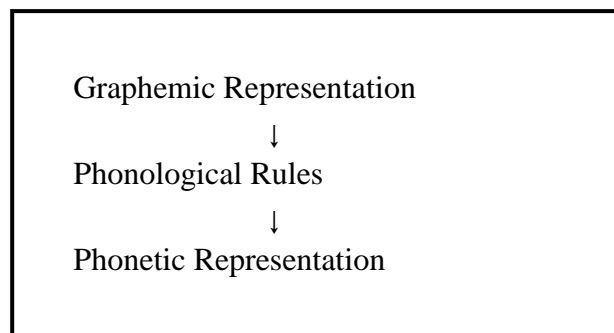
↓

Phonetic Representation

Diagram 3: Cognitive Process and Opaque Orthographies

According to this diagram, the reader of an opaque orthography must apply one or more phonological rules before he/she can read a word accurately. In some instances, several phonological processes must take place before one arrives at the correct pronunciation. This is certainly the case of <t> in the word <bitten>. The following derivations take place for an American to pronounce <t> and [ʔ] :

Underlying form: /# bɪtən#/

1. Schwa deletion: bɪt—n

2. Glottalization: bɪʔ—n

3. Syllabic /n/ rule: bɪʔ—ṇ
Phonetic Realization : [bɪʔṇ]

3.1 Transparent Orthographies

In contemporary orthographic practice, linguists tend to avoid opaque orthographies because of the cognitive burden it places on readers. In so doing, they have opted for transparent orthographies. Such orthographies are based on the phonemic principle that Sgall (1987:10-11) has redefined as follows:

Phone-to-Graph Correspondence Principle
Uniqueness of pronunciation, uniqueness of spelling.

Haas (1970) argues that this principle has elevated phonemic orthography so high on the pedestal of orthographic theories that it is viewed as the standard of excellence against which any orthography, established or proposed, is judged. Most orthographies being designed for African languages are transparent.

Transparent orthographies are maximally easy to read. There is a clear one-to-one correspondence between the graph and the phone. This eliminates the need for phonological rules that mediate between the graphemic representation of words and their phonetic realization. The reading process involved in transparent orthographies can be diagrammed as follows:
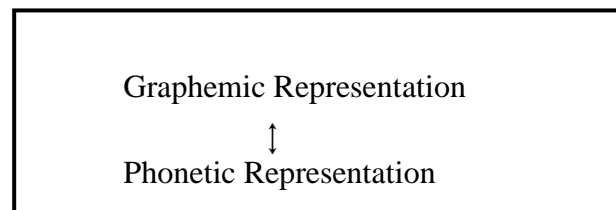
Graphemic Representation
↕
Phonetic Representation

Diagram 4: Cognitive Process and Transparent Orthographies

The readability of transparent orthographies comes at a cost. They have a serious side effect in the sense that such orthographies tend to be hegemonic. They invariably reflect the pronunciation patterns of a single dialect. The use of such an approach has led to the present-day proliferation of parallel orthographies in many African languages. Bender (2002: 90-117) has argued rather convincingly that parallel orthographies are to blame for low literacy levels in Cherokee.

3.2 The Search of a Supradialectal Model

The sociolinguistic limitations of transparent orthographies outweigh their cognitive processing advantage during the reading process. Such orthographies can be learned very easily by the speakers on whose dialect the spelling system is based. But when speakers of other dialects try to learn it, they find that in some cases, they have to undo some phonological processes used in their own dialects. Given these drawbacks, a supradialectal model is urgently needed for African languages. Such an orthography must accomplish two things at once. It must represent the underlying phonemic representation of words while adhering faithfully to a graph-to-phone correspondence. This orthographic model must also draw from the strengths opaque and transparent

orthographies while discarding their weaknesses. This superior model could be represented by the following diagram:

