A LEXICOSTATISTICAL STUDY: PHONOLOGICAL SIMILARITY BETWEEN
AMERICAN AND MALAWI SIGN LANGUAGES

by

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Abstract

This pilot study compared the relationship between American Sign Language (ASL) and the signed language of the deaf community of Malawi. Additionally, this study considered the mutual intelligibility between the two languages. A video recording of signed words, stories, and scriptures being used by children and teachers at the School for the Deaf in the northern region of Malawi was used as a beginning lexical database for this study. From the video, a list of 50 words were placed on a list for comparison and given to deaf signers for analysis. Words were analyzed for similarity on four domains of phonology (hand shape (HS), location (LOC), palm orientation (PO), and movement (MOV)) and then coded. A modified second sample of 50 words was then obtained using the Swadesh list and both lists were then compared. Using the original list, there were similarities between the two languages 39.2% of the time overall. Using the Swadesh list, similarities existed only 32% of the time. In both cases, results from the current study appear to strongly support that Malawian sign language is unique and unintelligible from ASL, despite the potential influence from users of ASL on the signed language of Malawi.

Key words: Sign Language Structure (An Outline of the Visual Communication Systems of the American Deaf)

Introduction

Among Africa's developed and developing countries, the description and codification of 25 signed languages of deaf communities have been preserved and are accessible for use; yet Malawian sign language remains undocumented (Kamei, 2004). For many people who are deaf in Malawi, this means they are still without a way of adequately expressing themselves, interacting with others around them, or having any understanding of their environment or social group. While children with mobility impairments or other types of disabilities can often navigate the large 'mainstream' classrooms (currently the most available in special needs education), for those children who cannot hear, learning becomes an impossible task. According to statistics provided by deaf Action and the Malawi National Association of the deaf (MANAD), there are an estimated 200,000 deaf people in Malawi. This is merely an estimate because many deaf individuals are undiagnosed or identified. Of those who are, MANAD's findings suggest that 98% of this population are unable to read, write, or communicate beyond their own family members and only 3% of the school age children who are deaf have attended school (Baer, 2011; MANAD, 2012; Mbewe, 2009).

In countries where there is a documented sign language with developed curriculum, the research literature supports the resulting positive effect not only on the children's academic achievements but also on their ability to successfully contribute to their communities (Klaudia, 2014; Malloy, 2003; Marschark & Everhart, 2006; Mellon et al., 2015). In other sub-Saharan African countries such as South Africa and Uganda where the signed language of the deaf community has been documented, it has resulted in greater access to educational opportunities, health information, religious worship, and the significant political representation, providing greater quality of life for its members (Druchen & Newboudt-Druchen, 2015). It is the teaching of a standardized sign language that ultimately provides a bridge of communication between the hearing community and the people who are deaf.

The Oral Tradition

Kiyaga and Moores (2003) noted that with the potential influence of the European Missionary movement, deaf education for the colonized countries in sub-Saharan Africa began in the late 1800s. Initially serving a small number of the deaf children in the urban areas of Malawi, the missionaries incorporated a strict oral approach forbidding the use of gestures or signs. Unfortunately, while well intended to facilitate assimilation into the hearing world, this method merely frustrated and traumatized those individuals who were moderately or profoundly deaf. This frustration continues today for

children who are deaf and who attend mainstream classrooms that attempt to incorporate total communication (both oral and sign language) where teachers have "an impoverished form of signed language" (Glaser & van Pletzen, 2012, p. 25).

Emerging Indigenous Signed Languages

When the value of incorporating a signed language with educational instruction was finally recognized in the 1990s, there were only limited written vocabulary word images or descriptions of the natural Malawian Sign Language emerging at the Schools for the Deaf. Additionally, there is no lexical database with any archival access for research and the formal development of course curriculum. "Signed language research is vital to the better understanding of how a community's language contributes to the empowerment of the deaf community, the positive evolution of deaf education, and the overall equality (socially, politically, and economically) of a deaf person" (Hochgesang, 2015, p. 9). Additionally, lexical databases have been utilized in notable research studies regarding literacy, language acquisition, and memory to name a few (Caselli, Sevcikova, Goldberg, & Emory, 2016).

The Concern of Western Influence

With only limited resources and knowledge of the signed language of the deaf students, national teachers and those coming in to help from the United States and Great Britain often used American Sign Language and British Sign Language to teach. This still continues to endanger the indigenous signed language of Malawi (Mbewe, 2009). While the Malawian National Association of the Deaf is struggling to teach and incorporate the use of the signed language of the deaf community of Malawi, they have only received limited support to achieve their goal.

