From abugida to alphabet in Konso, Ethiopia: The interplay between script and phonological awareness

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Abstract

This study examines the interplay between phonological awareness and orthography in Konso, a Cushitic language in Southwest Ethiopia. Thirty-two adults reading the Konso abugida but with minimal exposure to alphabetic literacy completed an orally administered phoneme deletion task. The responses were then examined using the *minimal edit distance hypothesis* (Wali, Sproat, Padakannaya & Bhuvaneshwari 2009) as a framework for the analysis. The results suggest that the difficulty of a deletion was related to the way the phoneme was represented in the Konso abugida. Content-based error analysis of the incorrect responses gave indications of how Konso abugida readers' processing of sounds is linked to Konso abugida sound-symbol relationships.

The Konso language community is undergoing a change in their writing system from abugida to alphabetic writing. As abugida symbols primarily denote consonant-vowel sequences, the change requires learning new sound-symbol mappings. By examining Konso abugida readers' phonemic awareness the study contributes to developing transfer literacy teaching methods from abugida to alphabetic writing in Konso and elsewhere.

Keywords: phonological awareness, phonemic awareness, abugida, alphabetic writing system, orthography, transfer literacy, Konso, Cushitic languages, African languages

1. Introduction

Konso [kxc] is a Cushitic language spoken by 299 600 people as a mother tongue in the Konso Zone, Southwest Ethiopia.[1] The history of written Konso dates back to the 1970s, when the Konso orthography was developed, using the Ge'ez script[2] in line with the language policy of Ethiopia at the time. According to Daniels' (1990; 1996) typology of writing systems, the Ge'ez script is classified as an abugida, defined as a writing system in which a character represents a consonant accompanied by a specific vowel, other vowels being denoted by modifying the basic characters (Daniels 1996: 4). In the Ethiopian context, both the basic characters and the modifications are called *fidels*.

The Ge'ez script was developed in the fourth century or earlier for the Ethio-Semitic Ge'ez (Getatchew 1996: 569). It was used for Ethiopian languages until the 1990s, when Ethiopian language policy changed, and the new constitution of 1994 granted rights to all ethnic groups[3] in the country to develop their own language and to choose between Ge'ez and Roman scripts[4] (Mekonnen 2005: 32-3, 36; Zelealem 2012: 40). Today the Ge'ez script is used for the largest Ethio-Semitic languages, Amharic and Tigrinya, and a few other Ethiopian languages, but several language communities have chosen the Roman script, and thus an alphabetic writing system. Many of them had previously used an abugida.[5]

In Konso the Ethiopian Evangelical Church of Mekane Yesus has run a literacy programme for adults since 1993, using the Konso abugida. Church records show that between 1998 and 2016 the annual number of literacy students varied from 2562 to 4194. Most of the students have been church members, and reading religious texts, song writing and sending

[1] Source: Konso Zone, Department of Finance and Economic Development 2018.
[2] *Ge'ez script* is also referred to as *Ethiopic script*.
[3] The latest official Population and Housing Census of Ethiopia from 2007 lists 85 ethnic groups, and according to different sources the number of Ethiopian languages is from around 70 to 90 (Mekonnen 2005: 20; Eberhard, Simons & Fennig 2019; Zelealem 2012: 2).
[4] *Roman script* is also referred to as *Latin script*.
[5] Between 1975 and 1990 Ethiopia ran a national literacy campaign in 15 Ethiopian languages with the aim of eradicating illiteracy amongst the adult population (Zelealem 2012: 24-5). Ten of the 15 have now switched over to an alphabetic orthography. In addition, churches had developed abugida orthographies for a few more languages which have now changed to an alphabetic orthography.

handwritten messages have become common practices in the church community. According to the Konso parish church books, in July 2017 the church had 55 001 members, that is, about 20% of the population of Konso, and according to a rough estimate by the Konso literacy office, about half of church members are literate (personal communication, September 20, 2018).

In 2012, the Bureau of Culture, Tourism and Government Communications Affairs arranged a Language and Culture Symposium in Konso and invited community leaders, local language experts, and Konso scholars to discuss the script issue for their mother tongue. In the Symposium the decision was made to switch over to using the Roman script and to extend the use of written Konso in public life outside the church domain. To implement the decision, the Konso Language Promotion Committee, including a subcommittee for orthography development, was formed. (For a full description of the script decision, see Ongaye 2013: 2). The first mother-tongue-medium pilot classes for primary school grade one commenced in October 2017.

Meanwhile, to address the need for adult readers of the Konso abugida to learn alphabetic literacy skills, the church launched a transfer literacy programme. The results of the present study are being applied to develop an efficient transfer teaching methodology for Konso abugida readers. The church community has welcomed the script change, and abugida readers look at it as a chance to learn something new.

2. Theoretical framework

Phonological awareness (PA), the ability to recognise, identify and manipulate phonological units within words (Ziegler & Goswami 2005: 4), is widely recognised as having a crucial role in literacy learning in writing systems operating on different phonological units (e.g. Koda 2017: 78; Nag 2007: 7; Page 2017: 38-9; Richardson & Nieminen 2017: 264, 267-9; Share 2017: 165; Yin & Sun 2017: 224). Studies on the

development of PA indicate that awareness of bigger units such as syllables precedes awareness of smaller units such as phonemes (e.g. Alcock, Ngorosho, Deus & Jukes 2010; Goswami 2005: 464-6, 478; Porpodas 2005: 195-96; Ziegler & Goswami 2005: 3-6), with *syllable awareness* developing alongside oral language skills but with *phonemic awareness* linked to learning alphabetic literacy (e.g. Gombert 1990/1992: 27-35; Goswami 2005: 464; Karanth 2005: 399). Thus, PA both serves as a precursor of literacy skills and develops alongside learning to read and write. Consequently, it can be assumed that a transfer from an abugida to alphabetic writing involves expanding the transfer learners' phonemic awareness.

Ziegler and Goswami (2005) have developed the *psycholinguistic grain size theory* (PGST) to identify the parameters to be considered when studying the relationship between phonological development and reading in different orthographies. According to the PGST, a literacy learner faces three orthography related problems: the availability problem, the consistency problem, and the granularity problem. Firstly, if the phonological units represented by the orthography are easily available, the learning task is easier. Therefore, as larger sound units (e.g. syllables) are learned before smaller sound units (e.g. phonemes), characters representing syllables are easier to learn than characters representing phonemes. Secondly, if the relationship between phonological units and characters is consistent, the learning task is easier than if the relationship is inconsistent. And thirdly, as orthographies using a larger grain size include a larger number of orthographic units than orthographies using a smaller grain size, it is more demanding to master all the units in an orthography using a larger grain size.

It follows that the availability problem is easier to solve in orthographies using a larger grain size, such as abugidas, while the granularity problem is easier to solve in orthographies using a smaller grain size, such as alphabetic orthographies. The relative difficulty of solving the granularity and availability problems has been studied in Eritrea

by Asfaha, Kurvers and Kroon (2009), who compared the reading skills of Tigre and Tigrinya children learning to read in an abugida (Ge'ez script) and of Kunama and Saho children learning to read in an alphabetic orthography (Roman script). According to the findings, children learning to read the alphabetic script scored lower in spelling and word-reading tasks than children learning to read the abugida. The authors therefore conclude that for early literacy learners, the granularity problem is easier to solve than the availability problem. As abugida reading does not require extensive phonemic awareness, the characters of an abugida are more easily available to learners than the characters of an alphabetic script. Consequently, having solved the granularity problem, i.e., having learned the fidels of the abugida and their relationships to sound sequences of the language, which are predominantly CV sequences, learners are able to gain word-level reading skills even though they do not have extensive phonemic awareness.