Underlying Phonemic Representation

$\updownarrow$

Graphemic Representation

$\downarrow$

(Phonological Rules)[3]
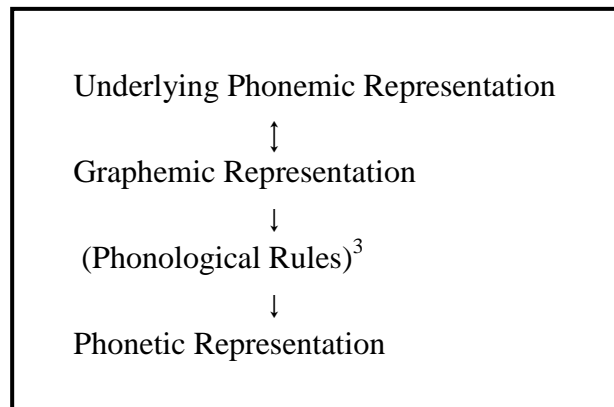
$\downarrow$

Phonetic Representation

Diagram 5: Cognitive Process and Supradialectal Orthographies

Spanish comes very close to exemplifying this model. In Spanish the number of graphemes correlates very well with the number of phonemes. As a result, the spelling of a word is almost identical to its underlying phonemic representation. This affords the Spanish orthography its unsurpassed readability quality.

4.0 Application of the Optimal Model to Anyi Orthography

Let us now show how an optimal model may be used to create a supradialectal orthography for the Anyi language. A number of phonological processes could be used to illustrate the point, but we limit our investigation to **CC-Cluster Formation, Initial Vowel Deletion** and **Cliticization**. These processes were chosen because they are found in other West African languages. These same issues are known to have contributed to the existence of parallel orthographies in other languages.

4.1 CC-Cluster Formation

This is a very widespread phonological process which consists in deleting the first vowel of disyllabic words in which an approximant consonant occurs intervocalically. The Wave Theory in sociolinguistics helps explain this phenomenon in Anyi. It seems that the epicenter of this phenomenon is located in the Baule-speaking area. Consequently, the Anyi dialects that are closer to Baule delete the first vowel in similar environments. However, the further one moves from the epicenter, the less often the vowel is deleted. Since the Sanvi dialect is geographically the furthest removed from the Baule-speaking area, CC-Cluster formation is less pronounced. The rule can be stated informally as follows:

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[3] The arrows pointing in both directions underscore the grapheme-to-phoneme correspondence between the underlying phonemic representation and the graphemic representation. The parentheses around "Phonological Rules" mean that sometimes it may be necessary to apply phonological rules while reading but in other cases, one may arrive at the phonetic realization directly by taking cues from the graph.

CC-Cluster Formation Rule
Delete the first vowel in a CVCV word where the second C is [+approximant].

/CVCV/ /bàlá/ = woman
↓ ↓
First Vowel Deletion Rule bØ l ă
↓ ↓
[CCV] [bl ă]

The word /bàlá/ (woman) has different pronunciations in different Anyi dialects. In the Sanvi area, the first vowel is clearly audible. In the Morofou area, the first dialect is completely deleted. Closer to the Indenie area, the first vowel is reduced to a schwa. In the Bona dialect, not only is the first /a/ reduced to /ə/, the lateral consonant /l/ becomes an alveolar flap represented by Eschalimann and Jaboulay (1980:166) as /ɾ/. Each dialect of Anyi represents the word for <woman> as it pronounces it. However, the underlying phonemic representation /bàlá/ is same in all these dialects. All Anyi spelling systems would benefit greatly if the same word for <woman> were written everywhere as <bala>. Each dialect would be at liberty to apply the phonological rules it uses to arrive at the correct pronunciation. This spelling could even meet the spelling conventions of Baule and bring the orthographies of the two languages even closer.

4.2 Initial Vowel Deletion
Most Anyi words are CV(CV). However, there is a substantial amount of words which begin with an initial vowel. In certain constructions, especially in the genitive, the initial vowel is often deleted, as is the case in the second sentence "b" below:

Sentence "a": Kàsí a tó èlúò
Kasi perfective buy yam
Kasi bought yam

Sentence "b": Kàsí ─ lúò
Kasi possessive yam
Kasi's yam

We notice that the initial vowel /e/ of the word [èlúò] is deleted in the genitive construction. However, in sentence initial position or in other environments, the initial vowel remains. An orthography based on the phonetic representation of words will be forced to have two spellings for the same word, once as <luo> and another as <eluo>. Similarly, the same word would have to be entered twice in the dictionary. This is clearly a non-economical way of dealing with this situation. An optimal orthography would spell "yam" as <eluo> in all dialects because it is closer to the underlying representation of the word. In the reading, learners would be taught to delete the initial <e> if their dialect permits it.