The common denominator in the articles regarding deaf people in sub-Saharan Africa is a collective desire for help and support to document their common indigenous signed language which will eventually provide instructional resources available to train interpreters for the deaf community where none exists. Perhaps the reason for this desperate plea is the realization that b

Part of the growing concern is that these indigenous languages, along with their culture and history, will be lost as more people from Western countries, in their efforts to support the educational struggles of the Schools for the Deaf in Malawi, simply use the dominant sign language that they have learned. This concern was recognized with the documentation of the Mardin Sign Language in Turkey by Zeshan and Dikyuva (Jones & Ogilvie, 2013). Establishing a

signed language as a unique language begins by establishing its difference from other signed languages - especially those that are dominant and tend to be used by western societies as they come to help, teach, and support students who are deaf (Perlmutter, 1991). To establish the degree of relationship or the unique differences between two signed languages, linguists have incorporated the modified Swadesh list of 100 words for signed languages as the framework for establishing the lexical statistics of the languages. The degree to which they have linguistic similarities determines if they are simply a different dialect, a related family language, or a completely different family language. These statistical guidelines are: 81-100% rate of similarity for a different dialect; 36-80% for a related family language, and less than 36% for a completely different language. There have been several studies that have incorporated these lexical statistic guidelines for the comparing of signed languages and determining mutual intelligibility (Aldersson & McEntee-Alaianis, 2008; Al-Fityani & Padden, 2008; Bickford, 2005; Blair, 1990; Chan & Xu, 2008).

This pilot study (as part of a larger project) was a detailed lexical database incorporating data and metadata of 439 words that will be eventually processed into ELAN and archived in the ELAR data system at the University of London. It critically looked at the degree of relationship between the signed language of the deaf community of Malawi and American Sign Language. American Sign Language (ASL) was originally brought to the Schools for the Deaf in Malawi that initially provided only oral instruction. While the ASL alphabet was primarily used to learn the words for the indigenous signs being used by the children who were deaf there, it was believed that an initial comparative study with ASL and the signed language of Malawi might be a good starting point as, to date, the lack of research indicates that Malawian sign language has not undergone a comparative study.

Additionally, this study considered the mutual intelligibility between the two languages and was based on the following research questions and hypotheses.

Research Questions
1. Is the lexicon of the signed language of Malawi similar or different than American Sign Language?
2. To what extent are they mutually intelligible or unintelligible?
3. What are the implications of this study for the analysis of the signed languages in the different regions of Malawi?

Hypotheses:

H1: Malawian sign language is phonologically unique from ASL; in other words, less than 36% of the phonology is similar to ASL.

H2: There will be no mutual intelligibility between the two signed languages.

Method

This pilot study, conducted October 2015, documented through video recordings of the signed words and some stories and scriptures the signed language being used by the children and teachers at this school. Like many other sub-Saharan African countries, it was in these boarding schools for the deaf where this indigenous signed language and deaf culture began to emerge. This school is one of several private schools for the deaf in the country. From these video recordings, a beginning lexical database of the natural signed language in the northern region of Malawi was created as well as digitized visual images whether one or several that incorporated the visual concept of the word.

Key Language Consultant

The key sign language consultant was one of two instructors at this school who were deaf and fluent in the signed language used at this school. One of these instructors seemed stronger in the signed language and was willing to serve in this role. This private school for the deaf in the northern region was exposed to ASL and British Sign Language (BSL) by way of NGO workers and institutions. However, despite this contact, the sign language system appeared to be independent of other language systems.

Principal Investigator and Research Assistants

The principal investigator, Dr. Carol Minton-Ryan, has spent a total of 12 weeks in Malawi from 1998 – 2005 while visiting on three different occasions. She conducted her dissertation research there in 2001, when she lived with a Malawian family for five weeks and had time to learn about the culture, the rituals, and norms. Additionally, she conducted research and studied people with disabilities during the course of her graduate career and as such has received over 40 hours of instruction in disability sensitivity training, interviewing skills, and ethical concerns regarding research cross-culturally, with those who have disabilities, or with vulnerable populations.