In another study, comparing the reading skills of Ethiopian children reading in the Ge'ez script (Amharic, Tigrinya and Harari) and children reading in the Roman script (Oromo, Somali and Sidamo), Piper and van Ginkel (2017) investigated the relationship between letter-naming skills and word-reading accuracy. According to the results, children reading in the Ge'ez script achieved word-reading accuracy faster in relation to their letter-naming skills than did children reading in the Roman script (Piper & van Ginkel 2017: 47-9).

The results of these two studies are in line with the prevailing conception about the development of PA from bigger phonological units to smaller ones, indicating that the obstacle to fluent alphabetic reading is the availability problem, that is, the lack of phonemic awareness. If this is true, enhancing the learners' phonemic awareness needs to be a key element in a transfer literacy teaching programme from abugida to alphabetic orthography. Consequently, the development of an efficient transfer teaching methodology requires studying the extent and nature of the phonemic awareness of the transfer learners.

So far as we know, no previous studies on the PA of readers of the Ge'ez script are available. However, several studies on the PA of readers of Brahmi-derived scripts have been published since the 2000s (e.g. Bhide, Gadgil, Zelinsky & Perfetti 2014; Nag 2007; Reddy & Koda 2013; Sproat 2006). The Ge'ez script and Brahmi-derived scripts have many features in common, both being classified as abugidas (Daniels 1996: 4; Nag & Perfetti 2014: 2), but the term alpha-syllabic is more widely used by scholars studying Brahmi-derived scripts.

Studies on Brahmi-derived scripts indicate that although syllable awareness is the predominant level of readers' PA, phonemic awareness is not absent, but is closely linked to the ways the orthography represents different phonological units (Bhide et al. 2014: 73, 85-6; Reddy & Koda 2013: 121-2; Sproat 2006; Wali, Sproat, Padakannaya & Bhuvaneshwari 2009). According to Nag (2007: 19-20), the phonemic awareness of readers of Kannada, a Brahmi-derived script, develops more slowly than the phonemic awareness of readers of alphabetic scripts, and syllable awareness remains an important factor in reading fluency beyond the first phases of reading. It is likely that this may also hold true for readers of the Ge'ez script, given that in both Brahmi-derived and Ge'ez scripts characters primarily denote sound units larger than a phoneme. Moreover, as the Ge'ez script does not have characters for denoting consonants without an adjacent vowel, whereas in Brahmi the inherent vowel of the basic character can be nullified (Nag 2017: 104-5), it is possible that the phonemic awareness of readers of the Ge'ez script is even slower to emerge.

Based on the findings of studies focusing on languages using Brahmi-derived scripts, Wali et al. (2009) have presented the *minimal edit distance hypothesis* (MEDH) as a generalised framework to explain how the script influences the phonemic awareness of its readers. According to the MEDH, the difficulty of a segmental manipulation task is related to the number of differences between the orthographical representations of the stimulus and the

correct response, the number being defined by counting the editing operations needed to transform the graphic form of the stimulus into the graphic form of the response (see Table 7). Wali et al. used a phoneme deletion task in Tamil, a language using Brahmi-derived script, to test their hypothesis, and found that almost all the erroneous responses required fewer editing operations than a correct response. They also performed an analysis on earlier data from phoneme deletion tasks in Kannada and got similar results. In analysing the erroneous responses in the Konso phoneme deletion task in the present study, the MEDH has been considered a potential explanation for the results. However, a crucial difference between the Tamil study by Wali et al. and the present study is that the Konso test was carried out orally, whereas in the Tamil test the stimulus was given in written form. A written stimulus makes visual processing more likely than an oral stimulus.

3. The Konso abugida and the teaching method

3.1 The Konso abugida

As a typical vowel system of Ethio-Semitic languages consists of seven vowels, the Ge'ez script inventory includes a basic fidel for each consonant together with an inherent vowel and six modifications to denote the remaining vowels. For word-initial and word-medial vowels preceded by a glottal stop, a separate set of seven fidels is used. Differences between short and long vowels on the one hand, and between geminate and non-geminate consonants on the other are not marked. The seven forms of each set are called orders. Unlike Ethio-Semitic languages, Konso has five short and five long vowels /a, a:, u, u:, i, i:, e, e:, o, o:/. This is a typical Cushitic vowel system (Mous 2012: 353). Vowel length frequently makes meaning differences in Konso, and to accommodate the need to show vowel length, in the Konso abugida the left-over fidels of the traditional seven-vowel system of the Ge'ez script are used for distinguishing the length of the two most frequently

occurring vowels /a, i/. Table 1 shows the set of Konso fidels for the CV sequences of the consonant phoneme /l/.

Table 1. Konso fidels for the CV sequences of the consonant /l/

Konso fidels	ለ	ሉ	ሊ	ላ	ሌ	ል	ሎ
Phonemic transcriptions	la	lu/lu:	li:	la:	le/le:	li/l	lo/lo:

In addition to vowel length, consonant quantity is a frequently occurring contrastive feature in Konso phonology, expressing semantic differences on both the lexical and grammatical levels. The Konso abugida orthography, however, does not mark consonant quantity, so the reader needs to use the context to determine whether a word includes a geminate or a non-geminate consonant. Konso has 21 consonant phonemes, which are presented in Appendix 1.

Another type of under-differentiation in the Ge'ez script is using the same fidel to mark both a single consonant (Example 1) and a consonant with the sixth-order vowel (Example 2). Thus, the presence or absence of the vowel needs to be deduced from the context. In the Konso abugida the sixth-order vowel is a short /i/.

(1) ከ ል ሰ ተ

ka-l-sa-tta

'to wear'

(2) ከ ል ሶ ተ

ka-li-soo-ta

'offering'

As Konso phonology does not allow word-initial consonant clusters, and as syllable onsets and codas can both be occupied by only one consonant (Ongaye 2013: 23), a fidel denoting a single consonant occurs only in the coda position of closed syllables.

Apart from these two types of under-differentiation (i.e. not showing the quantity of the consonant and vowel sounds, and using the same fidel to mark a single consonant and a

consonant with the sixth-order vowel), the Konso abugida is consistent in following the principle of one symbol – one CV sequence. The number of fidels in the Konso abugida is 147, including 21 basic fidels and 6 modifications for each (see Appendix 1). Konso morphology is rich, using inflectional and derivational affixes for both verbs and nouns (see Section 6.3.1).

There is no lexical tone in Konso, but tone carries a grammatical role. Ongaye (2013: 56-7) distinguishes high and low tone levels and notes that the overall role of tone (or pitch-accent) in Konso grammar needs further investigation. Tone is not marked in the Konso abugida, and experience gained from the literacy activities in Konso indicates that tone marking is not necessary for fluent reading, whereas marking the quantity of all sounds is.

3.2 Teaching method of the Konso abugida

The method used to teach literacy influences the development of the learners' PA (Caravolas 2004: 8; Sproat 2006: 59; Yeong & Rickard Liow 2011: 483). The method adopted for teaching the Konso abugida is a modified version of the *multi-strategy method*, developed in Papua New Guinea by Faraclas and Stringer (1987) and modified for the Ge'ez script by Morgan and Breeze (1991).[6]

In the Konso primer (1997/2013), each fidel is introduced with a keyword and a picture (see Appendix 2 for a sample lesson). The keyword normally begins with the fidel being taught. The keyword is then blended and segmented, and additional words including only familiar fidels are given for reading and writing practice. Syllable-final consonants are not explicitly taught, so for example the sixth-order fidel ሊ (which denotes /li/ or /l/) is introduced with the keyword ሊሸ /liʃ:a/ 'whip', and there is no indication of the alternative

[6] The multi-strategy method consists of two sets of lessons called primer lessons and story lessons. Primer lessons develop the learners' accuracy skills on the character level, whereas story lessons focus on meaning and the ability to handle larger texts. In Konso no separate materials have been developed for story lessons, as most of the literacy students are members of local congregations and get exposure to texts in the church by singing familiar songs from the song books, by listening to scripture reading and following the text in the scripture book, etc.

pronunciation of the fidel as a single consonant syllable finally. However, as syllable-final consonants appear in keywords and in the reading and writing exercises, fluent readers do not confuse C and Ci units. Nevertheless, the lack of explicit teaching of single consonants may affect Konso abugida readers' ability to consciously process them.

