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Mapping the Dimensions of Linguistic Distance: A Study on South Ethiosemitic Languages

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Abstract:	We measured selected South Ethiosemitic languages from three dimensions: structural, functional and perceptual. The aim of the study was to examine the relationship among these three dimensions of linguistic distances, to re-examine previous classifications of the languages, and to determine the degree of mutual intelligibility among the language varieties. We determined the structural distance by computing the lexical and phonetic differences. The phonetic distance was computed using the Levenshtein algorithm. A word intelligibility test was adopted from Tang and Heuven (2009) to measure the functional distance. A self-rating test, based on the recordings of 'The North Wind and the Sun' was administered to measure the perceptual distance among the languages. Then we performed cluster analyses using Gabmap. Multidimensional scaling was employed for the cluster validation. The results of the analyses show that there is a very strong correlation among the measures of the three dimensions of distance. Moreover, the language taxonomies obtained from the measures of the three dimensions of distance are very similar, and they are generally comparable to the classifications previously proposed by historical linguists. Furthermore, the mutual intelligibility test results show that many of these languages are mutually intelligible with the exception of Silt'e.

MAPPING THE DIMENSIONS OF LINGUISTICS DISTANCE: A STUDY ON SOUTH ETHIOSEMITIC LANGUAGES

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1 Introduction

Issues of how to distinguish dialects from languages and how to quantify the resemblance between two or more language varieties have been the central concerns of dialectology. These two subjects are often addressed by linguists by measuring the distance between two or more language varieties. As a general principle, the more two languages are structurally (phonetically, morphologically, lexically or syntactically) similar, the more they are related to each other; if they are similar enough, they are dialects of the same language. Distinguishing dialects from languages is more complex than this though, and in most cases non-linguistic variables (social, cultural, political, and psychological) have roles to play. This means that determining a linguistic distance just based on the structural similarity between languages may not always be sufficient to determine whether two language varieties should be considered dialects of a language or two different languages.

In addition to the influences of the non-linguistic variables, there are inherent limitations of the structure-based traditional approach. The structural approach is often criticized for having two drawbacks. First, measuring the linguistic distance requires quantifying the distance among the language varieties. However, languages differ in several dimensions (phonology, phonetics, morphology, syntax and lexicon) and identifying the level that must be measured is a major challenge (Author2, 2018,p.206; Heeringa et al., 2006, p.51; Tang & van Heuven, 2007, p.223; Tang et al., 2009, p.710). Second, even if all the levels could be measured, determining the relative contribution of each level, and squeezing the differences into a single unidimensional mathematical measurement is another challenge (Chiswick & Miller, 2005, p.01).

Previous studies of dialectology, in general, have followed two research perspectives to address these limitations. On ~~one~~ hand, there has been a successful move in terms of shifting from measuring linguistic distance just based on purposefully selected specific linguistic features to measuring distance based on a large aggregate data (Goebl, 2010; Others et al., 2011; Nerbonne & Heeringa, 2001; Prokić et al., 2013). On the other hand, different methods that take into account the non-linguistic variables, for example, the perception and the knowledge of non-linguists have been developed in the last couple of decades to circumvent the limitations of the structure-based approach (e.g., Preston, 2010). In this regard, the use of mutual intelligibility as a means of measuring linguistic distance and recent advances in folk linguistics have made important contributions. As a part of these endeavors, different methods of measuring mutual intelligibility have been developed (see Author2, 2013; Menuta, 2013, p.57-58).

There have also been various methods of measuring linguistic distance from perceptual perspectives. The perception-based approaches vary in a couple of ways. Some of them examine the perception of the speakers based on carefully selected language inputs such as recorded stories (e.g., U. Other1 et al., 2009); some others measure the overall perception of the speakers without focusing on a specific language input, for example, by asking in which nearby area a similar language is spoken (e.g., Bucholtz et al., 2007; Pearce, 2009; Tamasi, 2003; Montgomery, 2007; Preston, 1996). Moreover, some recent studies focused on examining the perception of non-linguists towards specific sound features such as the features of vowels or consonants (e.g., Labov; Plichta & Preston, 2005; Niedzielski, 1999).

Hence, since dialectologists have taken different paths in an attempt to boost the possibility of adequately quantifying the distance among related languages, there has been an immense increase in the methods of measuring linguistic distance. These methods can be subsumed into three broad categories: structure-based (based on phonetic, lexical or grammatical similarity), intelligibility-based (based on inherent and acquired intelligibility) and perception-based (based on the perception of non-linguists). Previous studies measured linguistic distance either from one or from the combinations of these three perspectives (Author2, 2018, p.196; Tang et al., 2009, p.710; Tang & van Heuven, 2007, p.223). As noticed by Author2 (2018), the degree of correlation among the linguistic distances measured from each of these perspectives is a concern that requires further exploration.

In the present study, partly, we further investigate this matter. For the sake of expediency, we use functional distance and mutual intelligibility with slight meaning differences. We adopt the common definition of mutual intelligibility which is the extent to which the speakers of language A understand the speakers of language B and vice versa (Gutt, 1980, p.57). We define the functional distance as the degree of difference between language A and

language B on the bases of the speakers' understanding. This distinction is important for some logical reasons. First, in literature, very often a distinction is made between inherent intelligibility and acquired intelligibility (Author2 & Other1, 2018; Gutt, 1980). Even, for some, only inherent intelligibility is considered as mutual intelligibility (e.g., Gutt, 1980; Tang et al., 2009). We use functional distance to refer to a linguistic distance which is measured using either the inherent intelligibility or acquired intelligibility tests or both. Second, both inherent intelligibility and acquired intelligibility are parts of the actual communication - which is the main function of the language. Hence functional distance (function-based distance) can best describe all distances measured from this perspective. More importantly, by using functional distance, we make a distinction between the mutual intelligibility which is measured based on the actual performance and perceived intelligibility, which is measured based on the perception of non-linguists. Based on these considerations, we classify the methods of measuring linguistic distance in general as structure-based, function-based and perception-based. The distances that are determined using these methods are therefore considered as structural, functional and perceptual distances respectively.

By examining these three distances, we contribute to one of the continuing debates in dialectology, which is to what extent these dimensions of distance correlate. In previous works, there have been doubts, for example, about the reliability of the non-linguists' consciousness in measuring linguistic distance (Goeman, 1999, p.141). The correlation between mutual intelligibility and degree of linguistic similarity has also been the concern of several recent studies (Author2, 2018; Author2 & Other1, 2018; Author2 et al., 2010). The present study partly indulges into these concerns, and examines them in the context of Ethiosemitic languages. In addition to examining the relationship among different perspectives of measuring linguistic distance, we also aim to determine the distance and mutual intelligibility among selected south Ethiosemitic languages - Chaha, Inor, Ezha, Endegagn, Gura, Gumer, Mesqan, Muher, Kistane and Silt'e. These languages were selected based on two parameters: the number of speakers and the language sub-family they belong to, according to previous classifications by historical linguists. As we sought to include a high number of participants, language varieties with relatively high number of speakers were selected (based on Ethiopian National Census Report, 2007). We also strove to include at least one language from each of the five so-called Gurage varieties: Kistane (North Gurage), Muher and Mesqan (West Gurage), Silt'e (East Gurage), Endegagn and Inor (Peripheral West Gurage) and Gura, Gumer, Chaha and Ezha (Central West Gurage).

2 Ethiosemitic Languages

Ethiosemitic languages are Semitic varieties which are spoken in Ethiopia and Eritrea. Many scholars classified these languages. The present study largely relies on the classification of Hetzron (1972) which is often considered as the most complete one. Ethiosemitic languages are divided into North and South Ethiosemitic. North Ethiosemitic consists of Tigre, Tigrigna and Ge'ez (see Demeke, 2001 and Hetzron, 1972). The south Ethiosemitic languages consists several languages (see Figure 1). Languages classified under 'Outer south' and 'Eastern' branch are traditionally called Gurage languages. According to Demeke (2001), Fleming (1968) and Faber (1997), there is no clear genealogical relationship among Gurage varieties which constitute a large number of the south Ethiosemitic languages. For instance, Silt'e is closer to Harari than to the rest of the Gurage languages. Furthermore, Kistane is closer to Gafat than to other Gurage languages. There is also a controversy about the position of Mesqan. Hetzron (1972) classified it under West Gurage while other ~~scholors~~ such as Demeke (2001) classified it under North Gurage. Moreover, Muher does not have a settled position in the classification of Ethiosemitic languages. While Hetzron (1972) classified it under the tt-Group, Demeke (2001) placed it under Central West Gurage. Neither of the studies provided a sufficient description for their classification.

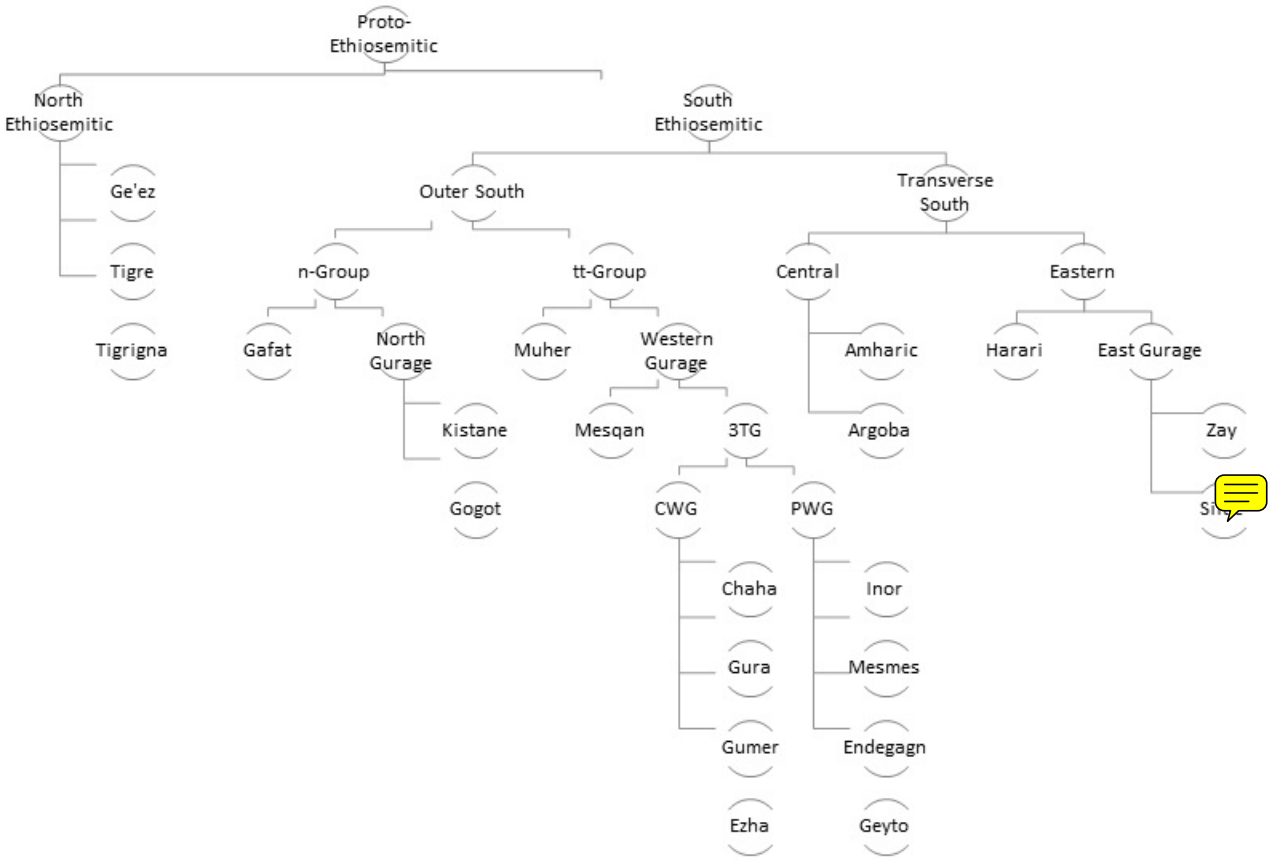


Figure 1: Classification of Ethiosemitic languages, Hetzron, 1972

Lack of detailed evidence, combined with other factors such as a long history of contact among Ethiosemitic and other neighboring Afro-asiatic languages, compelled previous studies to provide often sketchy conclusions regarding the origin and the classification of the languages (Goldenbekg, 1977, p.462). So far, there is no single clear proposal about the origin and the classification of Ethiosemitic languages (Demeke, 2001; Hetzron & Bender, 1976; Hudson, 2000 and Goldenbekg, 1977). Previous studies on the phonetic and perceptual distance among the Ethiosemitic languages are completely absent. However, there are studies on lexical comparisons. For instance, Bender et al. (1972), examined 12 Ethiosemitic languages using a 98 word list from Swadesh (1955). Inor, Chaha, Mesqan and Kistane are among the languages included in this study. According to this study, none of these languages share more than 80% cognates. In the same manner, Hudson (2013) investigated the lexical similarity among 14 Ethiosemitic languages based on a 250 basic vocabulary list. Silt'e, Inor, Chaha, Muher, Mesqan and Kistane are among the languages investigated by

this study. The study reported more than 80% shared cognates between Inor and Mesqan, Inor and Muher, Inor and Chaha, Chaha and Muher, Muher and Mesqan, and Mesqan and Kistane. Likewise, Menuta (2013) examined the lexical similarity among six south Ethiosemstic languages: Kistane, Chaha, Inor, Mesqan, Muher and Wolane, using a list of 255 words. The study reported more than 80% cognates between Chaha and Inor, Chaha and Mesqan, Chaha and Muher, Mesqan and Chaha, and Mesqan and Muher.

The degree of mutual intelligibility among many of the languages also has not been investigated. To the best of our knowledge, there are three studies that so far investigated the mutual intelligibility among some of the south Ethiosemsitic languages: Gutt (1980), Ahland (2003) and Menuta (2013). Gutt (1980) examined the mutual intelligibility among six south Ethiosemitic language varieties, Silt'e, Kistane, Chaha, Inor, Mesqan and Amharic, using an oral comprehension task. The results of the study indicate that, based on the 80% intelligibility threshold, only Silt'e and Mesqan are mutually intelligible. In the same manner, Ahland (2003) determined mutual intelligibility among eleven Gurage varieties using oral comprehension questions. According to this study, based on an 80% mutual intelligibility threshold, Chaha is intelligible to Ezha, Muher and Gumer; Ezha is intelligible to Gumer; Inor is intelligible to Endegagn; Gumer is intelligible to Ezha and Endegagn; Endegagn is intelligible to Inor; Mesqan is intelligible to Chaha, Ezha, and Muher.

Menuta (2013) also investigated mutual intelligibility among six Gurage varieties (Kistane, Mesqan, Inor, Chaha, Muher and Wolane). In this study, different tests were used to measure the mutual intelligibility: word recognition (words in different parts of sentences were recognized by the respondents), sentence repetition (the informants listened to various sentences and wrote down exactly what they have heard), sentence verification (the informants judged sentences that are habitually true by saying 'true' or 'false'), instruction (the respondents perform certain actions based on given instructions) and comprehension questions. Based on the 80% intelligibility threshold, this study reported mutual intelligibility between Chaha and Inor, Chaha and Mesqan, Inor and Mesqan, Mesqan and Kistane, Muher and Chaha, and Muher and Mesqan.