The three research assistants involved in the project were highly trained and

motivated to provide the rigorous work that was required to complete this initial study. Mary Sorola earned her Master's degree in linguistics from the University of London. She is also an interpreter for the deaf in the United States and is very familiar with deaf culture. Jackson Brown (who is profoundly deaf and for whom ASL is his first language) was part of this research project and is a graduate student in a Master of Arts Counseling Ministry program. Jackson provided an insider's perspective on deaf culture and has been accepted as an insider by the members of the deaf community of Malawi with which our team has interacted. Lane (2005) described deaf culture as deaf world: "Deaf-worlds are to be found around the globe, and when deaf members from two different cultures meet, they feel a strong bond although they share no common territory and are limited in their ability to communicate with one another" (p. 292). Dr. Minton-Ryan, Mary, and Jackson traveled to Malawi for the fieldwork portion of this study in October 2015 and July 2016. YuMin Park was a senior at California Baptist University in Graphic Design. He completed all of the initial digitalization of the video clips of the signed words. This process, as well as the development of the lexical data base and other work, was done back in the United States over a period of several months.

Procedure

Our key language consultant is an active member of the Malawi National Association for the Deaf (MANAD). Initial word elicitation was based on eight language categories, including: family signs, signs around the village, educational signs, medical signs, animals, activities, numbers, and time signs, resulting in a total of 437 signed words. With the assistance of the multilingual (English, Chichewa, Chitimbuka, and the signed language of Malawi) teachers at the School for the Deaf in the northern region, a list of signs was written and translated from written English to written Chichewa. Although the sign language key informant did know English, he seemed most familiar and comfortable with the written words in Chichewa. The informant then modeled the signed language of Malawi for each word corresponding with the English/Chichewa word list. The elicited words were filmed with a continuous video recording. He additionally shared the Lord's Prayer in the sign language and some information about his background.

A spreadsheet was created to locate and process each of the language items. Each sign was isolated and the corresponding time-stamp of the video clip was noted. Also included along with the English and Chichewa translations was a gloss of each sign. Any relevant cultural or linguistic notes were also noted on the spreadsheet. The time stamp data was sent to a research assistant serving as a graphic designer for the study. He isolated the optimal freeze frame of

each morpheme of the sign and converted the video freeze frame to a two-dimensional print image of the signer. These images were then notated with arrows to indicate movement within each sign.

From this spreadsheet, 100 signed words were extracted for analysis of statistical similarity on the phonological level. Inspired by Stokoe's (2005) methods of validating ASL as a genuine independent language, the four domains of phonology (hand shape (HS), location (LOC), palm orientation (PO), and movement (MOV) first analyzed by quantitative coding of each domain compared/contrasted with ASL signs were explored. Each category was coded with values of one and zero; one being similar to an ASL and/or zero for the category to have no similarity to an ASL sign (see Figure 1). A modified second sample was also obtained of 50 words that were recorded and included on the Swadesh list. The Swadesh list has more recently been used to determine lexical similarities and levels of intelligibility among users of comparative signed languages (Aldersson & McEntee-Alaianis, 2008; Bickford, 2005; Parkhurst & Parkhurst, 2003).

To further explore mutual intelligibility, a convenient sample of three native deaf signers of ASL were chosen to view the initial sample of 50-word signs (not the Swadesh word list) of the signed words of the signed language of Malawi that had been prepared from the data. The face of the signer was intentionally obstructed to replicate the omission of the fifth domain in the preliminary data analysis (facial expression). Each participant, individually, viewed the video and wrote down what he or she thought the sign was from based on their experience as an ASL user. Instruction was given in ASL prior to the video: "Once you begin the video, after you watch the signer sign, your task is to write down the first word/sign that comes to mind. If it looks similar to a sign in your lexicon, record it. If a word/sign does not come to mind, puzzled as you may be, please draw a line to indicate a blank answer. When you are done, please turn in the 50-sign sample worksheet to the researcher." Each participant was allowed adequate time to analyze each sign and recorded responses. Once the worksheet responses were gathered, the researchers then determined the number of signs correctly identified by each rater. The answers that correctly matched the conceptual values of the sign were not considered to be correct (i.e., restaurant vs. eating in a house).