4. Research questions

To study the interplay between the Konso abugida and readers' phonological awareness, the following research questions were posed:

1. To what extent are Konso abugida readers able to orally delete consonant phonemes from words?
2. Does word position give rise to differences in the ability to orally delete consonant phonemes? If so, how do the differences relate to the sound-symbol relationships of the Konso abugida?
3. What types of errors do Konso abugida readers make in oral phoneme deletion tasks, and what do the errors tell about the nature and extent of readers' phonemic awareness and its relationship to the abugida orthography?

Since earlier studies indicate a close link between phonemic awareness and alphabetic literacy skills, it was expected that orally deleting consonant phonemes from words would be difficult for Konso abugida readers. Moreover, because a consonant in syllable-final position is marked with a fidel of its own, it was expected that deleting it would be easier than deleting a consonant from syllable-initial position. This result would be in line with the MEDH, as deleting a syllable-final consonant requires only deleting the fidel denoting it, whereas deleting a syllable-initial consonant requires both deleting a fidel and either adding a different fidel in its place (word-initial deletion) or modifying the previous fidel (word-medial deletion).

To answer the third research question, errors were grouped into categories using content-based error analysis to look for patterns and potential explanations in the sound-symbol relationships of the Konso abugida. Wali et al. (2009; 165-8) used a similar method while testing the MEDH. To our knowledge, apart from the study by Wali et al., no previous studies using error analysis to investigate errors in phoneme deletion tasks have been published. Error analysis has been applied more widely in other types of language studies, including the study of spelling (e.g. Aaron & Joshi 2005; Abu-Rabia & Taha 2006) and second language learning (e.g. Atmaca 2016; Khansir 2013; Seitova 2016).

5. Methodology

5.1 Participants

A total of thirty-two farmers from the Tuuro administrative area in the Konso Zone participated in the PA test. They were all mother-tongue speakers of Konso. Twenty-one of the participants were male and eleven female. They had learned Konso literacy skills through the literacy programme in the church. To confirm their reading ability, they were asked to read a short passage aloud. Based on the reading task, six participants were recorded as poor readers, using as criterion their limited orthographical skills, manifested by their inability to recognise some of the fidels. Nineteen of the participants had no formal education and were literate only in Konso. The educational level of the others varied from one to three grades in the Amharic-medium primary school, where they may have learned the English alphabet.[7]

The ages of the participants are presented in Table 2, their years of education in Table 3 and the number of years they had been able to read Konso in Table 4. The age of the participants did not correlate with their education (Spearman r=.26, p=.15). However, the

[7] English is included as a subject in the primary school curriculum, but in the countryside schools, shortage of text books and other reading materials, lack of opportunities to hear or practice English, and practical problems such as irregular school attendance make the learning outcomes very poor.

age and education of participants correlated significantly with the years they had been able to read Konso (Spearman r=.60, p <.001 and r=.43, p <.0.5, for age and education, respectively). The older the participant was and the longer the education she/he had, the more years she/he had been able to read Konso. The median of poor readers did not differ from the others in age, education, or years they had been able to read Konso (χ^2(N=32)=0.17, χ^2(N=32)=0.003, and χ^2(N=32)=0.75, all ps > .05, for age, education, and years of reading Konso respectively).

Table 2. Age of the participants

Years	Number of participants
14-17	4
18-20	17
21-29	8
30-45	3
Total	32

Table 3. Formal education of the participants

Grade	Number of participants
none	19
1st	2
2nd	6
3rd	5
Total	32

Table 4. Number of years the participants had been able to read Konso

Years	Number of participants
1-3	11
4-6	9
7-9	7
10-17	5
Total	32

5.2 The data collecting procedure

The testing was carried out over a two-week period by a research assistant who was a Konso mother-tongue speaker from the same dialect area as the participants. He had

served as a literacy teacher in the area. Before the data collection phase, he was given one-day of training by the primary researcher, and he participated in piloting and finalising the instruments. Prior to data collecting, a meeting was arranged for the local community to explain the research objectives and the plan for data collection. The research assistant led the meeting in the Konso language. People were given an opportunity to ask questions and express any reservations regarding the research. The primary researcher took part in the meeting and in testing sessions with three participants in the initial data collecting phase. Each participant did the test individually. The research assistant explained the aims of the study to the participant in Konso, and the participant signed an agreement to permit the use of the results for research purposes.

The test consisted of 27 meaningful stimuli, presented in Appendix 3 with phonemic and orthographic transcriptions and an English gloss. Each stimulus was a spoken two-syllable word and the participants were asked to orally delete a consonant from the stimulus. The words were morphologically simple, taken from ordinary language.

Nine of the deletions were word initial, such as: "What do you get from *Poyta* if you leave *P*^{i} out?" The rest of the stimuli (18) were word medial, including nine first-syllable-final deletions such as: "What do you get from *paRka* if you leave *R*^{i} out?", and nine second-syllable-initial deletions such as: "What do you get from *karMa* if you leave *M*^{i} out?" In pronouncing the consonant to be deleted, the research assistant was advised to release the air carefully, with as slight an /i/ sound as possible.[8] The deletions from different word positions were presented in a mixed order.

The correct response for each item was a meaningful word, but the participants were not informed of this. Meaningful words were used because the task was new to the participants, and it was expected that meaning would make it easier.

[8] When the Konso alphabetic orthography was developed, it was decided that the names of the consonant letters are pronounced with the vowel /i/, (e.g. /mi/ for <m>), but since the participants had not learned the alphabetic orthography, they were not aware of this.

Two practice items, one word-initial deletion and one second-syllable-initial deletion, preceded the test. No time limit was given, and the research assistant repeated the question if the participant asked him to. The time range for responding to all items varied from 4 to 22 minutes. The test was audio-recorded.

6. Results and discussion

6.1 Ability to delete a consonant phoneme and the effect of word positions

Descriptive statistics for the test results (Table 5) shed light on the first research question. The mean score of correct responses for all test items shows that deleting consonant phonemes from words was difficult for the participants as, on average, only 26% of the responses were correct. The differences between the mean scores of correct responses in the deletion tasks from different word positions indicate that deleting a consonant from a word-initial position was the most difficult task for the participants (paired sample t-test, $t(31) = 6.57$ and 5.88, both $p < .001$, for the first-syllable-final and second-syllable-initial tasks, respectively). Moreover, first-syllable-final deletion was easier than second-syllable-initial deletion ($t(31) = 4.7$, $p < .001$). The age, education and years of being able to read Konso did not correlate with the number of correct responses in the deletion task from any of the three word positions (Spearman r =.06 - .29, all ps >.05).

Table 5. Descriptive statistics for the correct responses in the phoneme deletion task (N = 32)

	Number of items	Observed range of correct responses	Mean	Median	SD
Word-initial deletion	9	0 – 6	.59	0	1.56
Word-medial deletions					
Syllable-initial	9	0 – 6	2.06	2	1.61
Syllable-final	9	0 – 9	4.25	5	2.99
Total score	27	0 - 18	6.90	7.5	4.81

Further inspection of the results confirmed the order of difficulty in the three deletion tasks. Altogether 84% of the participants (27 out of 32) scored zero on the word-initial deletions, whereas the corresponding figure for both word-medial deletions was 22% (7 out of 32). In second-syllable-initial deletion, most of the participants had 1-3 correct responses, whereas in the first-syllable-final task the biggest group scored 4-6 (Table 6).