An additional advantage of this spelling is that it satisfies the **Uniqueness of Lexical Representation Constraint** proposed by Chomsky (1970:282):

Uniqueness of Lexical Representation Constraint
Each lexical item must have a unique spelling.

The same principle is stated slightly differently by Jones (1967:227) as follows:

Subject to rare exceptions, each word should be written in *one way only*, and its orthography form should in most cases be based on the pronunciation it has in isolation.   (Italics added for emphasis)

4.3 Cliticization

Clitics are usually pronouns which have such a weak phonetic realization that they tend to be either entirely deleted or reduced. In Anyi, direct object pronouns often undergo cliticization by deletion. However, they leave a syntactic trace that shows up phonetically as vowel lengthening, as shown in the following examples:

Sentence "c": Kàsí á   já   Sòmàlà
              Kasi past marry Sòmàlà
              Kasi married Sòmàlà

Sentence "d": Kàsí á   já   yì
              Kasi past marry her
              Kasi married her

Sentence "e": Kàsí á   jâ   ⸻
              Kasi past marry her
              Kasi married her

In sentence "e", the pronoun <yì> is deleted. However, a phonological rule of vowel lengthening applies to the final vowel of the verb and lengthens it. This phenomenon has been frustrating to capture orthographically in a number of languages, including Fon, a language spoken in southern Benin. The questions that orthographers have grappled with in this case are the following. Should the phonological process vowel lengthening which is the direct result of cliticization be represented in the orthography or not? Opinions differ on this very matter. However, an optimal orthography would recommend representing the full form of the direct object pronoun in the orthography because this form is found in all the dialects.

5.0 Morphophonology and Optimal Orthographies

Chomsky and Halle (1991) do not go so far as to claim that English orthography is fully optimal. They only say that it is "near" optimal. Pinker (1994:190) argues that "for about eighty-four percent of English words, spelling is completely predictable from regular rules." There are several reasons for this near optimality. For one thing, English orthography does not follow a single principle when it comes to morphophonology. In some instances, the orthography reflects the underlying morphophonological form, but in others it does not. As a general tendency, the English spelling system is optimal in its dealing with suffixes but not optimal when it comes to prefixes, as shown in the examples below:

N0	Spelling	Pronunciation
1.	<kicked>	[kʰɪkt]
2.	<seized>	[siːzd]
3.	<dreaded>	[drɛdəd]

Table 2: The Allomorphs of <-ed>

In the examples in Table 2, the suffix <-ed> has the same spelling even though this morpheme has three different allomorphs, [-t], [-d], and [-əd]. Similarly, the suffix <-s> has three different allomorphs [-s], [-z], and [-əz] as in the examples in Table 3:

N0	Spelling	Pronunciation
1.	<kicks>	[kʰɪks]
2.	<judges>	[dʒʌdʒəz]
3.	<dreads>	[drɛdz]

Table 3: The Allomorphs of <-s>

It appears from these examples that English orthography represents the underlying morphophonemic information by writing the past tense morpheme as <-ed> everywhere. However, this observation is not true for prefixes. The negation prefix <-in> has different orthographic forms depending on the phonetic nature of the first consonant of the root to which it is attached. This is shown clearly by the examples in Table 4 taken from Kaplan (1995:100):

N0	Spelling	Phonemic Form	Pronunciation
1.	<impossible>	/inpɑsəbl/	[ĩmpɑsəbl̩]
2.	<imbalance>	/inbæləns/	[ĩmbæləns]
3.	<indecisive>	/indisɑɪsiv/	[ĩndisɑɪsiv]
4.	<inedible>	/inɛdibl/	[ĩnɛdibl]
5.	<inhuman>	/inhjumən/	[ĩnhjumə̃n]
6.	<infallible>	/infælɪbl/	[ĩnfælɪbl̩]
7.	<inglorious>	/inglɔriəs/	[ĩŋglɔriəs]
8.	<illegal>	/inligl/	[iliːgl]

9.	<irreverent>	/inrɛvərənt/	[irːɛvərənt]