With regard to the geographical distribution of the languages, Ethiosemitic languages, in general, are spoken in the north, central, east and southwest of Ethiopia. The ten languages we investigated in the present study are spoken in the south west part of Ethiopia (see Figure 2), around 160 kilometer from Addis Ababa, the capital. This small area is sometimes called Gurage area. It is one of the most linguistically diverse areas in Ethiopia. More than 12 Ethiosemitic varieties are spoken in this area. We adopted the term 'Gurage language area' and 'Gurage languages' from earlier

works (e.g., Leslau, 1979). However, it is important to mention here that, the so called Gurage languages do not refer to a single genetically attested unit (Hetzron, 1972, p.119; Meyer, 2011, p.1221). Moreover, some of the speakers of these varieties do not consider themselves as Gurage (Meyer, 2011, p.1223). Silt'e is taught at elementary level in Silt'e zone.

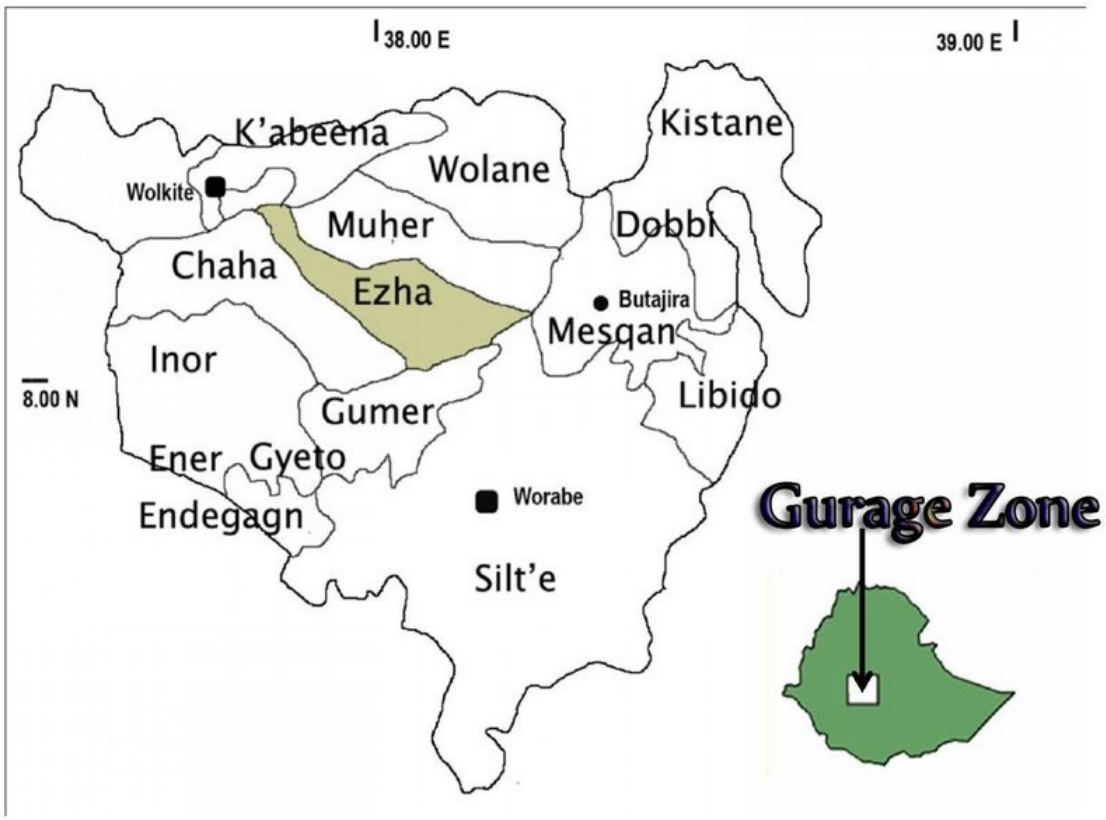


Figure 2: Gurage language area, Meyer, 2014

Given that there have been debates both about the methods of dialectology and about the classification of the Ethiosemitic languages, the present study aims to address two general objectives. The first one is methodological, i.e., to what extent the methods of measuring linguistic distance are related. There are two specific objectives related to the methods: (a) determining to what extent the structural, functional and perceptual distances correlate; (b) examining the possibility of substitutability among the three dimensions of distance. By addressing these objectives, we illustrate the link among various methods of measuring linguistic distance. We expect strong correlations among the three dimensions of distance based on previous studies (e.g., U. Other1 et al., 2008; R. Other1 & Author2, 2007; Author2 & Other, 2004; Tang & van Heuven, 2007; Tang et al., 2009).

The second general objective is determining the linguistic distance among the selected south Ethiosemitic language varieties. We aim to address four specific objectives related to the Ethiosemitic language varieties: (a) determining the distance among the selected language varieties; (b) classifying the languages using the data obtained from the three dimensions of distance; (c) examining to what extent the taxonomies obtained from structural, functional and perceptual distance measures are similar to the classifications previously proposed by historical linguists, and (d) determining the mutual intelligibility among the language varieties. Based on Hudson (2013) and Menuta (2013), we expect very close lexical similarity between Chaha and Mesqan, Chaha and Inor, Mesqan and Muher, ~~Chaha and Mesqan~~, and Mesqan and Kistane. Furthermore, we expect close similarity between taxonomies obtained from the three distance measures, and the classifications previously provided by historical linguists, based on Tang et al. (2009). Based on Ahland (2003) and Menuta (2013), we further expect mutual intelligibility between Chaha and Ezha, Chaha and Muher, Chaha and Gumer, Mesqan and Chaha, ~~Meqan~~ and Ezha, and ~~Mesqan and Chaha~~.

3 Methods

This section presents the methods employed to address the objectives presented in section 1. First, the description of the research participants and informants is presented. This will be followed by the methods and procedures used to measure the structural distance among the selected Ethiosemitic languages. Then, methods used to determine the functional and perceptual distance are explained. This is followed by a presentation of the methods of clustering and cluster validation techniques.

3.1 Research Assistants and Informants

In this study, the term 'research assistants' and 'informants' are used with a meaning difference. Research assistants are individuals, specifically school teachers, who participated in selecting test-takers, preparing materials such as translating texts and reading translated texts during the recordings. 'Informants' refer to individuals (students in this case) who completed the tests designed to measure the functional distance and the perceptual distances. The procedures used to select both the research assistants and the informants are presented as follow.

3.1.1 Research Assistants

Research assistants refer to carefully selected secondary school teachers (minimum bachelor degree holders). They were selected from ten schools in nine districts in the Gurage and Silt'e zones: eight districts in Gurage zone and one district in the Silt'e zone (Chaha and Gura are spoken in Chaha district). From each school, three teachers who speak the variety of that particular area as a native language were selected. In other words, a total of thirty teachers were recruited from the ten schools in the ten districts. The teachers were selected using two screening steps. For the initial screening, a call for preparation in form of printed leaflets was distributed in the schools. The leaflets informed about a few language requirements such as being the native speakers of the local variety and lifelong residence in the language area. There were many schools in some of the districts. Except for Mesqan and Gura, a school in the administrative town of each district was selected. Regarding Mesqan, the administrative town is Butajira. Since the residents of Butajira are largely Amharic speakers and Mesqan is not so frequently used, a school outside the Butajira town was selected. Gura is spoken in Chaha district. Regarding Gura, speakers from around Gura ~~Megnase~~ (suburb area of ~~Edebir~~, a town in Chaha) were considered.

On the leaflet the contact information of the main researcher was included so that any interested teacher could easily get in touch with the researcher if s(he) fulfilled the requirements. The call for participation was posted on the notice boards of all the secondary schools in the districts of interest. Among the teachers who responded to the call for participation, three of them were selected from each languages area. This second screening was conducted using semi-structured interviews. The interviews focused on issues such as the teachers' home language situation, amount of exposure to the neighboring varieties, and language conditions in earlier workplaces (whether they regularly use mother language in the work places). Based on these parameters teachers who are the native speakers of the local variety and who use the language both in schools and at home were recruited. The interviews took place in the schools of the respective teachers. They received a mild payment (300 birr) for their services.

3.1.2 The Informants

The informants were selected by the research assistants. Thirty (30) students were recruited from each school, in total 300. The students in all the grade levels in the secondary schools (from grade 9 - 12) were considered to incorporate as many students as possible. Similar to the selection of the research assistants, the students were selected in a two-step screening processes. First, all students who are native speakers of the local variety were requested to

register on a registration form prepared for this purpose. The registration was made by the research assistants. Once the native speakers of a local variety were identified, they were administered to the second screening. Questionnaires were employed for the second screening (see Appendix A.1). The questionnaires contained items about the students' first and second language background, family language conditions, personal information and their contact with speakers of other neighboring language varieties. The questionnaires were prepared in Amharic since all secondary school students in the study areas were able to read and write Amharic. Indeed, Amharic is both the language of schooling and language of work places in the study areas, except in Silt'e zone where Silt'e is taught in elementary schools. The questionnaires were coded for each school and for each study area so that they could be easily identified during the analysis. All the items (questions) in the questionnaires were closed-ended to maximize the accuracy of the responses and to take into account the age and the education levels of the students. The questionnaires were administered by the researcher and the research assistants.

Then, based on the information obtained through the questionnaires, 300 participants (30 from each variety) who are the native speakers of the varieties of interest were selected. Besides, based on the data that were obtained from the questionnaire, it was assured that the participants had lived throughout their life in the area where their variety is spoken and that their parents are the native speakers of the variety under investigation. Whenever the eligible students that fulfill the requirement exceeded 30 for each variety, the equal proportion of sex (15 male and 15 females) was used as an additional parameter. Whenever there were too many eligible candidates, 15 male and 15 female students were randomly selected. Prior to the data gathering, permission was obtained from both Gurage and Silt'e Cultural and Tourism Bureaus, and from the administration of each school. Not all the selected participants attended the tests. As the word categorization and perception tests were administered at different time in some of the language sites, the number of participants who completed the word categorization test and the perception test was not exactly the same. In total, 285 participants completed the word categorization test. Among these, 171 were males and the remaining 114 were females. Moreover, 289 participants took part on the perception test among which 171 were males and the remaining 118 were females. The details of the participants of each site are presented in Appendix C.8.

3.2 Determining the Structural Distance

The structural distance was measured from two perspectives: lexical and phonetic. Words for the structural distance measure were randomly collected from different sources: from a list of words gathered for the word categorization test, from the 'North wind and the Sun' (all the words in the story were included) and other published materials.

Hence a total of 240 words were compared to determine the two distances (see appendix B.1). The fable, 'the North Wind and the Sun' contains simple words which are comprehensible to speakers with any educational background. It was translated from English to the ten varieties under investigation by the research assistants. A slightly modified Ethiopic writing system was used for the translation from English to the ten varieties. During the translation, whenever there was a disagreement among the three translators, the disagreement was resolved by the majority rule (2/3).

3.2.1 The Lexical Distance

The lexical distances among the ten selected language varieties were determined by computing the percentage of non-cognates of the total lexical items within pairs of varieties. Non-cognates are words that do share meaning, but have different forms. The corpus of the lexical-distance measurement is constituted by the words indicted in 3.2. The shared cognates were determined based on two parameters: similarity of roots and meaning between the corresponding pairs of words. These parameters were employed in a two-step process of cognate identification. First, the researcher identified pairs of words that share a common root based on the form (phonological) similarity between the corresponding words. In almost all Semitic languages, sequence of consonants form the basic word meaning (root). Hence, root similarity was considered as a core parameter, e.g., Amharic bərre 'ox', Endegagn bawra 'ox', Chaha bora 'ox'. Then, the meaning similarity among the pairs of words that share the same root was confirmed by the researcher, and the research assistants who are native speakers of the varieties. Once the cognate and non-cognate words in pairs of all varieties were identified, the percentage of non-cognate words was computed.

3.2.2 Phonetic Distance

The output of the lexical distance measurement was used as an input for the phonetic distance measurement, i.e., the phonetic distance was measured only between cognates which were phonetically transcribed (IPA). Cognates that are shared at least by six of the ten language varieties were considered for the phonetic distance. The cognates were aligned, and the distance among them was computed using Levenshtein algorithm, based on the number of phones which are inserted, deleted or substituted. The distance computation was made using the simplest cost assignment. The simplest cost assignment assigns equal cost (1 unit) to all the operations. Only the distance among the cognates was computed based on (Kessler, 1995, p.5) since the difference among non-cognates is not phonetic. The Levenshtein distance among the cognates was computed using Gabmap (see Others et al., 2011). The following are sample Levenshtein (phonetic) distances between Kistane and Chaha based on a shared cognate 'cloud'. In this case, the

Levenshtein distance is 2; substitution of [m] by [b] and [n] by [r]. This operation costs two units. This distance value is divided by the longest alignment, 6 in this case, to obtain the normalized distance. The normalized distance between Kistane and Chaha in this particular example .33 (2/6).

Table 1: Phonetic Distance, using Levenshtein Algorithm

Kistane - Chaha 'cloud'					
d	a	m	ə	n	a
d	a	b	ə	r	a
		1		1	
Absolute				2	
Relative				0.33	

3.3 Functional and Perceptual Distances

This section presents tests designed to measure the functional distance and perceptual distances among the ten language varieties.

3.3.1 Functional Distance

The word categorization test was adopted from Tang et al. (2009). This test was selected since it could be administered with a minimal impact of the priming effect, the major factor that probably influenced previous studies by Gutt (1980), Ahland (2003) and Menuta (2013).

Materials: The material selection and preparation procedures were quite similar to that of Tang et al. (2009). The first step in the material preparation was determining ten semantic categories to be used for the test. The semantic categories are general concepts such as plants, fruits, animals, furniture, etc. (see Appendix B.2). One of the parameters was the frequency of use of the semantic categories among the speakers of all varieties. For instance, some categories such as musical instruments are extremely culture-specific; as a result, they might not be common among all the speakers. The second parameter was the possibility of a semantic category to incorporate as many words as possible. This parameter was important since each semantic category must contain at least ten words. First, the researcher selected the categories based on his intuition. The categories were later approved by the research assistants.

Similar parameters were used to determine words to be included under each semantic category. Besides, word frequency was computed since frequency could be one of the factors that determine the comprehension of the words. It was not possible to compute directly the frequency of the lexical items to be categorized under each semantic category. This was because neither of the Ethiosemitic varieties under investigation has its own structured corpus. Many of them also do not have online oral and written documents which could be used as inputs to create one's own corpus. The only language in the area with sufficient amount of easily available language data is Amharic. Hence an Amharic language corpus containing about 100,000 written words, was created using AntConc software (Anthony, 2004), and this corpus was used to estimate the frequency of each lexical item. All the sources of the data were written texts such as newspapers, magazines, academic articles and social media texts. In the corpus, texts of different genres (politics, economics, agriculture, culture, sport, science, etc.) were included to make the corpus as representative as possible. Using this corpus, words that have relatively high frequency were selected.