Table 6. Number of participants receiving different ranges of correct responses in the phoneme deletion tasks

Range of correct responses	0	1-3	4-6	7-9	Total number of participants
Word-initial deletion	27	2	3	0	32
Word-medial deletions					
Syllable-initial	7	20	5	0	32
Syllable-final	7	6	10	9	32

Comparing the three different deletion tasks in terms of editing operations, as suggested by Wali et al. (2009: 163), in the Konso abugida the deletion of a syllable-final consonant is the easiest of the three deletions, as it requires one editing operation, whereas the other two deletions require two operations each, as demonstrated in Table 7. The Konso samples in Table 7 and in the following pages are written in Konso alphabetic orthography, and the phonemic values for the alphabetic characters are presented in Appendix 1. The consonant to be deleted from the stimulus is marked with a capital letter.

Table 7. The editing operations needed for each type of deletion task.

Kind of deletion	Stimulus	Editing operations	Correct response
Word-initial deletion	*Xarpa* <ኸርፐ>	Delete ኸ. Add አ.	*arpa* <አርፐ>
Word-medial deletions			
Syllable-initial	*qorSa* <ቆርሰ>	Delete ሰ. Modify ር to ራ.	*qora* <ቆራ>
Syllable-final	*kaNta* <ከንተ>	Delete ን.	*kata* <ከተ>

Note: Gloss for the stimuli and for the correct responses is provided in Appendix 3.

Assuming that modifying an existing fidel is easier than adding a different fidel, the participants' performance on the three deletion tasks was in line with the MEDH. In other words, the ease of the deletion was related to the number and difficulty of the editing operations which would have been needed to transform the graphic form of the stimulus

into the graphic form of the response. However, the difference between the performance of deleting a word-initial consonant as compared to a second-syllable-initial consonant seems too big to assume that the only reason would have been the relative difficulty of the second editing operation (i.e. adding vs. modifying a fidel).

6.2 Error types and their correspondence to Konso abugida writing

The total number of responses was 836, of which 615 (74%) included an error. Twelve error types were identified using three criteria: the position of the word where the error occurred, the number of syllables in the response, and whether the error involved consonants or vowels. The twelve error types were then grouped into the following four categories: errors involving word-medial consonants, monosyllabic responses, errors involving vowels, and miscellaneous errors. The error types are presented in Table 8. Quantity differences between the phonemes of the stimulus and the response were not counted as errors, as in an oral response the quantity of the pronounced phoneme may vary because the respondent is processing the task while uttering the response. Moreover, as the quantity of phonemes frequently makes semantic differences between Konso words, for many of the stimuli a response with the correct phonemes but an altered quantity of one or more phonemes rendered a meaningful word (e.g. *karMa* <ከርመ> without m: *kara,* 'inside'; *karra,* 'a ground squirrel' - both spelled <ከረ> and *kaara* <ካረ> 'kind of traditional ceremony'). As the abugida marks quantity only for /a/ and /i/, in most cases a written form of a response in which the quantity of sounds was correct and a response in which it was not were orthographically ambiguous, like *kara* and *karra* above. Tone was not involved in the errors.

Table 8. Overview of the error types and an example of each type.

Error type	Word-initial deletion		First-syllable-final deletion		Second-syllable-initial deletion	
	Stimulus	Error	Stimulus	Error	Stimulus	Error
Errors involving word-medial consonants:						
1a. First-syllable-final deletion	Xarpa,	*xappa			qorSa,	*qosa
1b. Second-syllable-initial deletion		*xara	kaNta,	*kanna		
1c. Word-medial substitution		*xatta		*kara		*qoonna
Monosyllabic responses						
2a. Initial syllable only	Xarpa,	*xa	paRka,	*pa	takMa,	*ta
2b. Final syllable only		*pa		*ka		*ma
2c. Another syllable only		*ra		*ra	xelTa,	*xa
Errors involving vowels						
3a. Re-arranging phonemes	Kaasa,	*saka	diKla,	*lika	kalTa,	*lita
3b. V substitution	Xarpa,	*xiippa			karMa,	*karmi
3c. C deletion and V substitution			xaRta,	*xati	falQa,	*fali
Miscellaneous errors						
4a. Syllable addition	Xarpa,	*xapanna	paYra,	*payyina	qorSa,	*qoraca
4b. Random modification	Karma,	*xorma	iLka,	*ipsa	xelTa,	*kata
4c. No phoneme change	Tela	*teela	paYra	*payra	kalTa	*kalta

Note: Gloss for the stimuli and for the correct responses is provided in Appendix 3. The abugida spelling and gloss for errors which are meaningful words is provided in the subsequent sections (6.2.1-6.2.4) where the error types are explained in more detail.

6.2.1 Errors involving word-medial consonants

Of all the errors, 36% involved word-medial consonants. In error type 1a, the first-syllable-final consonant was deleted even though the task was to delete a syllable-initial consonant either word initially or word medially (e.g. *Xarpa* <ኽርፐ>, **xappa*[9] <ኽፐ>; *qorSa* <ቆርሰ>, **qosa* <ቆሰ>). In error type 1b, the second-syllable-initial consonant was deleted instead of deleting the word-initial or the first-syllable-final consonant (e.g. *Xarpa, *xara* <ኽረ> 'foam'; *kaNta* <ከንተ>, **kanna* <ከነ>, 'let us sell'). In error type 1c, a different consonant was substituted for the word-medial consonants (e.g. *Xarpa, *xatta* <ኽተ>, 'long

[9] *xappa* does not have a meaning. If the erroneous response is a meaningful word the meaning is given (e.g. *xara,* 'foam' under error type 1b). All erroneous responses are marked with an asterisk.

ago'; *kaNta, *kara* <ከረ>, 'inside'; *qorSa, *qoonna* <ቆኘ>, 'let us divide'). The number of errors involving word-medial consonants and the number of participants making the errors are shown in Table 9.

Comparing the number of different error types within the category, 49% fell under error type 1a, 34% under error type 1c, and 17% under error type 1b. Of the errors, 32% occurred in the word-initial deletion task, 22% in the first-syllable-final deletion task and 46% in the second-syllable-initial deletion task.

Table 9. Number of errors involving word-medial consonants in each type of deletion task and number of participants making the error

Error type	Word-initial deletion	First-syllable-final deletion	Second-syllable-initial deletion	Total	Number of participants making the error
1a. First-syllable-final deletion	36	(correct response)	74	110	26
1b. Second-syllable-initial deletion	14	23	(correct response)	37	19
1c. Word-medial substitution	22	27	28	77	21
Total	72	50	102	224	29

Note for reading the Table: Error type 1a, i.e. the first-syllable-final deletion, occurred 36 times instead of word-initial deletion (row 1, column 1) and 74 times instead of second-syllable-initial deletion (row 1, column 3). Thus, the total number of 1a errors was 110 (row 1, column 4). The number of people who made error 1a at least once was 26.

As was shown in Section 6.1, the first-syllable-final deletion task yielded the highest number of correct responses. In addition, syllable-final deletion was also a common error, constituting 18% of all errors. The result gives further evidence for the ease of deleting a syllable-final consonant (Table 5), a potential reason for this being the ease of the editing operations needed to transform the graphic form of the stimulus into the graphic form of the response. However, 34% of the errors involving word-medial consonants were substitutions for a different consonant (error 1c) - an error type which cannot be explained by the MEDH, as three editing operations were needed to come up with the erroneous response (Table 10), whereas the correct response would have required a maximum of two editing operations (Table 7).

Table 10. The editing operations needed for a response of the error type 1c

Kind of deletion	Stimulus	Editing operations	Erroneous response
Word-initial deletion	*Xarpa* <ኽርፐ>	Delete ር. Delete ፐ. Add ተ.	**xatta* <ኽተ> 'long ago'
Word-medial deletions			
Syllable-initial	*qorSa* <ቆርሰ>	Delete ር. Delete ሰ. Add ነ.	**qoonna* <ቆነ>'let us divide'
Syllable-final	*kaNta* <ካንተ>	Delete ን. Delete ተ. Add ረ.	**kara* <ከረ> 'inside'

Note: Gloss for the stimuli is provided in Appendix 3.