Figure 1

	A	B	C	D	E	F	G	H	I	J	K	L
1	Number	Video #	Chichewa	English Equivalent		Handshape	P.O.	Loc.	Mvmt.	Total (insert value of 0 or 1, see Key)		Key for Assessing Similarities:
2	26	1251	Mzinda	City		0	0	0	0			0 = Not significant (NO)
3	34	1259	Mpolisi	Police		0	0	0	0			1 = Significant (YES)
4	37	1262	gule	Dance		0	0	0	0			Total of 2 or less = Not significant = 0
5	41	1266	mudzi	Village		0	0	0	0			Total of 3 or more = Significant = 1
6	48	1274	kumaliza	Finish		1	0	0	0			
7	49	1275	kukhuta	Full/Satisfied		0	0	0	0			4 Domains:
8	51	1277	zomwezo/osiyana	Same/Different		0	1	1	1			Handshape - HS
9	57	1295	bambo	Father		0	0	0	0			Palm Orientation - P.O.
10	58	1296	mayi	Mother		0	0	0	0			Location - Loc.
11	68	"	anakwatira	Married		0	0	0	0			Movement - Mvmt.
12	69	"	kusudzulana	Divorce		0	0	0	0			Note: most of the significantly matchin
13	70	"	ukwati	Wedding		0	0	0	0			
14	77	1297	bwenzi	Friend		1	1	1	1			

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Results

All data was analyzed using SPSS 22. Results revealed very few similarities between Chichewa Sign Language and ASL. Using the original list, there were similarities between the two languages 39.2% of the time overall. The specific domain similarities are listed in the table below (Table 1).

Table 1

Chichewa / ASL Sign Similarities (Original)

	Frequency	% Similar
Palm Orientation	17	33.3
Handshape	15	29.4
Location	19	37.3
Movement	20	39.2

Using the modified Swadesh word list, even fewer similarities were found. This time, the two languages were determined to be similar in only 16 of the 50 words (32%) on the list (Table 2).

Table 2

Chichewa /ASL Sign Similarities

	Frequency	% Similar
Palm Orientation	12	24
Handshape	12	24
Location	18	36
Movement	15	30

Additionally, the quantitative and qualitative results from the three native signers of ASL seems to support mutual unintelligibility. (Please see Table 3 for the statistics).

Table 3

Rater Scoring Results

Rater No.	Words Correct	%
1	21	42
2	11	22
3	14	28

The qualitative comments also provided additional insights. Participant 1 said, "I struggled with several of the signs but I could see some similarity. What caught me off guard is that the sign in my head does not match the meaning of the sign I saw." Participant 2 said, "Ah! Many of these signs look similar to some ASL signs but the meaning was different. Interesting study! I can tell the signer is deaf but I can't understand the signs." Participant 3 said, "Shoot. These signs are different! When they look about the same, the sign is completely different in meaning. I think I got less than half right." In fact, none of three participants were able to correctly identify even half of the signed words correctly.

Discussion

With the existence of indigenous sign languages comes the issue of sociolinguistic oppression; indigenous deaf communities are oftentimes the linguistic and cultural minority (Zeshan, 2007). Since many people from the U.S. familiar with ASL came to help and support the private schools for the deaf (especially in the northern region where we were working), the initial study was to focus on the comparison of the signed language of Malawi from the northern region to ASL. Despite this more dominant sign language being used, this pilot study suggests Malawian sign language appears to have retained its uniqueness from ASL. Currie (1999) noted that LSM (Mexican Sign Language) and LSE (Spanish Sign Language) shared similarities as they had a shared ambient spoken language and related ambient cultures. The comparison of LSM to JSL (Japanese Sign Language) retained much less similarity. Therefore, Malawi's unique culture and multiple language usage (national languages such as Chichewa, English, and Malawian sign language) may be what has contributed to uniqueness despite appearing to have historical influence.

Results from the current study appear to strongly support that, despite the potential influence from users of ASL on the signed language of Malawi, Malawian sign language is unique and unintelligible from ASL. As illustrated in Table 1, the results from the original words chosen, based on categories rather than the Swadesh list, suggested that ASL and the signed language of Malawi could be considered a related language family with 39.2% similarity. However, when the modified Swadesh list of words were used as illustrated in Table 2, there was only 32% similarity; both lists suggest a completely different language. Ebling (2015) noted that the role of movement must be determined in a sign language. Within sign languages, Ebling noted 5 techniques present; Ebling et al. establishes the usage of manipulative technique, substitutive technique, stamping technique, sketching technique, and measurement technique. In this particular analysis, the role of movement in Malawian Sign Language seemed to favor manipulation technique while ASL retained a variety of the 5 techniques. Therefore, while movements remained similar due to a physically bound perimeter of movement, the roles of movement varied and therefore maintained distinction. A portion of the research done by Ebling et al. highlighted that despite being geographically close, Swiss German and German retain some distinction (2015, p. 36-37).