Using these procedures, ten semantic categories, each containing the ten most frequent words were identified (see Appendix B.2). After the identification of the words and the semantic categories, the words under each semantic category were translated from Amharic to the ten varieties by the research assistants. The translators were told to solve the disagreements by the majority vote (2/3) whenever there was a disagreement among them. After the translation, each translator pronounced the translated words, 100 words for each variety, for sound recording with Adobe Audition running on a personal laptop. Then, the three translators from each variety were asked to rate their three recordings of 100 words on the Likert scale that ranges from 0 (not natural) to 5 (natural). Finally, among the three recordings, the one with the highest rating score was selected for the mutual intelligibility test.

Procedure : In the word intelligibility test, the participants' recognition capability was tested through semantic multiple choice categorization. In the test, the listeners indicated to which of the ten given semantic categories a spoken word belongs. For instance, the respondents heard 'banana' and we asked to categorize this word under one of the ten semantic categories ('fruits' in this case). The assumption here was that the correct categorization is achieved only if the listeners correctly recognize the target words. As there were ten semantic categories for each word, the probability of categorizing the words by chance is very small (10%). In the process of developing this test, the primary activity was creating audio input in such a way that the listeners do not hear the same word in the same variety more than once. In other words, the priming effect due to the repetition of similar input should be blocked. Similar to Tang et al. (2009), the Latin Square system was used for this purpose. Different data files (CDs) were created using the following procedures.

As indicated above, in the word intelligibility test, listeners must not hear the same word more than once. A word which is heard twice or more has a possibility to be more easily recognized than a word which is heard only once - the priming effect. In the present study, there were ten semantic categories, each semantic category consisted of ten lexical items, total of 100 (10*10) words. Based on these words, different CDs were created. In the first CD, the selected 100 list of words were presented in a fixed random order (1-100) in such a way that every following word is spoken in different variety. This is a default order. On the second CD (CD2), the words were presented in the same order except that the presentation begins with the variety in which no. 100 was spoken, then followed by varieties in which no. 1 to no. 99 were spoken. Due to this shift, every word in CD2 was spoken in a different variety than in CD1. The third CD begins with the variety in which no. 99 was spoken followed by the variety in which no. 100 was spoken, then followed by varieties in which from no. 1 to no 98 were spoken. Through this rotation, total of ten CDs, each CD containing 100 words in ten semantic categories were created.

One CD was administered for participants from each language area (see Figure 3). The 100 words on a CD were divided into ten tracks and each track was presented to a group consisting of three participants (every track was repeated three times) so that each member of the group classified the ten same words into ten semantic categories. Since there were ten tracks on each CD, a total of 30 students listened to each of the CDs administered in each language area. Because of these procedures: (1) each listener experienced each word only once. (2) A listener from every language area heard each word in ten different varieties. (3) Every member of a group heard one tenth (1/10) of the total lexical items. Figure 3 below shows the procedure of the task. Tang et al. (2009) used 7 seconds as response time. In the present study, the time was increased to 10 seconds in order not to put the students under time pressure. Before the actual testing, there was a practice session. For this session, a separate practice CD containing ten words and ten semantic categories from additional material was prepared. Each participant practiced at least once before beginning the actual task. More than one practice was allowed depending on the confidence and interest of a participant.

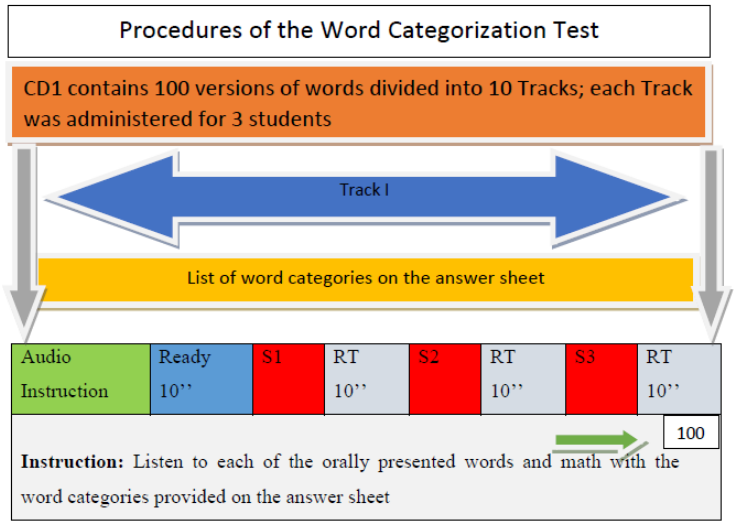


Figure 3: Procedures of Lexical Categorization test

For every track of the CDs, there was an answer sheet. Each answer sheet had its own CD and track numbers (e.g., CD 1, Track 2) so that each participant received an answer sheet with a different code number. Tang et al. (2009) provided the list of ten semantic categories on the response sheet. The same method was used in the present study. After listening to the orally presented words, the participants responded by choosing the appropriate match from lists of categories provided on the response sheet. The test was administered in quiet classrooms in the selected schools. Each participant was tested individually in a separate session. The test was administered by the researcher and one of the research assistants. The intelligibility measure was the percentage of words correctly matched with the given semantic categories.

3.4 Perceptual Distance and Attitude Tests

This section presents procedures which were employed to determine the perceptual distances and the attitudes of the speakers towards the test languages. The perceptual distance was measured from two perspectives: perceived similarity and perceived intelligibility. The presentation begins with the materials used for preparing the tests.

3.4.1 The Materials

As stated above, the fable 'The North Wind and the Sun' was used as input to determine the perceived intelligibility, the perceived similarity and the attitude of the speakers towards each other's variety. First the story was

translated from English to each of the local varieties (see section 3 for the procedure). After the written translation, the translated version of each variety was orally presented by the three research assistants. The presentation of each translator was recorded using Adobe Audition running on the personal laptop. Then, the three translators listened to each recording and rated the readings on a Likert scale that ranges from 1(not natural) to 5 (natural). Eventually, among the three readings, the one which received the highest rating score was selected for the test. The recording was made in a silent room in each school. The recording process was administered by the researcher.

3.4.2 The Tests and Test Procedures

The selected students took part in the perceptual tests after they had taken part in the intelligibility test. The three types of tests: perceived intelligibility, perceived similarity and the attitude of the speakers were combined and administered at the same time using the same material. Each test was represented by one item (question) with its own rating scales. This means that the combined test contains three questions: one for perceived similarity; another for perceived intelligibility and the remaining one for language attitude. The three test items were presented simultaneously to minimize the effect of the participants' familiarity to the test material, i.e. the test-takers answered the three questions after listening to each version of the recordings.

In order to minimize a response bias that might occur due to fatigue and familiarity to the test, the test items were arranged in three different orders; order A: (1) attitude test item, (2) perceived intelligibility test item, (3) perceived similarity test item; order B: (1) perceived intelligibility test item, (2) perceived similarity test item, (3) attitude test item; order C: (1) perceived similarity test item, (2) attitude test item, (3) perceived intelligibility test item. Due to these arrangements, each test item appeared in three different orders. Before the test administration, the thirty (30) speakers of each variety were randomly divided into three groups, each group containing about ten members. Then, the tests were administered in such way that members of the same group received tests of the same order: the first group received order A, the second group order B and the third group order C. Administering tests of the same order for members of the same group was important to give the same instruction for all group members. The audio inputs were presented using loudspeaker so that it would be possible for us to follow each response of the respondents.

During the test, the test takers listened to the recording of each variety and responded to the three successive questions (see Appendix A.3). They responded by putting 'X' mark on the Likert scale provided to each question. To measure the perceived intelligibility, the participants were asked to determine to what extent they understand the

speaker in the recordings. After listening to each of the recordings, the test takers indicated their judgment on the Likert scales that range from 0 ('do not understand at all') to 10 ('completely understand'). In the same manner, for perceived similarity, the respondents were asked to determine to what extent each of the presented recordings was similar to their own variety and to put their judgment on 11 point scales that range from 0 ('not similar') to 10 ('completely similar'). With regard to the language attitude, the respondents were instructed to determine whether the language in which the story was presented was beautiful or not, and to provide their responses on the Likert scales that range from 1 ('not beautiful') to 10 ('beautiful'). The recordings of the ten language varieties were presented in different orders for the speakers of each variety to manage the impact of fatigue (respondents could be less serious on the last presented story). In other words, there were ten different orders of the recordings, one order for the speakers of each language variety.

After the presentation of each recording, there was 3 minutes response time, 1 minute for each test item. For the sake of uniformity, the instruction was given in Amharic either by the researcher or by one of the research assistants. If there was a misunderstanding, further explanation was provided in the participants' native language. The recordings were presented using a personal laptop attached to a loudspeaker. After listening to each recording, the listeners provided their responses by putting 'X' on the scale provided. For each recording, there was a separate answer sheet. In other words, each test taker received ten pages of response sheet, one page for each recording. This procedure was vital to make sure that the test takers precisely matched each recording with the respective test items.

3.5 Clustering and Cluster Validation

After data collection, Gabmap was employed for the clustering and cluster validation. Gabmap is web-based software developed by linguists at the University of Groningen (see Leinonen et al., 2016; Others et al., 2011; Snoek, 2014). It provides several statistical alternatives (Ward's method, Complete link, Group average and Weighted average) to group similar languages together. Based on (Author2 & Other, 2004, p.196), weighted average method was employed to classify the language varieties investigated in the present study. However, clustering is often tricky - a small variation in the data matrix could result in quite different groupings. Gabmap provides three clustering validation techniques - discrete clustering, fuzzy clustering and multidimensional scaling. In the present study, multidimensional scaling was used to make sure that the clusters created were valid and consistent (see Others et al., 2011). The results of fuzzy clustering is only presented in the appendix for interested readers (see Appendix C.6) Multidimensional scaling takes a distance matrix as an input and groups values that are similar. Gabmap provides multidimensional scaling in a

two-dimensional space. The first dimension usually explains much of the variance in the distance matrix. The second dimension explains a large portion of the remaining small variances.

4 Results

Various distance matrices were obtained from the structural, functional and the perceptual distance measures. Appendix C can be referred to for the distance matrices. In section 4.1, we report results of the classifications of the language varieties based on the structural, functional and perceptual distances. As indicated in section 3, the structural distance was measured using the phonetic and lexical differences. The functional distance was determined based on the respondents' scores on Word Categorization test responses, the perceptual distance was estimated based on the respondents' response to self-rating rating perception test. The average of the upper and the lower halves of of the distance matrix was considered as distances between languages in both the functional and perceptual measures. Section 4.2 presents the results of the relationship among the three dimensions of distance. Section 4.3 presents the results of the word categorization test.

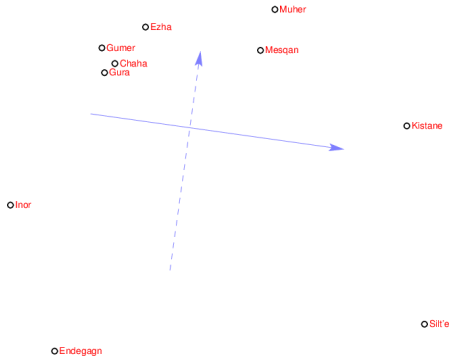
4.1 Classifications of the South Ethiosemitic Languages

In this section we present the classifications of the South Ethiosemitic languages based on the measures of the three dimensions of distance. The classification results are supplemented by the results of multidimensional scaling.

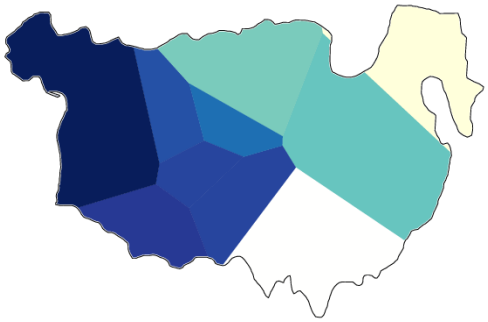
4.1.1 Classification of the Languages Based on the Structural Distance

Figure 4(a) shows the multidimensional scaling plot of the phonetic distance in two-dimensional space. The first dimension is indicated by a solid arrow, and the second dimension by a dashed arrow. In Figure 4a, the first dimension shows that Chaha, Gura, Gumer and Ezha have low phonetic distance values while Silt'e has the hiaghest distance Value. The values of other languages are between these two extremes. This dimension explains 52% (r = .72) of the variance in the distance matrix. The second dimension (dashed arrow) indicates that Endegagn has the lowest distance value while Mesqan and Muher have the highest value. The phonetic distance of other varieties is between these two extermes. This dimension also explains 38% of the variance (r = .62). The two dimensions combined explain 90% of the variance in the distance matrix. Based on the phonetic distance, the multidimensional scaling plot indicates six groups of language varieties: {Chaha, Gura, Gumer, Ezha}, {Muher, Mesqan}, {Endegagn}, {Inor}, {Silt'e} and

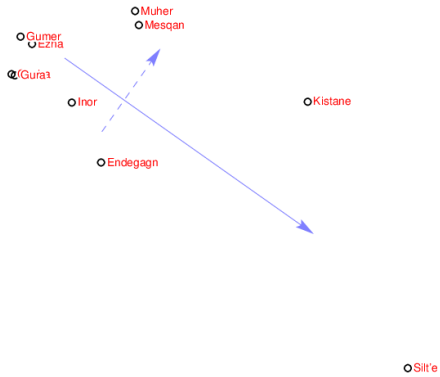
{Kistane}. As can be seen from the Figure, Silt'e and Kistane are separate languages. Inor and Endegagn are also phonetically somehow different.



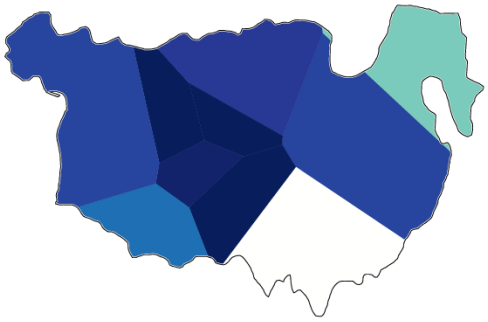
(a) Plot multidimensional scaling on two dimensional space for the phonetic distance, D1 = 52%, D2 = 38%



(b) Multidimensional scaling map for the first dimension of the phonetic distance; light colors show areas with the highest phonetic distance



(c) Plot of multidimensional scaling in two dimensional space for the lexical distance, D1 = 96%, D2 = 2%

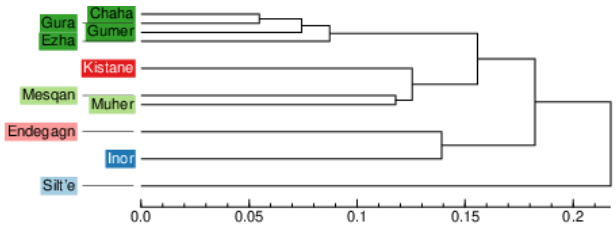


(d) Multidimensional scaling map for the first dimension of the lexical distance; light colors show areas with the highest lexical distance

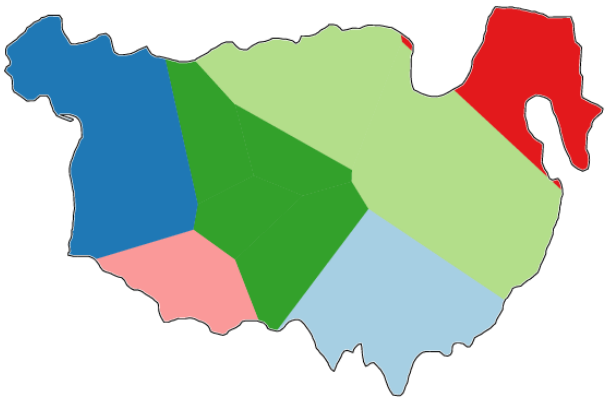
Figure 4: Classification of Ethiosemitic languages based on the structural distance

The multidimensional scaling plot based on the lexical distance is illustrated by Figure 4(c). The first dimension (solid line) explains the majority of the variance, 96% (r = .98). As the Figure illustrates, Gura, Gumer, Chaha, Ezha have the lowest distance values, and Silt'e has the highest distance value. The values of the other varieties are somewhere between these two extremes. The second dimension (dashed line) shows that Inor has the lowest distance values while Muher and Mesqan have the highest distance values. The dimension explains 2% (r = .15) of the variance in the data matrix. The two dimensions combined explain 98% of the variances. The multidimensional scaling plot of the lexical distance shows five possible groupings of the language varieties: {Gumer, Gura, Ezha, Chaha} form a group. {Inor and Endegagn} also form a group. In the same manner, {Muher and Mesqan} form a group. However, {Kistane} and {Silt'e} are separate languages.