In error types 1a and 1b the response differed from the stimulus only by one deleted consonant, and the remaining phonemes originated from the stimulus. Therefore, the erroneous response was a meaningful word or a pseudoword depending on the phonemes of the stimulus, or for some stimuli it could be either of the two, depending on how the respondent pronounced the quantity of the phonemes in the erroneous response. For example, error 1a rendered meaningful words as responses for *kalTa* <ከልተ> (i.e. *kata* <ከተ>, 'sell' and *kaata* <ካተ>, 'tie cows for milking'), pseudoword responses for *xelTa* <ኼልተ> (i.e. **xeta*, **xetta* and **xeeta*, all spelled <ኼተ>), and both real word and pseudoword responses for *qorSa* <ቆርሰ>, (i.e. *qoosa* 'insult'; **qosa* and **qossa*, all spelled <ቆሰ>). Therefore, meaningfulness of the response could not be a decisive factor in error types 1a and 1b.

In error type 1c the possibility to select the (erroneous) word-medial consonant provided more room for the respondent to consider the meaningfulness of the response. The proportion of meaningful words in responses representing error type 1c was 86%,[10] suggesting that, instead of solving the problem through phonological processing only, the participants who made the errors were also looking for meaningful words as responses. This may also explain why the erroneous responses of type 1c required more editing operations than would have been needed for the correct response.

[10] Distinguishing between errors which were meaningful words and errors which were not was based on participants' actual pronunciation, so the possible effects of real-time processing on phoneme quantity (which may alter a meaningful word into a pseudoword and vice versa) were not taken into account.

6.2.2 Monosyllabic responses

The second largest number of errors, 31%, were monosyllabic responses (Table 11) in which whole syllables were deleted, resulting in responses with only the word-initial CV (error 2a, e.g. *Xarpa* <ኽርፐ>, **xa* <ኽ>*; paRka* <ፐርካ>, **pa* <ፐ>*; takMa* <ተክመ>, **ta* <ተ>),[11] only the word-final CV (error 2b, e.g. *Xarpa, *pa* <ፐ>*; paRka, *ka* <ካ>, 'and'*; takMa, *ma* <መ>, 'but'), or another CV (error 2c, e.g. *Xarpa, *ra* <ረ>*; paRka, *ra* <ረ>*; xelTa* <ኼልተ>, **xa* <ኽ>).

Of the monosyllabic responses, 67% fell under error type 2a, 25% under error type 2b, and 8% under error type 2c. Of the total number of monosyllabic responses, 42% occurred in word-initial deletion tasks, and 29% in both the first-syllable-final deletion tasks and in the second-syllable-initial deletion tasks.

Table 11. Number of errors resulting in a monosyllabic response in each type of deletion task and number of participants making the error

Error type	Word-initial deletion	First-syllable-final deletion	Second-syllable-initial deletion	Total	Number of participants making the error
2a. Initial syllable only	34	43	50	127	12
2b. Final syllable only	37	10	1	48	15
2c. Another syllable only	8	3	4	15	6
Total	79	56	55	190	19

Although the number of monosyllabic responses (190) was close to the number of errors involving word-medial consonants (224), the number of participants giving monosyllabic responses was smaller. There were two participants who adopted a monosyllabic response as their only type of response, and four who gave another type of response for one to three stimuli and a monosyllabic response for the rest. Thus, six participants gave

[11] Apart from two responses of error type 2a (*Xarpa* <ኽርፐ>*, *xar* <ኽር> and *teYla* <ቴይለ>*, *tey* <ቴይ>) in the responses to a stimulus which included a closed syllable, the syllable-final C was deleted along with the word-final syllable. Responses to vowel-initial stimuli were single vowels (e.g. *iLka* <ኧልከ>*, *i* <ኧ>).

150 of the 190 monosyllabic responses. Three of the six were recorded as poor readers, and two of the other poor readers each gave six monosyllabic responses. This might indicate that abugida reading skills enhance phonemic processing skills, and that therefore poor readers do not perceive phonemes as separate units and are in turn more likely to give a monosyllabic response than are fluent readers. However, the amount of data presented here is not enough to draw a firm conclusion.

Responding with the final syllable only (error 2b) in a word-initial deletion task is a failure to separate the word-initial consonant and the vowel, represented by one fidel, with the whole CV unit being deleted instead. This provides further support for the difficulty of distinguishing the word-initial consonant as a separate unit.

In error types 2a and 2b, the phonemes of the response were determined by the initial and final CV sequence of the stimuli respectively, so meaningfulness of the response could not be a decisive factor in making the error. Overall, Konso words consisting of a single CV syllable are rare, and none of the responses of type 2c were meaningful words.

6.2.3 Errors involving vowels

Ten percent of the errors involved vowels (Table 12). Error type 3a included rearranging phonemes of the stimulus (e.g. *Kaasa* <**ካሰ**>, **saka* <**ሰከ**>, 'blessing'; **sika* <**ስከ**>, 'cattle herding'; *Karma* <**ከርመ**>, **rama* <**ረመ**>; **rima* <**ርመ**>, 'gestation of an animal'; *diKla* <**ድክለ**>, **lika* <**ልከ**>; *kalTa* <**ከልተ**>, **lita* <**ልተ**>, 'facing a mud house') and in error types 3b and 3c, /i/ was substituted for the vowel adjacent to the consonant to be deleted, the difference being that in 3b the consonant was not deleted (e.g. *Xarpa* <**ኽርፐ**>, **xiippa* <**ኺፐ**>, 'riddle';

karMa ,**karmi* <ከርም>), whereas in 3c it was (e.g. *xaRta* <ኻርተ>, **xati* <ኻት>, 'over there'; *falQa* <ፈልቀ>, **fali*[12] <ፈል>).

Comparing the different error types within this category, 47% fell under error type 3a, 31% under 3c, and 22% under 3b. Of the errors involving vowels, 63% occurred in word-initial position, 8% in first-syllable-final position and 29% in second-syllable-initial position. Different deletion tasks yielded different error types, 3a and 3b occurring almost entirely in word-initial deletion tasks and 3c mostly in second-syllable-initial deletion tasks. In error type 3b, in word-initial deletion tasks the syllable-final consonant was also deleted, although that added one editing operation – further evidence of the ease of leaving out the syllable-final consonant.

Table 12. Number of errors involving vowels in each type of deletion task and number of participants making the error

Error type	Word-initial deletion	First-syllable-final deletion	Second-syllable-initial deletion	Total	Number of participants making the error
3a. Re-arranging phonemes	25	1	2	28	13
3b. V substitution	12	-	1	13	9
3c. C deletion and V substitution	-	4	14	18	11
Total	37	5	17	59	23

Error 3a resembles error 2b in that they both result in omission of the word-initial CV, the difference being that in error 3a, instead of giving a monosyllabic response, the participants rearranged the phonemes of the stimulus and gave a disyllabic response. If the stimulus began with a closed syllable, the word-initial CV was deleted (e.g. *Karma* <ከርመ>, **rama* <ረመ>), whereas if it began with an open syllable, the word-initial CV occurred word finally (e.g. *Kaasa* <ካሰ>, **saka* <ሰከ>, 'blessing'). Thus, both errors 3a and 2b indicate a difficulty in separating the word-initial consonant from the adjacent vowel.

[12] *fali* would render a meaning in Fasha dialect where the suffix *-i* denotes perfective aspect. In the Tuuro dialect area where the participants came from the equivalent suffix is *-e* (thus *fale*, 'solved'). (See Ongaye 2013: 153-65 for Konso verb inflection.)

In addition, 10 of the 28 errors of type 3a included a vowel substitution, /i/ substituted for /a/ in eight cases and /a/ for /i/ in two cases.