Table 4: The Allomorphs of <-in>

Upon closer examination of affixation, it appears that English orthography follows two distinct principles in its orthographic representation of allomorphs. In general, morphemes whose allomorphs are based on homorganic assimilations are represented in the orthography. However, if a morpheme has allomorphs and these allomorphs that are not derived from homorganic assimilation, only the underlying form of the morpheme is represented in the orthography. This observation can be illustrated by how the morphemes <in->, <syn->, and <con-> are spelled as opposed to the morphemes <-ed>, <-s>, <-ure>, <-ity>, etc. The apparent "inconsistencies" in the representation of morphemes in English orthography led Fromkin et al. (2007:526) to draw the following conclusion between English morphophonology and reading (spelling too): "To read English correctly morphophonemic knowledge is required. This contrasts with a language such as Spanish, whose orthography is almost purely phonemic." Obviously this discordant representation of allomorphy is not advantageous for languages being reduced to writing. Consequently, a better approach must be used in representing morphophonological alternations in spelling systems of African languages.

6.1 Exceptions to the Optimality Principle

It seems that languages can depart from the optimality model without sacrificing the supradialectal nature of the orthography. This is so because, as noted by Wardhaugh (2006:5-8), dialectal variations in morphophonology are uncommon. This supports the allomorphic principle proposed by Koffi (1990:137):

Allomorphic Principle

Allormorphic alternations whose places of articulation are substantially different from the underlying morpheme should have separate graphemic representation in the orthography.

Representing allomorphic variations in the orthography actually reduces the amount of cognitive computation when reading out loud. Greek orthography offers a good model to follow in this respect. Greek orthography represents a number of allomorphic variations. When a verb stem ends with labial consonants such as /π, β, ϕ/ if the future suffix **<-σ>** is added, these consonants are spelled as /ψ/. Similarly, when the stem ends in a velar consonant /κ, γ, ξ/ the affixation **<-σ>** changes the spelling of these graphemes into "χ". Finally, the presence of the suffix **<-σ>** causes the deletion of the alveolar sounds verbs /τ, δ, θ/ at the end of verbs. All these morphophonological changes are represented in the Greek orthography. The analysis of the orthography of numerous languages seems to suggest that representing allomorphic variations enhances the overall readability of the written language.

In implementing the allomorphic principle, one would do well to pay attention to the advice given by Householder (1971:148), namely that "types of sounds never distinguished by the native speaker need not be distinguished in writing." Anyi has a perfective suffix <-lɪ> which undergoes morphophonological alternations. The vowel [ɪ]

changes to [i] depending on the [ATR] value of the vowels in the root. However, since most native speakers are not aware of this change, it is absolutely unnecessary to represent this morphophonological alternation in the Anyi orthography. However, other allomorphic changes such as consonant mutations must be clearly noted in the orthography because native speakers are aware of these alternations.

7.0 Optimal Orthographies and Tone

One of the most vexing problems in reducing African languages to writing is the problem of tone. Traditionally, three main positions have been proposed:

1. Toneless orthography
2. Full tone marking orthography
3. Selective tone marking

However, none of these proposals is entirely satisfactory. Toneless orthographies have been universally criticized for their unfaithful representation of meaningful elements of the language and for slowing down the reading process. The following quote from Lucht (1978:26) illustrates the practical problems that readers of toneless orthographies face: "It is because of tone that I've had to go back and reread several times what I wrote the day before in order to know what I meant on this translation work I've been doing. We all have to do something about it. What shall we do?"

7.1 The Drawbacks of Fully Marked Orthographies

In reaction to toneless orthographies, some have proposed marking tones fully. However, this proposal has come under attack recently. Bird (2002, 1999a, 1999b) has shown through a series of articles that such an approach does not work. The main reason for such a failure is well known: the emphasis has been on writing phonetic tones. However, it is well known that phonetic tones are elusive. Tones in African languages routinely undergo downstep and/or downdrift. The interaction between syntax and intonation disturbs tonal patterns frequently. Paralinguistic factors such as emotion and expressiveness affect phonetic of tones as well. Consequently, there are differences on how speakers of tone languages perceive phonetic tones. Moreover, it is cumbersome and tedious to write tones on all tone bearing elements. Furthermore, Bird (2002) and others have found that marking more tones does not translate into better reading. Tone density has been shown to disturb reading fluency.

7.2 Selective Tone Marking

   Selective tone marking consists in writing lexical and grammatical minimal pairs in which tone is the only distinctive feature. Wiesemann (1989:16), one of main the proponents of the full tone marking, is also one of the most vocal critics of the selective tone marking approach. She points out the following reason for rejecting this approach:

> It should be mentioned here that a system which marks tone where it is minimally different in individual words is not a good system. In such a system, for each individual word one must learn whether it carries a tone mark or not. To mark low tones only on words where there is a minimal tone pair makes the teaching of tone a matter of memory, rather than a matter of rules linked to pronunciation.