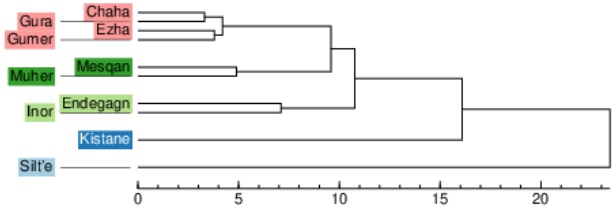
The dendrograms obtained from the distances are presented by Figure 5(a) and 5(c). The two dendrograms illustrate the classification of the language varieties based on the phonetic and lexical distances respectively. Figure 5(b) and 5(d) illustrate the dialect maps of the language varieties based on the phonetic and the lexical distance respectively. As can be seen from Figure 5(a), {Gura, Gumer, Ezha, Chaha} form a group. {Muher and Mesqan} are closely related. However, {Kistane} and {Silt'e} are separate languages. Likewise, {Endegagn} and {Inor} are separate languages. Figure 5(b) also shows the geographical distribution of the six dialect areas. In general, the phonetic distance measure shows that the South Ethiosemitic languages are classified into six dialect areas.



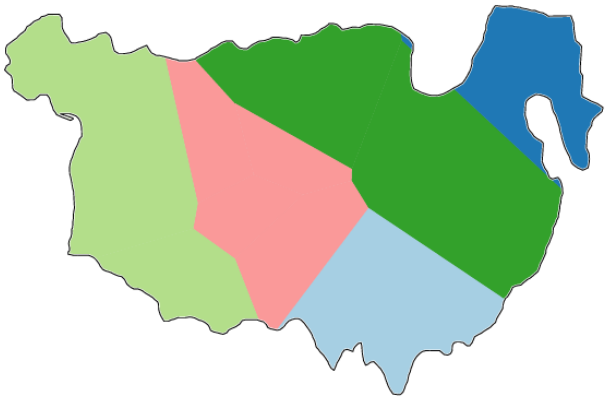
(a) Classification of Ethiosemtic languages based on phonetic distance



(b) Dialect map of Ethiosemitic languages based on phonetic distance



(c) Classification of Ethiosemitic languages based on lexical distance



(d) Dialect area of the south Ethiosemitic languages based on lexical distance

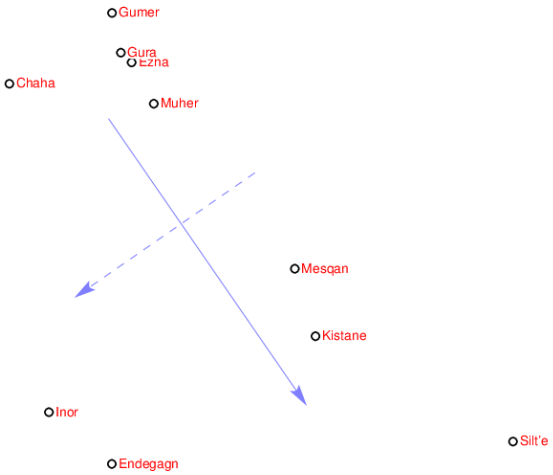
Figure 5: Classification of Ethiosemitic languages based on structural distances

Figure 5(c) presents the dendrogram of the language varieties based on the lexical distance. As can be seen from the figure, from lexical point of view, {Gura, Gumer, Chaha and Ezha} form a group. {Endegagn and Inor} also form a group. {Mesqan and Muher} form another group. {Kistane} and {Silt'e} are separate languages. Figure 5(d) presents the dialect map of the language varieties, based on the lexical distance. Unlike the phonetic distance, there are

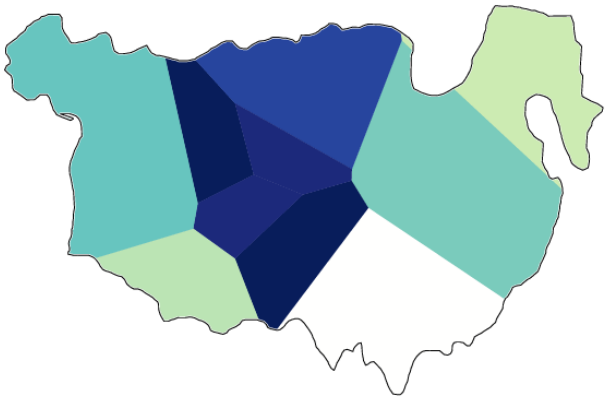
five distinct groups of languages. Clearly, the phonetic and lexical classifications are different. For example, Endegagn and Inor form a group in the lexical classification, but not in the phonetic classification. Kistane ans Silt'e are different in both classifications.

4.1.2 Classifications Based on the Functional Distance

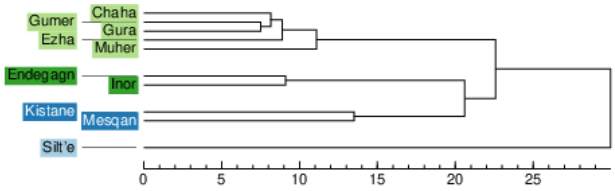
The functional distance results were obtained from the Word Categorization test. Since the Word Categorization test measures the similarity, not difference, among the language varieties, the average of the participants' scores on the test was subtracted from 100 to obtain the functional distance. Figure 6(a) presents a plot of multidimensional scaling of the functional distance in two-dimensional spaces. The first dimension (solid arrow) shows that Silt'e has the highest functional distance value whereas Gumer, Chaha, Ezha and Gura have the lowest values. Muher and Mesqan have medium values. This dimension explains 79% (r = .89) of the variance in the distance matrix. The second dimension shows that Inor and Endegagn have the highest distance values, while Muher and Mesqan have the lowest values. This dimension explains 14% (r = .37) of the variance in the distance matrix. The two dimensions together explain 93% of the variance in the functional distance matrix. The pattern in the multidimensional scaling plot shows that the language varieties are roughly grouped into five clusters - {Gumer, Chaha, Ezha and Gura} form one group, {Muher, and Mesqan} another group, and {Inor and Endegagn} also form another group. {Silt'e} and {Kistane} are separate languages. Figure 6(b) and 6(c) present the dendrograms of the language varieties based on the functional distance, and the corresponding dialect map. As can be seen from Figure 6(c), {Gumer, Gura, Chaha and Ezha} form a group. {Muher and Mesqan} another group. Moreover, {Endegagn, Inor} are closely related. {Sil'te} and {Kistane} are separate languages. Figure 6(d) also shows five language areas, with Silt'e and Kistane forming their own distinct dialect area.



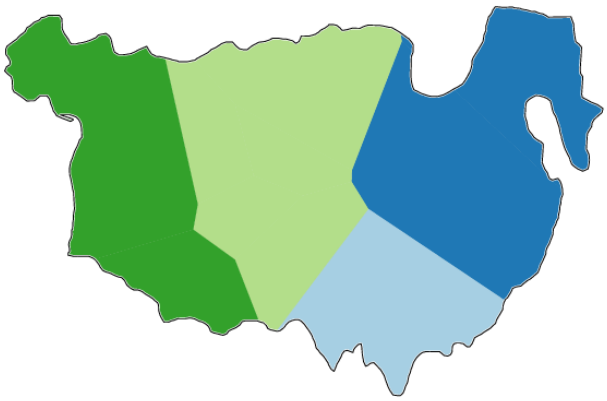
(a) Plot of multidimensional scaling for the functional distance, D1 = 79%, D2 = 14%



(b) Multidimensional scaling map for the functional distance



(c) Classification of Ethiosemitic languages based on functional distance

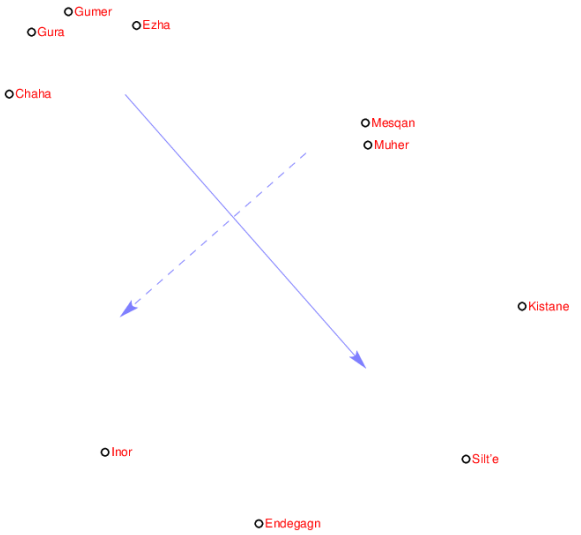


(d) Dialect map of Ethiosemitic languages based on functional distance

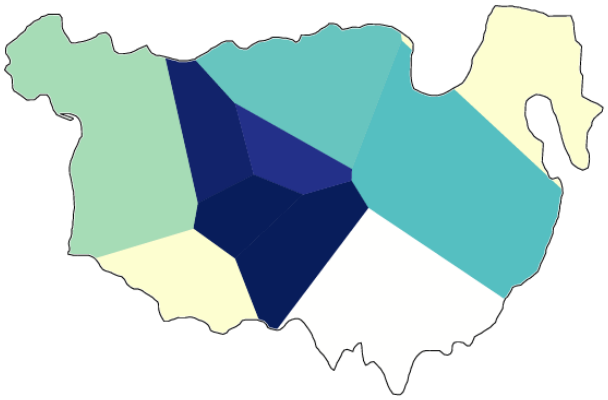
Figure 6: Classification of Ethiosemitic languages based on functional distances

4.1.3 Classifications Based on the Perceptual Distance

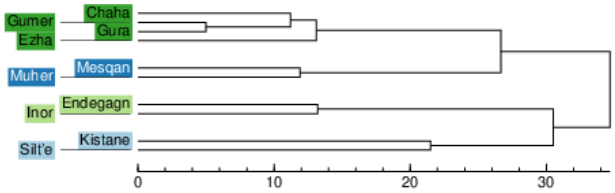
In section 3, it was indicated that two perceptual distance measures, perceived similarity and perceived intelligibility, were employed to determine the perceptual distance among the language varieties. The percentage of the mean of the two measures was computed and subtracted from 100 to quantify the perceptual distance among the varieties. It is important to remember that the perceptual test measures the similarity among the language varieties, not the difference, and this is why the subtraction was needed. The cluster analysis was performed on the average of the upper and the lower halves of the perceptual distance matrix.



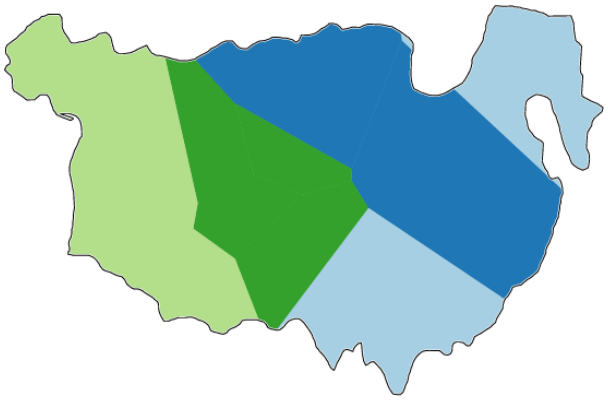
(a) plot of multidimensional scaling for the perceptual distance, D1 = 76%, D2 = 7%



(b) Plot of the first dimension of multidimensional scaling in two dimensional space, for the perceptual distance



(c) Classification of Ethiosemitic languages based on perceptual distance



(d) Dialect map of Ethiosemitic languages based on perceptual distance

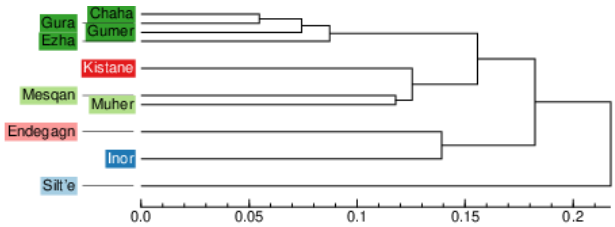
Figure 7: Classification of Ethiosemitic languages based on perceptual distances

Figure 7(a) shows the multidimensional scaling plot of the perceptual distance. As the Figure illustrates, in the first dimension, Ezha, Gumer, Gura and Chaha have the lowest distance values while Kistane and Silt'e have the highest values. This dimension explains 76% (r = .87) of the variance in the distance matrix. The second dimension (dashed arrow) shows that Inor has the highest perceptual distance value while Mesqan and Muher have the lowest distance values. This dimension explains 7% (r = .27) of the variance. The remaining values are between these two extremes. Both dimensions combined explain 83% of the variance in the distance matrix. The multidimensional scaling results clearly show that there are four groups of language varieties: {Chaha, Gura, Gumer and Ezha}, {Mesqan and Muher}, {Endegagn and Inor} and {Kistane and Silt'e}. From a perceptual point of view, Kistane is closely related to Silt'e. Figure 7(b) show the map of the first dimension of the multidimensional scaling. The light color shows an area

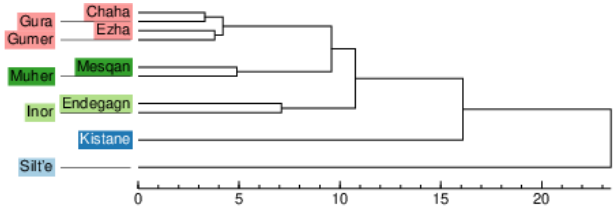
that has the highest linguistic distance, Silt'e Figure 7(c) and 7(d) show the classification of the languages based on the perceptual distance, and the dialect map of the ten language varieties respectively. Figure 7(c) shows that {Chaha, Gumer, Gura and Ezha} form a group. {Inor and Endegagn} form a group. There is also a strong affinity between {Muher and Mesqan}. In a different manner from the classifications based on structural and functional distances, Kistane and Silt'e form a group in the classification based on perceptual distance. Figure 7(d) Shows the dialect map of the south Ethiosemitic languages based on the perceptual measure.