As /i/ adjacent to a consonant is not marked in writing, it may not be regarded as being as prominent as the other vowels, indicating a link between the errors involving /i/ and Konso abugida writing. Moreover, in terms of the MEDH, using an /i/ instead of another vowel in word-initial and second-syllable-initial deletion tasks makes the number of editing operations fewer than the correct response would have required (Table 13). From all errors involving vowels only 52% were meaningful words. This suggests that the participants did not deliberately try to form a meaningful response.

Table 13. Editing operations needed for erroneous responses (E) if /i/ is substituted for /a/ and editing operations needed for correct responses (C)

Kind of deletion	Stimulus	Editing operations	Response
Word-initial deletion	*Sona* <ሶነ>	E: Modify ሶ to ስ. C: Delete ሶ. Add አ.	**sina* <ስነ> *ona* <አነ>
	Karma <ከርመ>	E: Delete ከ. C: Delete ከ. Add አ.	**rima* <ርመ> *arma* <አርመ>
Word-medial, syllable-initial deletion	*falQa* <ፈልቀ>	E: Delete ቀ. C: Delete ቀ. Modify ል to ለ.	**fali* <ፈል> fala <ፈለ>

Note: Gloss for the stimuli and for the correct responses is provided in Appendix 3. The erroneous responses do not have meanings.

6.2.4 Miscellaneous errors

Twenty-three percent of the errors were grouped under miscellaneous (Table 14). In error type 4a responses, the number of syllables was greater than in the stimulus, (e.g. *Xarpa* <ኻርፐ>, **xapanna* <ኻፐነ>, 'let us throw'; *paYra* <ፐይረ>, **payyina* <ፐይነ>, 'let us begin'; *qorSa* <ቆርሰ>, **qoraca* <ቆረቸ>, 'medicine') and the error type 4b responses included disyllabic responses of random types (e.g. *Karma* <ከርመ>, **xorma* <ኾርመ>, 'ox'; *iLka* <እልከ>, 'teeth'; **ipsa* <እፕሰ>, 'light'; *xelTa* <ኼልተ>, **kata* <ከተ>, 'sell'). Responses in which there was no phoneme change and the response was either identical with the

stimulus or included only a change of phoneme quantity (e.g. *Tela* <**ቴለ**>, **teela* <**ቴለ**>, ‘boarder’) were counted as a separate error type (4c).

Of the miscellaneous errors, 56% were random (4b), 28% included additional syllables (4a) and 16% included no phoneme change (4c). Of the total number of miscellaneous errors, 48% occurred in word-initial deletion tasks, 25% in first-syllable-final deletion tasks, and 27% in second-syllable-initial deletion tasks.

Table 14. Number of miscellaneous errors in each type of deletion task and number of participants making the error

Error type	Word-initial deletion	First-syllable-final deletion	Second-syllable-initial deletion	Total	Number of participants making the error
4a. Syllable addition	17	9	14	40	10
4b. Random modification	33	23	23	79	24
4c. No phoneme change	18	3	2	23	13
Total	68	35	39	142	28

Of the 40 responses with additional syllables (error type 4a), 21 were made by two participants, which makes the error type rather rare as an overall strategy. None of the 17 responses of type 4a for a word-initial deletion included the correct consonant deletion, and only in two responses was the word-initial consonant replaced by another consonant resulting in a kind of metathesis and resembling error 3a (*Xarpa* <**ኸርፓ**>, **parapara* <**ፓሬፓሬ**>, ‘every year’; *Silka* <**ስልከ**>, **likanna* <**ልከነ**>).

Of the 33 random errors (4b) occurring in word-initial deletions, in five the word-initial consonant was correctly deleted (e.g. *Kanta* <**ከንተ**>, **akki* <**አከ**>), and in another five the vowel adjacent to the word-initial consonant was changed into /i/, thus resembling the responses of error type 3b (e.g. *Kaasa* <**ካሰ**>, **kirra* <**ከሬ**>, ‘river’).

Most of the random errors and errors with additional syllables required more editing operations than would have been needed for the correct response. The proportion of meaningful words in these two error types was 80%. This suggests that, like in errors of type 1c, the participants were looking for a meaningful response, which may explain the

large number of editing operations needed to come up with the response. Responses representing error type 4c, including responses which included a quantity change, were all meaningful words.

6.3 Summing up the results of the error analysis

6.3.1 The difficulty of word-initial deletions

The difficulty of deleting a word-initial consonant was revealed by the mean scores of correct responses for the three deletion tasks, and also showed up in several ways in the error analysis. Of the errors involving word-medial consonants, 32% occurred in deletion tasks where a word-initial consonant had to be deleted. Likewise, in monosyllabic responses, word-initial CV only (error 2a) was a frequent error also in word-initial deletion tasks. Furthermore, a word-final CV only (error 2b) and rearranging phonemes (error 3a) in word-initial deletion tasks both indicate that when the respondents wanted to delete the word-initial consonant they failed to separate it from the adjacent vowel, and so ended up deleting the word-initial CV unit corresponding to the initial fidel.

Although the relative difficulty of a word-initial deletion as compared to both types of word-medial deletions is in line with the MEDH, the big difference between the difficulty of deleting a word-initial consonant as compared to a second-syllable-initial consonant cannot be explained by the MEDH only. Further, since the stimulus was presented orally, the participants may or may not have used a mental image of the written form of the stimulus as a starting point.

Another reason for the difficulty of a word-initial deletion could be the influence of the literacy teaching method of the Konso abugida. As the method has used keywords beginning with the fidel to be learned, the literacy learners' attention has been drawn to the word-initial CV as a unit, and this may have influenced the participants' processing of

the words and their constituents, making it harder for them to divide the word-initial fidel into two separate units.

Yet another reason, unrelated to the script, could be the nature of Konso morphology. Konso is a morphologically complex language, frequently using inflectional and derivational affixes for both verbs and nouns, including single consonants as infixes and suffixes but not as prefixes (Examples 3-9).[13] This may have made it easier for Konso speakers to manipulate consonant phonemes in word-medial positions than in word-initial positions.

(3) *imuke* <**እሙኬ**> 'he slept'

imukte <**እሙክቴ**> 'she slept'

imuken <**እሙኬን**> 'they slept'

(4) *idame* <**እደሜ**> 'he ate'

idamte <**እደምቴ**> 'she ate'

idamen <**እደሜን**> 'they ate'

(5) *i'aane* <**እኣኔ**> 'he went'

i'aanshe <**እኣንሼ**> 'he caused to go'

(6) *ikeere* <**እኬሬ**> 'he ran'

ikeershe <**እኬርሼ**> 'he caused to run'

(7) *sikmaya* <**ስክመየ**> 'shepherds'

sikmayta <**ስክመይተ**> 'shepherd'

(8) *diira* <**ዲረ**> 'men'

diirta <**ዲርተ**> 'a man'

(9) *alawa* <**አለወ**> 'brother'

[13] Subject clitics, which are required in most Konso clauses, are realised as prefixes, but they begin with a vowel (see Ongaye & Mous 2016 for a comprehensive description of Konso subject clitics).

alawta <**አለውተ**> ‘sister’

Studies on the nature of phonemic awareness among beginning readers of Turkish (Durgunoğlu 2006) support the assumption of the influence of morphology on phonemic awareness skills. Turkish is an agglutinative language with a rich suffix morphology, which means it is essential to pay attention to the ends of words. In line with this, Durgunoğlu (2006) reports on studies indicating that beginning Turkish readers are better at manipulating phonemes at word endings than at word beginnings. (See also Caravolas’ 2006 review of studies about potential connections between morphology and phonemic awareness in Czech, German, and English.)

An opposite trend, indicating that word-initial deletion tasks are easier than word-medial deletion tasks, has been reported by Gombert (1990/1992: 23, 25). Referring to phoneme and syllable deletion tests carried out on children in English, he concluded that word-medial deletions were more demanding than word-initial deletions because the former requires first analysing the word to extract the phoneme and then synthesising it to combine the remaining phonemes, whereas the latter requires only repeating part of the word. The logic of the explanation resembles the logic of the MEDH, but instead of orthographical operations the conclusion assumes phonological and oral processing of the task.