Ultimately, our research team wanted to provide native signers of ASL the opportunity to review the original list of words. Some researchers have recognized the concern of using native signers because of what some describe as their deaf intuition. Native signers may recognize and interpret the nuances of a sign without any exposure to the language observed. A phenomenon known as "deafhood," Ladd, (2009) suggested native signers are able to cross communication barriers because they share a kinship, an unspoken mutual understanding to an extent such as "reading between the lines." In the current study, the native signers correctly identified less than half of the 50 signs presented, strongly suggesting that mutual intelligibility was not present. Their comments also provided additional insights that, while seemingly similar, the signs were not understandable. As one participant stated, "I struggled with several of the signs but I could see some similarity. What caught me off guard is that the sign in my head does not match the meaning of the sign I saw." Al-Fityani and Padden (2006) argued, "the visual-gestural modality of sign languages and their capacity for iconic representations support at the very least, a minimal level of similarity between unrelated sign languages" (p. 7).

The limitations of this study certainly include the omission of comparing the signed languages in the other regions of Malawi. The percentage of similarity could increase due to regional influences and geographical location. Continued studies of Malawian sign language in different regions of this country are needed. The percentage of similarity even to ASL may increase or

decrease depending on the location, community, religious influence, organizations, educational systems, and/or neighboring countries sharing their sign language with Malawi deaf. While the key sign language informant from this study is experienced and has a background of interacting with deaf communities from the northern and southern regions of Malawi, greater research and documentation is needed.

Further, this research focused on the percentages of similarity at the phonological level; syntax and semantics were not mentioned. This was supported in many of the lexicostatistical studies due to the primary interest in phonology similarity. Facial expression, the final component of the phonology, was omitted as the key informant was mouthing the English word as he signed the Malawi sign. Inclusion of the facial expression domain would have contaminated the statistical percentage of similarity/non-similarity. This fifth domain was omitted as well in Al-Fityani and Padden's (2008) work on their comparative lexicostatistical study done on sign languages in the Arab world.

Another limitation of the current study was the lack of inclusion or notations of high-frequency/low-frequency signs as utilized in the lexical research of Caselli, Sehyr, Cohen-Goldberg, and Emory (2017). This is certainly something to consider in future research studies. In addition, comparative lexicostatistical research is needed in the three neighboring countries (Mozambique, Tanzania, and Zambia) that share the common Bantu Chichewa language and have a documented signed language. This type of research would provide a more in-depth knowledge and understanding of language emergence, and familial relationships of language, as well as the quality of life resulting from establishments and acknowledgements of language validation.

Conclusion

Using the modified Swadesh word list, the results from the current study strongly support that the signed language of Malawi is unique and unintelligible from American Sign Language (ASL). Future research and formal documentation of Malawi's indigenous signed language is needed so that educational resources and consistent training of interpreters can occur. The importance of this as Perlmutter (1991) suggests, is that one's unique language has ". . . its own history and traditions, its own art forms and poetry, representing a linguistic and cultural minority." (p. 45). Malawi has yet to see the academic achievements and successful contributions that can be made by the Deaf community when their signed language is documented and interpreters are available to bridge their communication with others.

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Appendix A

The Modified List of 50 Swadesh words for the purpose of comparative studies between signed languages (Crowley, 1992; Lehmann, 1992).

Left Column: Selected Words

Right Column: Words from the Swadesh list

A little	small
Black	black
Blood	blood
Cold	cold
Come	come
Dirt	earth (soil)
Dog	dog
Duku (small)	small
Eating	eating
Father	man
Fire	fire
Fish	fish
Full/Satisfied	full
Getting Water	water
Good	good
Green	green
Hair	hair
Crow	bird
Head	head
You	you
Husband	man
I am good.	good
Lice	louse
Cattle	flesh, meat
Moon	moon
Mother	breasts female
Mountain Climb	mountain
Nap	recline
New	new

Claw	claw
Man	man
Woman	woman
One	one
Rainy	rain
Red	red
Run	walk
Seeds	seed
Sleeping	sleep
Soil	earth
Stand	stand
Sun	sun
Swim	swim
Tall	big
Tree	tree
Two	two
Wash Hands	hand
White	white
Yellow	yellow
Hot	hot
Dry	dry