4.1.4 The Combined Classification of Ethiosemtic Languages

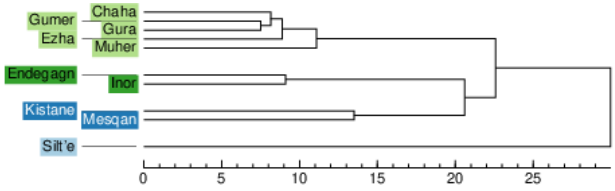
As presented in the preceding sections, the classifications that were obtained from the structural, functional and perceptual distance measures are not identical. The classification based on the phonetic distances shows six groups of languages while the classification based on the lexical distance indicates five group of the south Ethiosemitic languages. Hence, this section, aims to combine these classifications and provide a comprehensive classification of the languages. Then the results of the comparison between the combined classification and the classifications by the historical linguists will be presented. Figure 8 (a-d) summarizes the classifications presented in section 4.1-4.4. Figure 8 (e) presents the combined classification which was derived from the comparisons of all other classifications. The Sigma symbol in the combined classification represents unspecified mother language.



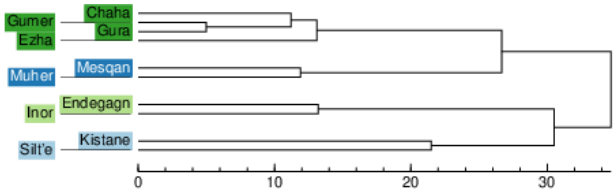
(a) Classification of Ethiosemitic languages based on phonetic distance



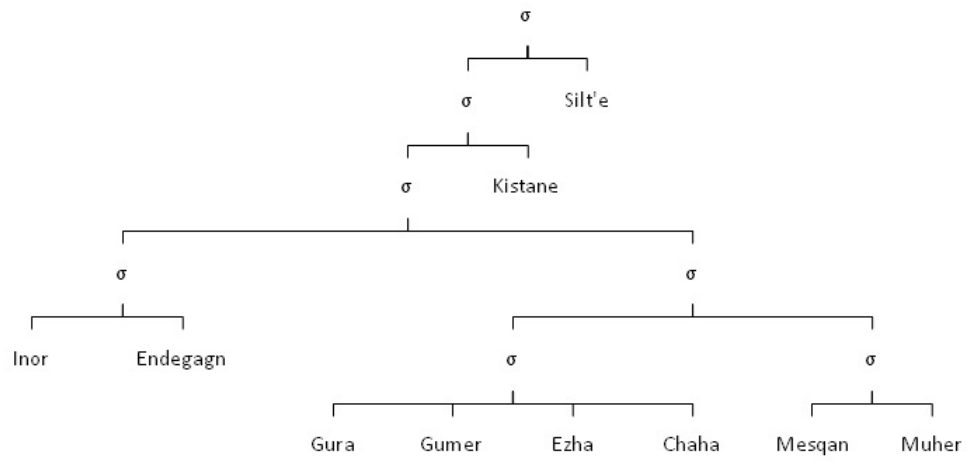
(b) Classification of Ethiosemitic languages based on lexical distance



(c) Classification of Ethiosemitic languages based on functional distance



(d) Classification of Ethiosemitic languages based on perceptual distance



(e) combined classification of Ethiosemitic languages

Figure 8: Comparisons of the classifications of Ethiosemitic languages

Given that the linguistic distance was measured from three perspectives (structural, functional and perceptual), the distance matrices were ranked based on their reliability, and the most reliable distance measures were prioritized in the process of combining the classifications presented above. Gabmap provides two measures of reliability of distance matrices: Local Incoherence and Cronbach's alpha. Local Incoherence is a numerical score of local stress that is assigned to set of differences between items (measure of linguistic distances in the present study). The optimal score is

zero while the non-optimal scores can be any positive value. Comparing the value of Local Incoherence for different measurements over the same data gives an idea about which result is more reliable (Others et al., 2011). Lower value of Local Incoherence means that the results are better. The idea behind the Local Incoherence is that on average, the locations that are close should be less different than localization that are further apart.

Cronbach's alpha is a coefficient of reliability. It is usually used to measure the internal consistency or reliability of the psychometric test scores. In Gabmap, it is used as the coefficient of reliability of the measurement of differences over the data. High ($>$ .70) Cronbach's alpha means that there is high level of consistency among the measure of distances. Table 2 shows the results of local incoherence and Cronbach's alpha for each of the distance matrices: phonetic, lexical, functional and perceptual.

Table 2: Consistency within the distance matrices

		Local Incoherence	[a]Cronbach's Alpha
Structural	Phonetic	.22	.97
	Lexical	.23	.87
Functional		.29	.63
Perceptual		.32	.61

[a]The high Cronbach's alpha of the phonetic distance could be due to the high sample size. Nonetheless, the higher degree of Cronbach's alpha of the remaining two measures (lexical and functional) clearly shows that perceptual distance has extremely low reliability. It is also important to remember that the reliability measures for the functional and perceptual distances is based on the mean of the upper and the lower halves of the respective distance matrix.

Table 2 shows that the phonetic distance has the highest Cronbach's alpha value, and the lowest value of Local Incoherence. This means that it is the most reliable measure compared to all other distance measures. Lexical distance has lower Local Incoherence and higher Cronbach's alpha compared to the functional and perceptual distance measures. Compared to the perceptual distance, the functional distance has a high Cronbach's alpha and low value of the Local Incoherence. Perceptual distance has the lowest Cronbach's Alpha and the highest Local Incoherence which means that it has very low reliability. In general, Table 2 shows that the structural distance (both phonetic and lexical measures) are the most reliable distance measures. Functional distance is more reliable than the perceptual distance. Perceptual distance is the least reliable distance measure.

Given these reliability differences, the structural distance was employed as a primary parameter in the process of determining the combined classification, i.e., if a set of the language varieties form a group in both phonetic and

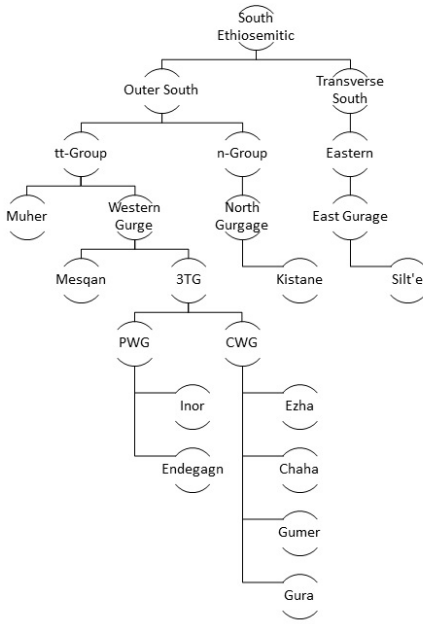
lexical classifications that set of languages was automatically considered for the combined classification. However, when languages belong to different groups in the phonetic and in the lexical classification, the functional distance was considered as a second parameter to determine which group is the most plausible one. Perceptual distance was considered as a third parameter when a set of language varieties form different groups in the classifications based on both the structural and functional distances.

In Figure 6.5 (a-d), {Chaha, Gura, Ezha and Gumer} form a group not only in the classification based on the phonetic distance, but also in the classification based on the lexical distance. Therefore, this group was automatically included in the combined classification without even considering their classification based on the functional and perceptual measures. {Inor} and {Endegagn} are separate languages in the classification based on the phonetic distance, but they are very similar in the classification based on the lexical distance. Therefore, the functional distance was used as a second parameter. Based on these requirements, Inor and Endegagn were grouped together in the combined classification. {Mesqan and Muher} form a group in the classifications based on both phonetic and lexical measures. Hence, they automatically qualified for the combined classification. {Silt'e} and {Kistane} are separate languages in the classification based on the phonetic and lexical parameters. They are also separate languages in the classification based on the functional distance. Therefore, they were considered as independent languages in the combined classification though they form a group in the classification based on the perceptual distance. This was due to the fact that the perceptual distance has very low reliability. Based on these requirements, the selected ten South Ethiosemitic language varieties were classified into five groups - the first group consists of {Chaha, Gura, Gumer, Ezha}; the second group contains {Inor, Endegagn}, the third group comprises of {Mesqan, Muher}; the fourth group includes only {Kistane}, the fifth group consists of {Silt'e}.

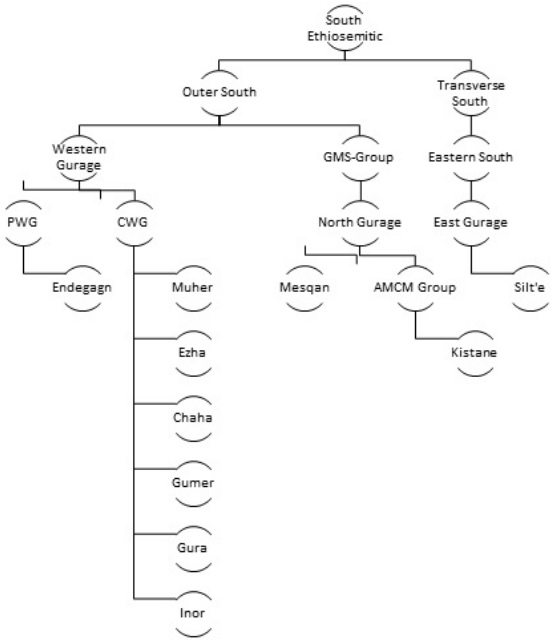
As can be seen from 6.5 (a-c), the grouping of the four Central West Gurage languages - Chaha, Gura, Gumer and Ezha is consistent across all the classification parameters. Therefore, the four Central West Gurage languages were used as a point of reference to determine the relative positions of other groups of languages in the combined classification. {Muher, Mesqan} are close to {Chaha, Gura, Gumer and Ezha} than {Kistane} in the classification based on lexical distances. This is not the case in the classification based on the phonetic distance since {Kistane} is rather close to {Chaha, Gura, Gumer and Ezha}. In this case, the functional distance cannot be used as a second parameter since Muher and Mesqan do not for a group in the classification based on the functional distance. Hence, the perceptual distance was used as a third parameter to move {Muher and Mesqan} close to the four Central West Gurage languages. {Inor, Endegagn} are close to the Central West Gurage languages than {Kistane} in lexical, functional and

perceptual classifications; therefore, they maintained their position in the combined classification. Moreover, compared to Silt'e, {Kistane} is closer to the Central West Gurage languages based on phonetic, lexical, functional and perceptual parameters. Silt'e is the one that is the most remote from the Central West Gurgae languages based on three (lexical, functional and perceptual) of the four classification parameters. The ultimate result of this process is the combined classification presented in Figure 6.5 (e).

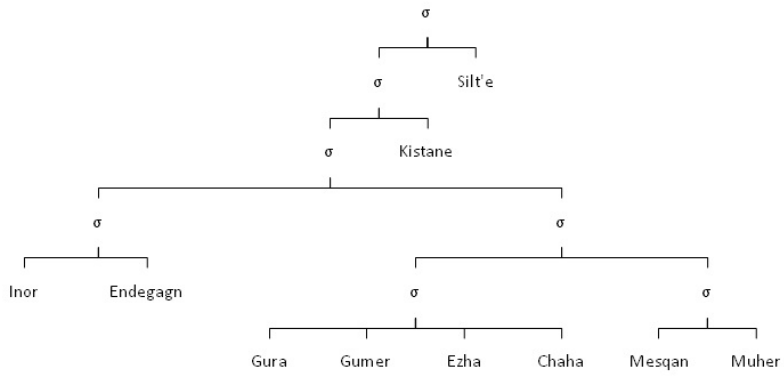
The remaining point now is determining to what extent the combined classification corresponds to the classifications previously proposed by historical linguists. Figure 9 (a) - 9 (c) shows that the combined classification seems similar with the classification by Hetzron (1972). For example, in both classifications, Chaha, Gura, Gumer and Ezha form a group. Inor and Endegagn also form a group in both classifications. However, unlike the combined classification, Muher and Mesqan do not form a group in the classification by Hetzron (1972). Moreover, unlike the classification by Demeke (2001), Muher and Inor do not form a group with the Central West Gurage languages which are {Chaha, Gura, Gumer and Ezha} in the combined classification.



(a) Classifications of the South Ethiosemitic language according to Hetzron (1972)



(b) Classifications of the South Ethiosemitic languages according to Demeke (2001)



(c) The combined classifications of the South Ethiosemitic language varieties

Figure 9: Comparisons between the combined classification and the classifications by historical linguists

Mere impressionistic comparisons of the dendrograms, may not precisely depict to what extent these classifications are similar. As a result, the cophonetic distance between each node in the classifications was compared to provide statistically sound evidences about the degree of similarity among the classifications. The cophenetic distance between any two terminal nodes in a tree is defined as the number of nodes one has to go up from language A to the

lowest common node shared between the member of the pairs and then down to language B (Author2 & Other1, 2018). For example, in Figure 9 (c), the cophenetic distance between Muher and Mesqan is two: (1) from Muher one node up to the the mother node, (2) from the mother node down to Mesqan. Pearson's correlation coefficient was used to illustrate the relationship between the cophenetic distance of combined classifications presented in 9 (e) and that of the classifications by the historical linguists.

For the sake of simplicity and space, only the ten language varieties under investigation are included in Figure 9 among several Ethiosemitic languages previously classified by the historical linguists. Since the distance between the nodes in a family tree is symmetrical (the distance between node A and node B is equal to the distance between node B and node A), the number of pairs of cophenetic distance measures is always N*(N-1)/2. This means that in the present study, there are 10 language varieties. Therefore, the possible symmetric pairs of languages to which the cohhenetic distance has to be computed is 10*(10-1)/2, which is 45. The cophenetic distance between each pair of the south Ethiosemitic languages is presented in Appendix C.5. For the sake of space, only the correlation coefficients between the cophenetic distance of the combined classification and that of the classifications by Demeke (2001) and Hetzron (1972) are presented here. The analyses of the relationship using Pearson's correlation show that the cophenetic distance of the combined classification correlates more strongly to the cophenetic distance of the classification by Hetzron (1972), $r = .761$ as compared to correlation between the cophenetic distance of the combined classification and that of the classification by Demeke (2001), $r = .553$. The two correlation coefficients are statistically significantly different, Hotelling's t-test, $t = 6.845$, $p = .001$.

4.2 Relations among the Three Dimensions of Distance

As indicated in 1.1, examining the relationship among the three dimensions of linguistic distance is one of the aims of the present study. Hence, in this section, correlations among the three dimensions of linguistic distances reported in the preceding sections are presented. Table 3 illustrates the correlation coefficients of the two structural distances, the functional distance and the perceptual distance. As can be seen from the table, there is a very strong correlation between the two structural distances - phonetic distance and lexical distance. Furthermore, the correlation between the two structural distances and the perceptual distance is very strong. Compared to other correlation coefficients, the correlation between the functional distance and the perceptual distance is small (though not statistically significant). This suggests that the participants' similarity judgment and their actual score on the intelligibility test may not be exactly the same. In general, there are strong correlations among almost all the distance measures compared in Table 3.