6.3.2 The ease of deleting the syllable-final consonant

The mean scores of correct responses revealed that it was easier for Konso speakers to delete the syllable-final consonant than the syllable-initial consonant. The error analysis revealed that deleting the first-syllable-final consonant was also the second most common error (1a), as it covered 18% of all errors and was made at least once by twenty-six participants. In addition, in error type 3b, where instead of deleting the required consonant, the vowel adjacent to it was replaced by /i/, the syllable-final consonant of the

stimulus was deleted (e.g. *Xarpa* <’ኸር.ፐ>, **xiippa* <’ኺ.ፐ>, ‘riddle’) and in monosyllabic responses with the initial syllable only (error 2a), except for two responses, the syllable-final consonant was also deleted (e.g. *Xarpa* <’ኸር.ፐ>, **xa* <’ኸ>).

All this indicates that a consonant phoneme without an adjacent vowel seems to be a separate unit in the abugida reader’s mind and thus easily deleted. Finding out to what extent this is due to the script would require similar testing with people without any reading and writing skills. Morphology does not seem to play a major role, as the infixes consisting of single consonant phonemes are syllable-initial, not syllable-final consonants (Examples 3-9); if morphology was a more dominant factor in moulding people’s phonemic awareness than script, a word-medial, syllable-initial deletion should be easier than a syllable-final deletion.

6.4 Implications of the results for Konso transfer literacy teaching

The results of the present study indicate that readers of the Konso abugida have learned the general mappings between sounds and Konso fidels, which predominantly represent CV sequences, and that readers’ phonological awareness skills are heavily shaped by those mappings. This makes it difficult for them to separate the components of the CV sequence represented by one fidel. Consequently, as the alphabetic orthography for Konso is transparent and represents each phoneme with a separate character, Konso transfer literacy learners need to learn to recognise phonemes as distinct units in all word positions. The transfer literacy teaching method therefore needs to include a strong component enhancing learners’ phonemic awareness. As the word-initial deletion task turned out to be the most difficult one, special attention needs to be paid to the skill of separating the word-initial consonant and vowel.

In addition, as deleting the word-medial, syllable-final consonant proved to be easy both when it needed to be deleted and when it did not (errors 1a and 2a, and in word-initial

deletions 3b), there seems to be a need to make transfer learners aware of the syllable-final consonant as a unit which is written with a separate character both in the Konso abugida and in the alphabetic orthography. Ignoring the syllable-final consonant was observed also during Konso transfer literacy lessons as a typical mistake that learners made when practising syllabification (e.g. *pal-da* <ፐል-ዶ> 'wide' segmented as **pa-da* <ፐ-ዶ>) and in dictation exercises (e.g. *pinanta* <ፕነንተ>, 'wild animal' spelled **pinata* <ፕነተ>).

6.5 Limitations of the study and the need for further studies

An unavoidable challenge in carrying out consonant phoneme deletion tasks is that it is hardly possible to pronounce a consonant without a slight vowel sound. The method used in teaching the Konso abugida had not introduced the concept of a consonant on its own and the participants were used to thinking in terms of CV fidels as units. The notion of a lone consonant was therefore new to them. Even though the research assistant was advised to release the air carefully when pronouncing the consonant to be deleted, the reactions of some participants indicated that there was a problem:

Research assistant: "*Poyta* without *p*^{i}?"

Participant: "There is no *pi*."

Because of the small size of the sample, the results of the study need to be interpreted as tentative. More data is needed to find out whether the difference in the difficulty of the deletion tasks and the error patterns holds on a larger scale. Similar tests could also be carried out in other Ethiopian languages using or having used the Ge'ez script to see whether there are similar relationships between the abugida and the readers' PA. Procedural limitations of the study include the vague criteria for measuring the participants' literacy skills and the failure to track their reading and writing frequency. Therefore, for future research more accurate criteria for literacy skills and means of tracking reading and writing frequency need to be set.

Also, because the correct responses for the deletion tasks were meaningful words, even though this was not revealed to the participants, they may have discovered it while doing the practice items, and therefore been more apt to look for a meaningful word as a response also when they made an error. To examine in more detail the role of meaning in erroneous responses, phoneme deletion tests using both meaningful words and pseudowords as stimuli and as correct responses would need to be carried out.

The lack of previously developed PA tests in Konso or a related language made it demanding to compose an instrument which would include a balanced set of stimuli, and it is likely that there are variables which were simply not considered here. One such variable is the manner of articulation of the consonant to be deleted. It would be interesting to test whether there is any difference between the difficulty of deleting a sonorant (which has a constant air flow) and deleting an obstruent (which does not).

7. Conclusions

The goals set for the present study were to find out about the extent and nature of the phonemic awareness of Konso abugida readers and to identify links between their PA skills and the sound-symbol relationships of the Konso abugida. It was expected that deleting a single consonant phoneme from a word would be difficult for participants because of their lack of alphabetic literacy skills, and that deleting a consonant from a syllable-final position would be easier than deleting a syllable-initial consonant because the syllable-final is marked with a fidel of its own. The results were in line with both these hypotheses, but the relatively big difference between the difficulty of deleting a syllable-initial consonant from a word-initial and a word-medial position was unexpected. Possible reasons for that may be the teaching method of the Konso abugida, with its emphasis on the word-initial CV unit, as well as Konso morphology, which frequently includes word-medial manipulations in derivational and inflectional patterns.

Overall, the results conform with earlier results reported from studies on Brahmi-derived scripts, indicating a close link between phonemic awareness and the ways the orthography represents different phonological units (Bhide et al. 2014: 73, 85-6; Reddy & Koda 2013: 121-2; Sproat 2006; Wali et al. 2009). Also, the relative ease of deleting a syllable-final consonant as compared to a syllable-initial consonant supports the MEDH proposed by Wali et al. (2009: 163). The error analysis of the incorrect responses revealed error types in which the editing operations were less complicated than would have been necessary for the correct response. This indicates close links between Konso abugida readers' processing of sounds and Konso abugida sound-symbol relationships. In some error types the editing operations were more complicated than necessary for the correct response, and in those errors the participants were found to look for a meaningful response instead of responding to the task through phonological processing only.

To sum up, the results suggest that the sound-symbol relationships of the Konso abugida play an important role in moulding its readers' phonemic awareness. This is in line with the assumption that PA is not only a precursor of literacy skills, but also something that develops further through reading and writing, being affected by the sound-symbol relationships of the orthography. Consequently, in developing an efficient method for teaching alphabetic literacy skills to abugida readers, the nature and extent of their phonological awareness needs to be considered and developed to match the sound-symbol relationships of the alphabetic orthography to be learned.

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References:

Aaron, P.G. & R. Malatesha Joshi (2005). Learning to spell from print and learning to spell from speech: A study of spelling of children who speak Tamil, a Dravidian language. In R. Malatesha Joshi & P. G. Aaron (eds.), *Handbook of orthography and literacy,* 551-568. Mahwah, New Jersey: Lawrence Erlbaum Associates.

Abu-Rabia, Salim & Haitham Taha (2006). Phonological errors predominate in Arabic spelling across grades 1–9. *Journal of Psycholinguistic Research* 35(2): 167–188. DOI:10.1007/s10936-005-9010-7.

Alcock, Katie J., Damaris S. Ngorosho, Charles Deus & Matthew C. H. Jukes (2010). We don't have language at our house: Disentangling the relationship between phonological awareness, schooling, and literacy. *British Journal of Educational Psychology* 80: 55–76.

Asfaha, Yonas M., Jeanne Kurvers & Sjaak Kroon (2009). Grain size in script and teaching: Literacy acquisition in Ge'ez and Latin. *Applied Psycholinguistics* 30: 709–724. DOI:10.1017/S0142716409990087.