Longacre (1964:133) concurs with this assessment by noting that selective tone marking "presupposes that one has already made a list of all the words in the language to see which ones are minimal pairs. Such a claim is pretentious since most newly written languages do not have good dictionaries." Smalley (1964:41) also rejects selective tone marking because "it represents the speech system of the language in such an inconsistent way, it compounds the learning problem seriously and, in many cases, means that the reader never learns to use the tone symbols at all because he meets them in such an inconsistent fashion."

7.3 Optimal Tone Marking Proposals

   Spanish is an accent language, not a tone language. However, how Spanish deals with issue of accent can serve as the foundation for an optical representation of tone in West African languages. Spanish relies on two main methods. It uses accentual diacritic to distinguish between lexical/grammatical minimal pairs, as in the following examples:

N0	Minimal Pairs
1.	<cómo> vs. <como>
2.	<sí> vs. <si>
3.	<esta> vs. <está>
4.	<qué> vs. <que>
5.	<él> vs. <el>
6.	<mí> vs. <mi>
7.	<exclamó> vs. <exclamo>

Table 5: Minimal Pairs in Spanish

   Spanish also uses diacritic accent marks to help the reader pronounce accurately words whose accent deviates from normal patterns. When a word has an accentual pattern that deviates from the general rule, Spanish orthography explicitly indicates the change by marking the accents on on the word. Here are a few examples: <espíritu>, <Gálata>, <corazón>, <apóstol>, <dádiva>, <árbol>, <automóvil>, <típico>, <éxito>, <según>, <ningún>, <algún>.   Finally, the Spanish orthography also helps readers to pronounce correctly verbal forms to which a complement pronoun is suffixed even though this pattern is predictible: <mirándose>, <enséñame>.

7.4 Learning from the Spanish Model

An optimal orthography for West African languages can follow the Spanish model. Such an orthography must adhere to the tonal minimal pair principle which states that lexical and grammatical structures that are distinguished only by tone should be represented in the orthography. Only phonemic tones should be marked because phonetic tones are too elusive. Longacre's (1964:133) objection alluded to above is based more on speculation than in concrete fieldwork realities. As it turns out, there are far fewer lexical and grammatical minimal pairs distinguished by tone than previously believed. After more than sixteen years of research on Anyi, I have not yet come across more than one hundred lexical and grammatical items distinguished solely by tone. Others, Bird (1989a:17)[4] and Welmers (1973:117), have commented on the scarcity of minimal pairs based on tones alone. Therefore, the fear that many minimal pairs would go unnoticed is unfounded. Additionally, following the example of how Spanish marks accents on words with irregular accent patterns can give clues in the orthographic representation of tones in African languages. Maddieson's (1978:342) finding on the universal tendency on tone is very helpful in this regard:

Tone Universal Tendency
Systems in which high tones are marked [fewer] are more frequent than systems in which low tones are marked.

If this finding is used in conjunction with Williamson's (1984:42) recommendation below, we arrive at optimal orthographies in which high only underlying high tones are indicated in the orthography:

Tone Economy Principle
If we are marking the tones fully in the language, we can reduce the number of diacritics used by agreeing to leave the most common tone of the language unmarked. This is a kind of spelling rule.

All these insights lead to optimal orthographies in which tones are marked in a principled fashion. Consequently, there is now no valid reason for not writing tones in the orthography of African languages.

8.0 Conclusion

It appears from this analysis that a supradialectal orthography is what is needed for African languages being reduced to writing. Such an orthography is optimal because it represents the underlying forms that are common to all the speakers of the language. A supradialectal orthography may not be necessarily transparent at all levels but it unites all the speakers of the language around a single spelling system. This has great benefits for the production and diffusion of literacy materials to all the dialects of the language. Hegemonic orthographies are transparent but they fail to unite. Furthermore, they lead to the proliferation of parallel orthographies which have been known to be an obstacle to the spread of literacy skills.

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[4] Bird (1988:17) quotes Thomas as saying that of a total of 3,000 words collected, there were only 28 tone-based minimal pairs.

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