574 As a result, in Table 4, these correlation coefficients are compared to each other to determine if there is statistically
575 significant differences among them.

Table 3: Correlation coefficients of the three dimensions of distance

		Structural		Functional[a]	Perceptual
		Phonetic	Lexical		
Structural	Phonetic		.874	.804	.853
	Lexical			.849	.777
Functional					.747

576

[a]The functional and perceptual distance values are obtained by subtracting the values of mutual intelligibility and the perceptual similarity from 100 respectively (d = 100 - s). The upper and lower halves of the matrix were averaged for both functional and perceptual distances. The participants' functional and perceptual test scores on their own native languages were excluded.

577 Fisher's r to z transformation was employed to compare the correlation coefficients among the three distance
578 measures: structural. functional and perceptual. Table 4 illustrates that there are no statistically significant differences
579 among the correlation coefficients of all the distance measures.

Table 4: Comparison of the Correlation Coefficients

Compared Coefficients[a]	Transformation		
	z-values	p.value	Test
r_{PcpD} r_{PD} vs. $r_{PcpD}r_{LD}$	1.051	.293	Fisher's z-transformation
$r_{FD}r_{PD}$ vs. $r_{FD}r_{LD}$	-.654	.513	Fisher's z-transformation

580

[a]PcpD = perceptual Distance, LD = Lexical Distance, FD = Functional Distance, PD = Phonetic Distance

581 4.3 Intelligibility among the South Ethiosemitic Languages

582 As indicated in section one, both the functional distance and the degree of mutual intelligibility to be discussed
583 in this section refer to the respondents' scores on the Word Categorization test. In other words, the respondents' score
584 on the Word Categorization test was used as a tool to determine the degree of functional distance among the ten
585 South Ethiosemitic language varieties as well to determine the degree of mutual intelligibility among the language
586 varieties. In this section, the respondents' scores on the word categorization test are presented. In section one, the
587 mutual intelligibility was defined as the degree of communication or understanding between the speakers of related

languages, in principle, without having a direct exposure to either of the languages. The assumption in the present study was that the correct categorization of the words into their semantic categories measures the degree of understanding (at least at lexical level) of the speakers of the language varieties.

To determine the degree of mutual intelligibility among the language ~~verities,~~ 75% mutual intelligibility threshold was set based on the suggestion of Grimes (1995) and partly based on the conservative nature of the test administered . Hence, 75% and more score in the word categorization test was considered the confirmation of mutual intelligibility between the test language and the language of the test-takers. 71-74% score was considered as partial intelligibility. Anything less than 71% was considered absence of mutual intelligibility. Table 5 show the mutual intelligibility scores of the participants on the Word Categorization test.

Table 5: Mean of the participants' score on the Word Categorization test

Language[a]	CH	EN	EZ	GM	GU	IN	KS	MS	MU	SI
Chaha	81[b]	58	81	85	81	69	50	46	69	42
Endegagn	62	81	48	48	43	71	48	43	57	33
Ezha	80	52	80	76	76	52	36	40	76	40
Gumer	82	54	79	86	82	50	57	68	82	36
Gura	83	52	79	83	86	55	59	59	79	38
Inor	71	91	64	68	55	82	50	45	55	32
Kistane	48	48	39	57	48	39	83	52	35	22
Mesqan	67	42	71	67	42	42	67	85	63	33
Muher	77	38	69	69	65	46	65	42	81	23
Silt'e	43	43	48	57	43	22	35	35	48	87

[a]The test languages are abbreviated - CH = Chaha, ED = Endegagn, EZ = Ezha, GM = Gurmer, GU = Gura, IN = Inor, MS = Mesqan, MU = Muher, SI = Silt'e and KS = Kistane; the mutual intelligibility results are converted to percentage.

[b]The participants did not fully understand their own variety. This could be because of various factors including recording quality, time pressure, lack of attention and others

As can be seen from Table 5, Chaha speakers understand Ezha (81%), Gumer (85%) and Gura (81%). Endegagn speakers partially understand Inor (71%). Speakers of Ezha understand Chaha (80%) and Gumer (76%). In the same manner, Gumer speakers understand Chaha (82%), Gura (82%), Ezha (79%) and Muher (82%). Gura speakers understand Chaha (83%), Ezha (79%), Gumer (83%) and Muher (79%). Inor speakers partially understand

Chaha (71%) and fully understand Endegagn (91%). Besides, Mesqan is partially intelligible to Ezha (72%). Muher speakers understand Chaha (77%). Silt'e and Kistane are not intelligible to any of the language varieties.

Table 5 further shows that the test-takers did not score 100% on their own native languages though, in principle, it is assumed that the native speakers have a perfect knowledge of their own language. The participants underperformed on their native languages probably due to non-linguistic factors such as fatigue, quality of the recordings, lack of attentions, noises in the test environment, time pressure and many others. In order to compensate the influences of these factors, adjusted mean was computed for the participants' score on the Word Categorization test. It was computed by subtracting the actual mean of the participants' score on their own native language from the hypothetical mean, which is always 100%. Then the mean differences was added to the same participants' score on the non-native languages with the assumption that the factors that affect the participants' score on their native languages equally affect their scores on the non-native languages. For instance, Chaha speakers, in average, scored 81% on their own native languages though they are supposed to score 100%. Therefore, the adjusted mean was computed by subtracting 81% from 100% which 19%. Then 19% was added to the scores of the Chaha participants on all other language varieties. Table 6.9 presents the adjusted mean scores computed based on the results illustrated in Table 6.8.

Table 6: The adjusted mean of the test-takers' score on the Word Categorization test

Language[a]	CH	EN	EZ	GM	GU	IN	KS	MS	MU	SI
Chaha	**100**	77	100	100	100	88	69	65	88	61
Endegagn	81	**100**	67	67	62	90	67	62	76	52
Ezha	100	72	**100**	87	96	72	56	60	96	60
Gumer	96	68	93	**100**	96	64	71	82	96	50
Gura	97	66	93	97	**100**	69	73	73	93	52
Inor	89	100	82	86	73	**100**	68	63	73	50
Kistane	65	65	56	74	65	56	**100**	69	52	39
Mesqan	82	57	86	82	57	57	82	**100**	78	48
Muher	96	57	88	88	84	65	84	61	**100**	42
Silt'e	56	56	61	70	56	35	48	48	61	**100**

[a]The test languages are abbreviated - CH = Chaha, ED = Endegagn, EZ = Ezha, GM = Gurmer, GU = Gura, IN = Inor, MS = Mesqan, MU = Muher, SI = Silt'e and KS = Kistane; the results are converted to percentage.

Based on the adjusted mean presented in Table 6.9, Chaha speakers can understand ~~Enegagn~~ (77%), Ezha (100%), Gumer (100%), Gura (100%), Inor (88%) and Muher (88%). Endegagn speakers can freely communicate with Chaha (81%), Inor (90%) and Muher (76%). Speakers of Ezha understand Chaha (100%), Gumer (87%), Gura (96%) and Muher (96%). They also partially understand Endegagn (72%) and Inor (72%). Gumer speakers understand Chaha (96%), Ezha (93%), Gura (96%), Mesqan (82%) and Muher (96%). They also partially understand Kistane (71%). Gura speakers understand Chaha (97%), Ezha (93%), Gumer (97%) and Muher (93%). They also partially understand Kistane (73%) and Mesqan (73%). Inor speakers understand Chaha (89%), Endegagn (100%), Ezha (82%), and Gumer (86%). They also partially understand Gura (73%) amd Muher (73%). Besides, Mesqan speakers understand Chaha (82%), Ezha (86%), Gumer (82%), Kistane (82%) and Muher (78%). Muher speakers understand Chaha (96%), Ezha and Gumer (88%) and Gura 84%). Silt'e is not intelligible to any of the language varieties.

Menuta (2013) argues that the best center of communication is Mesqan, based on the study he conducted on six Gurage varieties - Chaha, Inor, Kistane, Mesqan, Muher and Wolane. In other words, according to this study, many speakers of Gurage varieties understand Mesqan better than the remaining Gurage varieties investigated in the study. The present finding contradicts with this report. As can be seen from Figure 10, it is Chaha that seems to be the center of communication. Chaha is intelligible to seven of the ten language varieties investigated in the present study. Silt'e was excluded from the Figure since it is not mutually intelligible to any of the language varieties. In Figure 6.8, the two-directional arrow shows that the intelligibility is symmetrical while one-directional arrow shows that the intelligibility is asymmetrical.

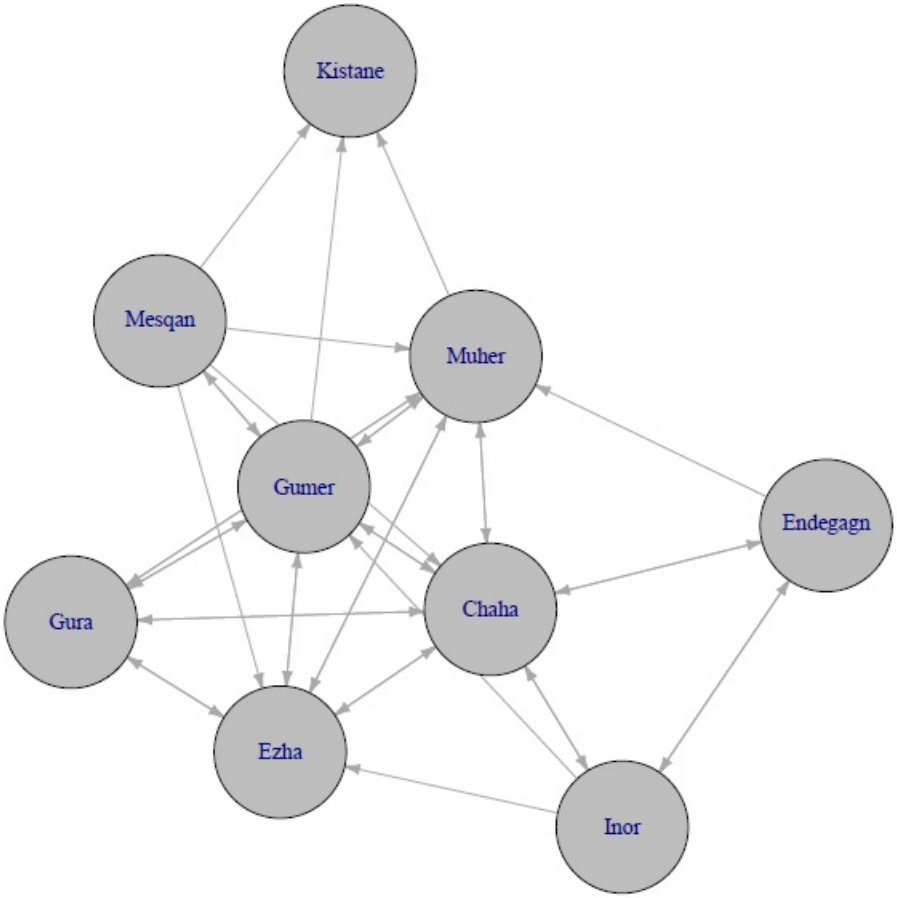


Figure 10: Chaha is selected as a center of communication

The difference between these two findings can be the outcomes of various factors. First, the present study used just the Semantic Word Categorization test. The author recognizes that testing mutual intelligibility at higher linguistic level may yield different results. Nonetheless, the present study opted the inclusion of relatively a large number of languages and examine them from different perspectives rather than focusing just on the mutual intelligibility. In this regard, Menuta (2013) included several tests which is very positive. Nonetheless, there are also concerns about the approaches of Menuta (2013). It appears to me that the priming effect was not properly controlled; since the same test materials were repeated across the speakers of the varieties, it is possible that the mutual intelligibility scores were inflated because of the participants' familiarity to the test materials. Besides, Menuta (2013) tested elderly people while the participants of the present study are secondary school students. It could be the case that elderly people performed on some of non-native languages better than the youngsters mainly because of the lifelong exposure they have had to the non-native language varieties. Sample size could also be another factor. Menuta (2013) tested 12 participants from each site. The present study tested 30 participants from each site. Carefully selected a small sample size could probably

lead to exceptional performance because of the exceptional linguistic abilities of the participants. Moreover, during test administration, Menuta (2013) asked the participants to provide written answers. It is not clear how the respondents managed to provide written answers since none of the Gurage varieties (except Silt'e) has a writing system.

5 Discussions

As presented in section 4.2, the comparisons among the measures of the three dimensions of distance show that the two structural distances (phonetic and lexical) strongly correlate with each other. This implies that the two structural measures can be used interchangeably to determine the linguistic distance among related languages. The present study also reported very strong correlation between the structural distance and the functional distance though different materials were used to measure the two dimensions of distance. This suggests a high degree of substitutability between the two dimensions of measuring linguistics distance. Moreover, the strong correlation between the structural distance and the functional distance indicates that the respondents' score on the mutual intelligibility test has a strong connection with the properties of the structure of the language varieties.

Given that there is no significant difference between the correlation coefficient of the phonetic distance and mutual intelligibility scores and that of the lexical distance and intelligibility scores, it seems that there is no difference between the two structural distances in terms of their influence on the participants' score on the word intelligibility test. This finding is slightly different from previous studies which reported a stronger correlation between the lexical distance and functional distance as compared to the correlation between the phonetic distance and functional distance (e.g., Tang et al., 2019), and from the studies which reported a stronger correlation between the phonetic distance and functional distance but not between the lexical distance and functional distance (e.g., R. Other1 & Author2, 2007). Maybe there are many factors such as similarity of phoneme inventory and the frequency of words that contribute to the relationship between the functional distance and the structural distances. The relationship between these two dimensions is probably language specific. For instance, in some languages, lexical similarity can be more important than phonetic similarity while in some other languages a slight phonetic difference may lead to misunderstanding.

Moreover, the strong correlation between the structural distance and the perceptual distance shows that the perceptual distance can be used as an alternative means of determining the linguistic distance among related languages, especially in a situation where gathering the real linguistic data is difficult. Similar results were previously reported by Author2 & Other (2004) and by Tang et al. (2009). This is a good news particularly for less studied languages that

do not have dictionaries or detailed descriptions of their linguistic features. However, the low level of consistency in the perceptual distance matrix hints that there is a risk of using a mere perceptual distance to measure the linguistic distance among related languages. This is because the perceptual perspective of measuring linguistic distance is more subjectivity-prone than other means of measuring linguistic distance. As noticed by Golubović & Sokolić (2013), Abu-Rabia (1996), Abu-Rabia (1998) and Pavlenko (2006), the impact of language attitude is also more pronounced in situations where there is political divisions, stereotyping, and social and cultural hostilities.