Atmaca, Çağla (2016). Error analysis of Turkish EFL learners: A case study. *Procedia - Social and Behavioral Sciences* 232: 234–241. DOI:10.1016/j.sbspro.2016.10.007

Bhide, Adeetee, Sonya Gadgil, Courtney M. Zelinsky & Charles Perfetti (2014). Does reading in an alphasyllabary affect phonemic awareness? Inherent schwa effects in Marathi-English bilinguals. *Writing Systems Research* 6(1): 73-93. DOI:10.1080/17586801.2013.855619.

Caravolas, Markéta (2004). Spelling development in alphabetic writing systems: A cross-linguistic perspective. *European Psychologist* 9(1): 3-14. DOI:10.1027/1016-9040.9.1.3.

Caravolas, Markéta (2006). Refining the psycholinguistic grain size theory: Effects of phonotactics and word formation on the availability of phonemes to preliterate children. *Developmental Science* 9: 445-447. DOI:10.1111/j.1467-7687.2006.00526.x.

Daniels, Peter T. (1990). Fundamentals of grammatology. *Journal of the American Oriental Society* 110: 727-731.

Daniels, Peter T. (1996). The study of writing systems. In Peter T. Daniels & William Bright (eds.), *The world's writing systems,* 3-17. New York: Oxford University Press.

Durgunoğlu, Aydin Y. (2006). Learning to read in Turkish. *Developmental Science* 9: 437–439. DOI:10.1111/j.1467-7687.2006.00522.x.

Eberhard, David M., Gary F. Simons & Charles D. Fennig (eds.) (2019). *Ethnologue: Languages of the world, twenty-second edition.* Dallas, Texas: SIL International. http://www.ethnologue.com.

Faraclas, Nicholas & Mary Stringer (1987). *Working together for literacy.* Papua New Guinea: Christian books. Melanesia Inc.

Getatchew Haile (1996). Ethiopic writing. In Peter T. Daniels & William Bright (eds.), *The world's writing systems*, 569-576. New York: Oxford University Press.

Gombert, Jean E. (1992). *Metalinguistic development.* (Tim Pownall, Trans.). Hemel Hempstead, Hertfordshire, Harvester Wheatsheaf. (Original work published 1990).

Goswami, Usha (2005). Orthography, phonology, and reading development: A cross-linguistic perspective. In R. Malatesha Joshi & P. G. Aaron (eds.), *Handbook of orthography and literacy,* 463-480. Mahwah, New Jersey: Lawrence Erlbaum Associates.

Karanth, Prathibha (2005). The kagunita of Kannada – Learning to read and write an Indian alphasyllabary. In R. Malatesha Joshi & P. G. Aaron (eds.), *Handbook of orthography and literacy,* 389-404. Mahwah, New Jersey: Lawrence Erlbaum Associates.

Khansir, Ali Akbar (2013). Error analysis and second language writing. *Theory and Practice in Language Studies*. 3(2): 363-370. DOI:10.4304/tpls.3.2.363-370

Koda, Keiko (2017). Learning to read Japanese. In Ludo Verhoeven & Charles Perfetti (eds.), *Learning to read across languages and writing systems,* 57-81. Cambridge University Press.

Konso Primer (2013). ፍተለ አፈ ኾንሶ [fitala afa xonso]. The Ethiopian Evangelical Church Mekane Yesus. (Original work published 1997).

Mekonnen Alemu Gebre Yohannes (2005). Socio-cultural and educational implications of using mother tongues as languages of instruction in Ethiopia. Unpublished Master's thesis, University of Oslo.

Morgan, Mary & Mary Breeze (1991). *Literacy guidelines for vernacular languages in Ethiopia.* Workshop handout. Unpublished. SIL. Addis Ababa, Ethiopia.

Mous, Maarten (2012). Cushitic. In Zygmunt Frajzyngier & Erin Shay (eds.), *The Afroasiatic languages (Cambridge Language Surveys)*, 342-422. Cambridge: Cambrige University Press.

Nag, Sonali (2007). Early reading in Kannada: The pace of acquisition of orthographic knowledge and phonemic awareness. *Journal of Research in Reading* 30: 7-22. DOI:10.1111/j.1467-9817.2006.00329.x.

Nag, Sonali & Charles A. Perfetti (2014). Reading and writing: Insights from the alphasyllabaries of South and Southeast Asia. *Writing System Reserach* 6(1): 1–9. DOI:10.1080/17586801.2014.883787.

Nag, Sonali (2017). Learning to read Kannada and other languages of South Asia. In Ludo Verhoeven & Charles Perfetti (eds.), *Learning to read across languages and writing systems,* 104-126. Cambridge University Press.

Ongaye Oda (2013). *A grammar of Konso.* PhD, University of Leiden. LOT, Utrecht, NL.

Ongaye Oda & Maarten Mous (2016). Subject clitics in Konso. *Nordic Journal of African Studies* 25(1): 23–51.

Page, Christina (2017). Biliteracy across scripts: Implications for language development in Southeast Asia. *Journal of the Southeast Asian Linguistics Society JSEALS* 10.1: 36-44 ISSN: 1836-6821. DOI:http://hdl.handle.net/10524/52396 University of Hawai'i Press.

Piper, Benjamin & Agatha J. van Ginkel (2017). Reading the script: How the scripts and writing systems of Ethiopian languages relate to letter and word identification. *Writing Systems Research* 9(1): 36-59. DOI:10.1080/17586801.2016.1220354.

Porpodas, Costas D. (2005). Literacy acquisition in Greek: Research review of the role of phonological and cognitive factors. In R. Malatesha Joshi & P. G. Aaron (eds.), *Handbook of orthography and literacy,* 189-199. Mahwah, New Jersey: Lawrence Erlbaum Associates.

Reddy, Pooja P. & Keiko Koda (2013). Orthographic constraints on phonological awareness in biliteracy development. *Writing Systems Research* 5(1): 110-130. DOI:10.1080/17586801.2012.748639.

Richardson, Ulla & Lea Nieminen (2017). The contributions and limitations of phonological awareness in learning to read. In Natalia Kucirkova, Catherine E. Snow, Vibeke Grøver & Catherine McBride (eds.), *The Routledge international handbook of early literacy education,* 264-272. London: Routledge.

Seitova, Meruyert (2016). Error analysis of written production: The case of 6th grade students of Kazakhstani school. *Procedia - Social and Behavioral Sciences* 232: 287–293. DOI:10.1016/j.sbspro.2016.10.022.

Share, David L. (2017). Learning to read Hebrew. In Ludo Verhoeven & Charles Perfetti (eds.), *Learning to read across languages and writing systems,* 155-180. Cambridge University Press.

Sproat, Richard (2006). Brahmi-derived scripts, script layout, and segmental awareness. *Written Language and Literacy* 9(1): 45–66.

Wali, Aamir, Richard Sproat, Prakash Padakannaya & Bhuvaneshwari B. (2009). Model for phonemic awareness in readers of Indian script. *Written Language and Literacy* 12(2): 161–169. DOI:10.1075/wll.12.2.02wal.

Yeong, Stephanie H. M. & Susan J. Rickard Liow (2011). Cognitive-linguistic foundations of early spelling development in bilinguals. *Journal of Educational Psychology* 103(2): 470-488. DOI:10.1037/a0022437.

Yin, Li & Yuting Sun (2017). Chinese speaking societies. In Natalia Kucirkova, Catherine E. Snow, Vibeke Grøver & Catherine McBride (eds.), *The Routledge international handbook of early literacy education,* 223-232. London: Routledge.

Zelealem Leyew (2012). The Ethiopian Language Policy: A historical and typological overview. *Ethiopian Journal of Languages and Literature* Vol XII (2): 1-59. College of Humanities, Language Studies, Journalism and Communication. Addis Ababa University.

Ziegler, Johannes C. & Usha Goswami (2005). Reading acquisition, developmental dyslexia, and skilled reading across languages: A psycholinguistic grain size theory. *Psychological Bulletin* 131: 3-29.