Furthermore, the close similarity between the classifications based on the three dimensions of distance and the genealogical classifications previously provided by the historical linguists implies that, in addition to the structural distances, functional and perceptual distances can be used to classify related languages. In the present study, we noticed very close similarity between the typological classifications and the genealogical classifications. This result is consistent with previous report by Tang et al. (2009). In general, the correlations among the three dimensions of distance which are reported in the present study are consistent with the studies previously conducted on Scandinavian languages (e.g., Author2 & Other, 2004; Author2, 2005; Author2, 2007; Author2 & Other1, 2018) and on Chinese dialects (Tang et al., 2007; Tang et al., 2009). These studies, in general, indicate that the distance among related languages can be measured from different perspectives. It is up to the researcher to choose the right perspective based on various factors such as the resources at disposal, and the desired study objectives; for example whether the aim of the study is typological or genealogical classification. Our study partly supports the claim that non-linguists' consciousness can be used as a valid means of measuring distances among related languages, but we also share the enduring debate about the validity of the perception-based approach (see Goeman, 1999 for the debate).

The classifications of the Ethiosemitic languages based on the results obtained from the structural, functional and perceptual distance measures show that Chaha, Ezha, Gumer and Gura are very closely related languages. Mesqan and Muher have also very strong lexical affinity with these four languages. The lexical affinity among these language varieties was also reported in Menuta (2013). Mesqan and Muher have also close phonetic and lexical similarity. Kistane and Silt'e are different from all the remaining language varieties. This difference could probably be due to the influence of the Cushitic languages on Silt'e and Kistane. This is an intuitive suggestion: the interaction between the South Ethiosemitic languages and the surrounding Cushitic languages is an issue that future studies may address.

The comparisons of the classifications obtained from the three distance measures show that the south Ethiosemitic languages under investigation can be classified into five groups. {Chaha, Gura, Gumer and Ezha} form

a group. {Muher and Mesqan} are very similar languages; hence, they form a second group. {Inor and Endegagn} consistently form the third group. {Kistane} and {Silt'e} are different from all other language varieties. These classifications are very similar to classifications previously proposed by Hetzron (1972), but somehow differ from the proposal of, for example, Demeke (2001). For instance, Demeke (2001) classified Mesqan under North Gurage together with Kistane. Though both the structural and functional measures show that Kistane and Silt'e are quite different languages, the speakers of the language varieties believe that their languages are similar to each other. The causes of the mismatch between the speakers' perception and the linguistic reality need further investigation.

With regard to the mutual intelligibility among the south Ethiosemitic languages, the results obtained from the functional distance measure show that Chaha, Gura, Gumer and Ezha are mutually intelligible. Muher and Mesqan are partially intelligible with these languages. This partial intelligibility is slightly different from the full mutual intelligibility previously reported in Menuta (2013). Endegagn and Inor are also mutually intelligible. Kistane and Silt'e are not intelligible with any of the Gurage varieties investigated in the present study. The reported intelligibility scores are largely asymmetrical. As noticed by Author2 (2018), Author2 et al. (2010) and Author2 (2007), this asymmetry can be due to linguistic and non-linguistic factors. Some languages can be incomprehensible because of their complicated phonological structures such as pervasive reductions due to assimilation, and alternation between obstruents and approximants (Bleses et al., 2008, p.623). Author2 (2018)) has also discussed various non-linguistic variables such as contact and experience, orthography, gesture and language attitude.

Based on the findings presented in section 4, we also provide our position with respect to the question whether the south Ethiosemitic languages investigated in the present study are dialects or not. Though providing a clear-cut boundary between 'dialect' and 'language' is always difficult due to various linguistic and non-linguistic factors, the results of the cluster analyses and the mutual intelligibility scores suggest that Silt'e and Kistane are independent languages. The remaining languages are dialects of the same language. Determining whether these varieties are dialects or independent languages may have significant consequences for the attempts that have been made to standardize the language varieties. The results of our study imply that Kistane and Silt'e need to be treated as separate languages in the standardization process. The remaining Gurage varieties can be considered dialects, and the same materials can be used to employ these languages for schooling, media and different administrative purposes.

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Appendix

A. Data gathering Tools

A.1 Background Questionnaire

Purpose: It was employed to determine the students' language background

Dear students, we use this questionnaire to gather information about the languages which are spoken in your area. Your responses will be kept confidential and are used only for research purposes. Hence, please respond as honest as you can. Thank you for the time you take to fill in the questionnaire.

Part I: Personal Background

1. What is your date of birth (DD/MM/YY)? ……
2. Are you a. Male b. Female (circle one)
3. Where is your place of birth (town/village)? .....
4. Where is your present address (town/village)? .....
5. What is your grade level? (Circle correct choice)

   a. Grade nine c. Grade ten d. Grade eleven f. Grade twelve

Part II: Language Background

1. What is your first language? _____
2. What languages do you speak other than your first language?
   _____
3. Which language (s) do your parents speak?
   a) Your Father_____
   b) Your mother_____
4. Which language is frequently spoken by your friends? _____
5. Has your family changed their place of residence? Please indicate the places they lived and the language spoken in each place

	Place	**Language**
a.	_____	_____
b.	_____	_____
c.	_____	_____
d.	_____	_____

6. How often do you use your mother tongue? _____
   A. Very often B. Often C. Sometime D. Rarely E. Not at all
7. Which language (s) is spoken in most of the schools you have attended?
   _____
8. Which other language is spoken in your vicinity?

_____

825 **A.2 Response sheet for Words Categorization test**

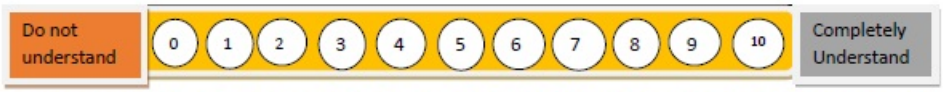
Instruction: Dear student, you are going to listen to some list of words. Listen carefully and determine in which of the following categories each word belongs. For one word there is only one possible category. Provide your answer by putting 'X' mark in the box provided in front of each category. Note that for every audio stimulus, there are 10 options of word categories.

1. **Cloths** ☐
2. **Body Parts** ☐
3. **Kitchen Utilities** ☐
4. **Fruits** ☐
5. **Food Type** ☐
6. **Domestic Animals** ☐
7. **Furniture** ☐
8. **Vegetables** ☐
9. **Wild Animals** ☐
10. **.Cereals** ☐

826 **A.3 Response sheet for perceptual and attitude test**

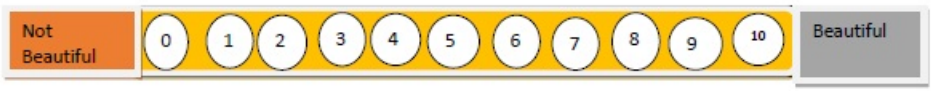
Direction: Dear student, you will be presented with ten successive stories. Listen attentively to each of the stories and rate the story based on the questions which are provided below.

1. To what extent do you understand the speaker in the recording? Respond by putting 'X ' mark on one of the numbers provided.



2. To what extent the recording is similar to your own language? Respond by putting 'X' on one of the numbers.

3. Is the speech of the speaker in the recording beautiful or not compared to your own language? Respond by putting 'X' mark on one of the numbers provided.



B. Test Materials

B.1 List of words for phonetic and lexical distance

No	English	Amharic	Oromo	Chaha	Endegagn	Ezha	Gumer	Gura	Inor	Kistane	Meskan	Muher	Silt'e
1	added	dəmmərə[1]	dabale[1]	dəpərəm[1]	dappərə[1]	dəbbərəm[1]	dəppərəm[1]	dəpərəm[1]	dappərə[1]	dəbbələm[1]	dəbbərəm[1]	dəbbərəm[1]	dəbələ[1]
2	all	hullum[1]	hunda[1]	innim[1]	hin?edi[2]	innim[1]	innim[1]	innim[1]	innə[1]	kullim[1]	innim[1]	innim[1]	hullimkə[1]
3	ape	t'ot'a	ɾamale[2]	wənɾə[1]	wenɾə[1]	wənk'ə[1]	wənkʲə[1]	wanɾə[1]	wanɾe[1]	ɾəmələ[2]	ɾəmələ[2]	ɾəmələ[2]	ɾəmələ[2]
4	arm	kind[1]	irree[3]	agat[2]	agad[2]	hinnə[1]	xinə[1]	hinə[1]	hini?ə[1]	kirrə[3]	hinnə[1]	hitte[1]	kire[3]
5	back	gərba	duuba	gʷišə[1]	gʷišə[1]	gingə[1]	fʷər[2]	gʷišə[1]	gišt?ə[1]	gingə[1]	gingə[1]	gingə[1]	ć'in[3]
6	barley	gəbs[2]	garbuu[2]	əxir[1]	əhir[1]	əxir[1]	əhir[1]	əhir[1]	əxir[1]	gəbs[2]	ihir[1]	əxi[1]	ixil[1]
7	basil	bəssobila[1]	maslobbaa[1]	məsobilal[1]	məsobila[1]	məsbilal[1]	bəssobila[1]	bəssobila[1]	məsobilal[1]	məssobila[1]	kʷasənət[3]	bəssobila[1]	bəɾəər[2]
8	bean	adəngʷarre[1]	ašongoree[1]	adengʷalle[1]	adengʷalle[1]	adengʷalle[1]	adəngʷare[1]	adəngʷaro[1]	[1]	bolokʼe[2]	adəngʷarre[1]	adəngurro[1]	bolokʼe[2]
9	beautiful	ɾonğo	bareeddu[2]	mərkama[1]	məlkama[1]	mərkamma[1]	mərkamma[1]	mərkama[1]	mərkama[1]	məlkama[1]	məlkama[1]	məlkama[1]	bəreedə[2]
10	bed	alga[1]	sire	alga[1]	anz[1]	alga[1]	alga[1]	arga[1]	arga[1]	alga[1]	alga[1]	alga[1]	dugmalə[2]
11	began	ğəmmərə[2]	eegale	ɾənəsəm[1]	ɾənəsə[1]	ɾənnəsəm[1]	ɾənəsəm[1]	ɾənəsə[1]	ɾənəsə[1]	ɾərrəso[1]	ɾərrəsə[1]	ɾərrəsəm[1]	ğəmmərə[2]
13	belt	ɾəbətto[1]	ɾabattoo[1]	mətagəča[2]	ɾəbətə?ə[1]	ɾəbətto[1]	ɾəbətto[1]	ɾəbətto[1]	zələbət[3]	ɾəbətto[1]	ɾəbətto[1]	ɾəbətto[1]	ɾəbətto[1]
14	bəsso	bəsso[1]	basso[1]	bəsso[1]	bassəʔə[1]	bəsiwə[1]	bəssiwə[1]	bəsiwə[1]	bəsiwə[1]	bəssiwə[1]	bəssiwə[1]	bəssowə[1]	bəsso[1]
15	big	tilliɾ	guddaa	niɾiyə[1]	nuʔ[1]	imiyə[1]	niɾyə[1]	niɾyə[1]	nuʔiyə[1]	mələk[2]	niɾ[1]	liʔiyə[1]	yəroore[3]
16	black	t'iɾur[1]	gurraačča	t'iɾur[1]	gəmbənə[2]	gəmbənna[2]	t'ikʷir[1]	t'iɾur[1]	gəmbəna[2]	t'iɾur[1]	t'iɾur[1]	t'iɾur[1]	t'em[3]
17	blew	nəffəsə[1]	afuufe	nəfəsəm[1]	nəfəsə[1]	naffəsəm[1]	nəfəsəm[1]	nəfəsəm[1]	nəfəsə[1]	nəffəso[1]	nəffəsə[1]	nəffəsəm[1]	nəfəsə[1]
18	blood	dəm[1]	diiga	dəm[1]	dəm[1]	dəm[1]	dəm[1]	dəm[1]	dəm[1]	dəm[1]	dəm[1]	dəm[1]	dəm[1]
19	boiled	afəlla[2]	danfise	čəkərəm[1]	čakarra[1]	čəkkʷərə[1]	čəkkərəm[1]	čəkərə[1]	čəkʷərə[1]	fəllam[2]	čəkkʷərə[1]	čəkkʷərəm[1]	fəla[2]
20	bone	at'int[1]	lafee	at'im[1]	at'im[1]	at'im[1]	at'im[1]	at'im[1]	at'im[1]	at'im[1]	at'im[1]	at'im[1]	hat'im[1]
21	bread	dabbo[1]	daabbo[1]	dabbo[1]	daboʔə[1]	dabbo[1]	dabbo[1]	dabbo[1]	dabboʔə[1]	dabbo[1]	furno[2]	dabbo[1]	furno[2]
22	breakfast	ɾurs	ćiree	ginzir[1]	ginzir[1]	ginzir[1]	ginzir[1]	ginzir[1]	ginzir[1]	ginzir[1]	yaddərə[2]	addərə[2]	ginzir[1]
23	breast	t'ut[1]	harma	t'u[1]	t'uw[1]	t'uw[1]	t'u[1]	t'u[1]	t'u[1]	t'ibuyyə[1]	t'ub[1]	t'iwəyyə[1]	t'ub[1]
24	brother	wəndimm	obboleessa	gʷəpə[1]	əššəʔəm[2]	gʷəbbe[1]	gʷəppay[1]	gʷəpə[1]	əsəm[2]	zəmmi[3]	gʷəbbe[1]	gʷəbbe[1]	indət[4]
25	bull	bəre[2]	dibiččа	wir[1]	wir[1]	wir[1]	wir[1]	wir[1]	wir[1]	wir[1]	wir[1]	bora[2]	wir[1]
26	cabbage	gommənn	raafu	ambir[1]	ambir[1]	ambir[1]	ambir[1]	ambir[1]	ambir[1]	ambil[1]	ambir[1]	ambi[1]	hamil[1]
27	calf (n)	[1]	ğabbi	mʷəsa[1]	mosa[1]	mʷəssa[1]	mʷəsa[1]	mʷəsa[1]	mʷəsa[1]	t'əg[2]	mʷasa[1]	dəg[2]	izək[3]
28	came	mət't'a[2]	dufe	čənə[1]	məʔa[2]	čənə[1]	čənə[1]	čənə[1]	məʔa[2]	mət't'a[2]	čəññə[1]	bəssam[3]	mət'a[2]
29	came out	wət't'ačč[1]	baate	wət'am[1]	wəʔačč[1]	wət't'aččim[1]	wət't'aččim[1]	wətə[1]	wəʔaća[1]	wət't'atti[1]	wət't'a[1]	wət't'aččim[1]	wət'at[1]
30	camel	gimməl[1]	gaala[1]	gamera[1]	gimməl[1]	gamera[1]	gamera[1]	gamera[1]	gamera[1]	gimməl[1]	gamela[1]	gamela[1]	gaameela[1]
31	cat	dimmət	adurre[2]	angača[1]	angačča[1]	angačča[1]	angačča[1]	angača[1]	angača[1]	angača[1]	angača[1]	angača[1]	aadən[2]
32	chair	wənbər[1]	barćuma[4]	wənbər[1]	t'əkəšə[2]	wəmbər[1]	wənbər[1]	wənbər[1]	t'əkəša[2]	wənbər[1]	sorər[3]	wənbər[1]	borććuma[4]
33	chassis	rəkəbot[2]	rakabooti[2]	yəsinəćə[1]	rəkəbot[2]	yəsinəććə[1]	yəsinəććə[1]	yəsinəćə[1]	sinəʔ[1]	rəkəbot[2]	yəsinəććə[1]	yəsinəččə[1]	gənćə[3]
34	cheap	rikkaš[3]	rakiša[3]	giwa[1]	wudəʔ[2]	giwa[1]	giwa[1]	giwa[1]	widiʔ[2]	arkus[3]	rikkaš[3]	giwa[1]	ruks[3]
35	cheek	gunć[2]	mallaa	danga[1]	dangə[1]	dangə[1]	danga[1]	danga[1]	gunćə[2]	gunćə[2]	danga[1]	gunćə[2]	gunćo[2]
36	chest	dərət[1]	lap'pe	data[1]	dattə[1]	dadda[1]	datta[1]	fanka[2]	data[1]	dərət[1]	hin[3]	dadda[1]	wəzənə[3]
37	chickpea	šimbira[1]	šumburaa[1]	čəmbʷəra[1]	šumburə[1]	čəmbʷəra[1]	šimbura[1]	čimbura[1]	šumbura[1]	šəmbura[1]	šimbura[1]	šimbura[1]	šumbura[1]
38	child	hiśan	daaʔima	tikə[1]	tikə[1]	tikə[1]	tikə[1]	tikə[1]	tikə[1]	bayy[2]	tixə[1]	tikə[1]	čilo[3]
39	cloak(n)	kot[1]	koota[1]	kot[1]	kot[1]	kot[1]	kot[1]	kot[1]	kot[1]	kot[1]	kot[1]	kot[1]	koote[1]
40	cloud	dammənа[1]	duumessa[1]	dabəra[1]	dawənə[1]	dabəra[1]	dabəra[1]	dabəra[1]	daməra[1]	damənа[1]	dabənа[1]	dabənа[1]	dəbənа[1]

41	coffee	bunna[2]	buna[2]	ќawa[1]	ќəwa[1]	buna[2]	ќawa[1]	ќawa[1]	ќawa[1]	buna[2]	ќawa[1]	ќawa[1]	buno[2]
42	coming	ɨyyəmət'ťa[1]	ďufaa	yičən[2]	yimə?a[1]	tičən[2]	yičən[2]	tičən[2]	timə?a[1]	ɨyyəmət'ťa[1]	tišəñň[2]	tibəsa[1]	timəc[1]
43	(her self)	tədəbəќəčč[1]	ďokotte	təšeməčč[1]	tədə?ənəčč[2]	təšemən[1]	təšeməčim[1]	təšeməčči?[1]	tədə?ərəčči?[2]	təsət'ətti[1]	təšemə[1]	təšəməččim[1]	təšeeme[1]
44	cow	lam[1]	sa?a	əram[1]	anaw[2]	əram[1]	əram[1]	əram[1]	əram[1]	ələm[1]	əram[1]	ənnam[1]	lam[1]
45	cried	aləќќəsə	booye	bəkəm[1]	bekka[1]	bəkəm[1]	bəkkʷəm[1]	bəkʲə[1]	bəkə[1]	bəššəm[1]	bəkkə[1]	bəkkʷəm[1]	bəče[1]
46	crocodile	azzo[1]	naačča	zabəhel[2]	dərəwə[3]	azzo[1]	azzo[1]	yəbar?awi[4]	abar?awi[4]	azzo[1]	azzo[1]	azzo[1]	wəro[5]
47	decide	məwəssən[1]	murteessu	wəwəssin[1]	iğğawirt[2]	fənnədəm[3]	wəsnot[1]	wəbər[4]	wəssin[1]	wowossin[1]	wəwəssin[1]	wəwəssin[1]	ќooče[5]
48	deer	agazən[1]	gadamsa	zəma[2]	genzo[1]	ğəzma[1]	sissamə[4]	imar[5]	wəšir[3]	fičče[6]	agazzən[1]	agazzən[1]	ğəlb[7]
49	destroy	mawdəm	barbadeessu	banərəm[1]	bannərə[1]	bannəsəm[1]	čifəćəfəm[2]	banərəm[1]	banərə[1]	dasəm[3]	bərrəsə[1]	afərrəsəm[4]	dasəm[3]
50	did	adərrəgə	godə	amənəm[1]	eppə[2]	amənnəm[1]	amənəm[1]	epə[2]	epə[2]	ќinnaw[3]	šəkkətə[4]	šəkkətəm[4]	añe[5]
51	dispute(n)	fikukkir[3]	falmii	šir[1]	manad[2]	fikukkir[3]	mʷagza[4]	guwarə[6]	mʷaguza[4]	fukukkir[3]	mʷagəzza[4]	fukikkir[3]	fikukkur[3]
52	dog	wiššа[2]	sare	giyə[1]	giyə[1]	giyyə[1]	giyə[1]	giyə[1]	giyə[1]	wissa[2]	giyə[1]	giyə[1]	buučo[3]
53	donkey	ahiyya	harre	imar[1]	əwan[1]	imar[1]	imar[1]	imar[1]	imar[1]	əmar[1]	imar[1]	imar[1]	uumar[1]
54	door	bərr[3]	hulaa	wəfənča[1]	sanќa[2]	sanќa[2]	bərr[3]	wəfənča[1]	sanќa[2]	sanќa[2]	wəfənča[1]	wəfənča[1]	wəzgəb[4]
55	down	tačč[1]	gadi[2]	tətnəyə[1]	gədəni[2]	təttinyə[1]	wəstʼinyə[1]	wəstʼiniyə[1]	gədəniyə[2]	tətatəy[1]	tətətte[1]	tətəttə[1]	təttiyə[1]	uftəkolo[3]
12	(v)(2.M.SG)	alləmə	manaabe	nəzəzəm[1]	nəzzə[1]	nəzzəzəm[1]	nəzəzəm[1]	nəzəzəm[1]	nəzəzə[1]	birəzəzə[1]	birəzzəzə[1]	nəzəzəm[1]	birəzəzə[1]
56	dress (n)	ќəmis[1]	uffata	ќəmis[1]	ќəmis[1]	muluʔiğir[2]	ќəmis[1]	ќambis[1]	mərdofa[3]	dirbədir[4]	ќəmis[1]	ќəmis[1]	ќəmbissə[1]
57	drink (v)	t'ət'ťa	ďuge	səćə[1]	seććə[1]	səććə[1]	sitʼə[1]	səćə[1]	səćə[1]	səććə[1]	səććə[1]	səććəm[1]	səče[1]
58	dry (adj)	dərək[1]	gogaa	tʼərək[1]	dərə?[1]	tʼərək[1]	tʼərək[1]	tʼirək[1]	dərə?[1]	dərək[1]	tʼirək[1]	tʼərə?[1]	dərək[1]
59	ear	ğoro	inzir[1]	inzir[1]	inzir[1]	inzir[1]	inzir[1]	inzir[1]	inzir[1]	inzin[1]	inzin[1]	inzin[1]	izin[1]
60	egg	inќulal[1]	bupʼpʼa[2]	inќʷira[1]	inќula[1]	anќʷə[1]	inќʷira[1]	inќʷira[1]	inќʷira[1]	anќo[1]	anќʷə[1]	anќʷə[1]	bupʼpʼa[2]
61	eight	simmint[1]	saddet[1]	sunt[1]	sunt[1]	šimut[1]	simʷit[1]	simut[1]	suunt[1]	səmmint[1]	simmut[1]	simmut[1]	səmut[1]
62	elephant	zihon[1]	arba	ǯəxʷərə[1]	zəhon[1]	ǯəxʷərə[1]	ǯəxʷərə[1]	ǯəxʷərə[1]	ǯəxʷərə[1]	zəxon[1]	ǯəxʷənə[1]	zixon[1]	dəxano[1]
63	evening	miššit[2]	galgala	gəpat[1]	gəppaʔad[1]	gəbbat[1]	gəppat[1]	gəbat[1]	gəpad[1]	mišər[2]	gəbbat[1]	gəbbat[1]	gəbbat[1]
64	expensive	widd[2]	ќaali	tʼirə[1]	nud[2]	tʼirə[1]	tʼirə[1]	tʼirə[1]	numd[2]	ćəm[3]	ćum[3]	tʼinə[1]	ćum[3]
65	eye	ayn[1]	iğa	en[1]	en[1]	en[1]	en[1]	en[1]	er[1]	in[1]	en[1]	en[1]	iin[1]
66	farmer	araaš[2]	ќoteebulaa	čəwač[1]	čowač[1]	čəwač[1]	čəwač[1]	čəwač[1]	čəwağ[1]	araš[2]	araš[2]	čəwač[1]	araaši[2]
67	father	abbat[1]	abbaa[1]	ab[1]	aba[1]	abba[1]	abba[1]	aβa[1]	aba[1]	abi[1]	ab[1]	ab[1]	abot[1]
68	fava bean	baќela[1]	baaќilaa[1]	baќela[1]	baќela[1]	baќella[1]	baќella[1]	atərə[2]	atərə[2]	baќela[1]	baќela[1]	baќela[1]	baќelə[1]
69	fenugreek	abiš[1]	hulbata	abəšə[1]	awəšə[1]	abəš[1]	abəšə[1]	abəšə[1]	abəšə[1]	abəšə[1]	abəšə[1]	abəš[1]	šuќo[2]
70	finger	tʼat[1]	ќuba	atebət[1]	atʼeyə[1]	atebət[1]	atebət[1]	atʼebə[1]	atʼeyə[1]	atʼabət[1]	atʼebət[1]	atʼebət[1]	intʼabit[1]
71	finish(v)	ćərrəsə[3]	tʼumure	ğəpərə[1]	ğəppərə[1]	fəğğəm[2]	ğəppərə[1]	ğəpərə[1]	ğəpərə[1]	ćərrəsəm[3]	ǯəbbərə[1]	fəğğəm[2]	ćeerəsə[3]
72	five	amist[1]	šan	amist[1]	amist[1]	amist[1]	ammist[1]	amist[1]	ammist[1]	ammist[1]	ammist[1]	ammist[1]	ammist[1]
73	food-table	məsob[2]	masooba[2]	səfi[1]	məsob[2]	səfet[1]	məsob[2]	səfi[1]	səfi[1]	lemat[3]	lemat[3]	wəskənbiya[4]	iffə[1]
74	found	agəññə[2]	arge[2]	nəkəbəm[1]	nəkkə[1]	nəkkəbəm[1]	nəkkəbəm[1]	nəkəbə[1]	nəkəβə[1]	agəññə[2]	rəkkəbə[1]	agəññəm[2]	rəkəbə[1]
75	four	aratt[1]	afur	arbət[1]	arwəʔat[1]	arbət[1]	arβət[1]	arbət[1]	ərbʔat[1]	arat[1]	arbətt[1]	arbət[1]	arat[1]
76	fox	ќəbərə[1]	deeğallo	ќəwərə[1]	wəlake[2]	ќəwərə[1]	ќəwərə[1]	ќəwərə[1]	ingʷərəgiyə[4]	sərəndidə[3]	yəgʷərəgʲə[4]	ќəwərə[1]	zəgədo[5]
77	friday	arb	ğimma[1]	ğimat[1]	ğimʔat[1]	addarə[2]	ğimat[1]	ğimat[1]	ğimʔat[1]	addarə[2]	addarə[2]	addarə[2]	ğimat[1]
78	frog	inќurarit[2]	raačča	ќwənća[1]	ќwənča[1]	ќwəča[1]	ќwənća[1]	ќwənća[1]	ќončə[1]	ќoləčə[1]	ќwəčə[1]	ќoləčə[1]	inќurarit[2]
79	full	mulu[1]	gutuu	mura[1]	murʔə[1]	mura[1]	mʷira[1]	mura[1]	murʔa[1]	mula[1]	mula[1]	mʷəy[1]	mulla[1]
80	garlic	nəćć šinkurt	ќullubi	tumma[1]	tummə[1]	tumma[1]	tumma[1]	tumma[1]	tuma[1]	tumma[1]	tumma[1]	tumma[1]	tumma[1]
81	gazelle	midaќќo	kurupʼpʼe	gimbe[1]	gimbə[1]	ğimbe[1]	gʲimbe[1]	ğimbə[1]	ğimbʔə[1]	gʷəməča[1]	gimbe[1]	gʷəməčə[1]	gedemo[2]
82	giraffe	kəććine[1]	ќaććine[1]	ќəććine[1]	ќəćine[1]	ќəććine[1]	ќaććine[1]	ќaććine[1]	ќaććine[1]	ќəćine[1]	ќəćine[1]	ќəćineć[1]	sologe[2]
83	give up	təwə[1]	diise	wəte[1]	itaʔut[2]	wəte[1]	tabot[2]	wəte[1]	ətəʔut[2]	wəgfir[3]	wəgfir[3]	wəte[1]	idəgot[4]
84	goat	fiyyəl[1]	reʔe	feќ[1]	foññəʔ[1]	fiyəќ[1]	feќ[1]	feќ[1]	fəñəʔ[1]	fiyyəl[1]	feќ[1]	fəññəʔə[1]	feќ[1]
85	griddle	mitʼad[1]	ќibaaba	midad[1]	mitʼad[1]	midad[1]	midad[1]	midad[1]	midad[1]	mitʼad[1]	midad[1]	midad[1]	mitʼad[1]
86	guava	zəytun[1]	zeeytuna[1]	zəytuna[1]	zəytun[1]	zəytuna[1]	zəytuna[1]	zəytuna[1]	zəytun[1]	zəytuna[1]	zəytuna[1]	zeytuna[1]	zəytun[1]
87	had	nəbbərəw[2]	ќabature	bʷanən[1]	banəndə[1]	bʷannən[1]	bʷanən[1]	bʷanən[1]	banəndə[1]	nəbbərən[2]	bʷannənit[1]	bannənnitt[1]	narey[2]
88	hair	šəgur	rifeensa	gunər[1]	gunʔər[1]	gunnər[1]	gunər[1]	gunər[1]	gunʔər[1]	gunnən[1]	gunnən[1]	gunnən[1]	dum[2]
89	handkerchief	məharrəb[1]	məharraba[1]	məharrəb[1]	məharrəb[1]	məharrəb[1]	məharrəb[1]	məharrəb[1]	məharrəb[1]	məharrəb[1]	məharrəb[1]	məharrəb[1]	məharrəb[1]
90	hard (adv)	bəhayl[1]	haalaan	banəmdərəg[1]	bədərəg[1]	yannənim[2]	bəʔona[4]	bəʔʼona[4]	gerika[3]	bəhayl[5]	bəhayl[5]	bəhayl[5]	bəyadidnət[6]
91	hat	kofiyya[1]	kofiyyaa[1]	kofiyya[1]	kofit[1]	kofitta[1]	kofita[1]	kofita[1]	kofita[1]	kombobo[2]	məlləyyo[3]	kofita[1]	kofiya[1]
92	he	issu	isa	hut[1]	hudə[1]	hut[1]	xut[1]	hut[1]	huda[1]	kʷa[1]	huti[1]	xʷa[1]	uha[1]
93	head	ras[2]	mataa	gunər[1]	iras[2]	gunnər[1]	gunər[1]	gunər[1]	gunʔər[1]	gunnən[1]	gunnən[1]	gunnən[1]	dum[3]
94	headdress	šaš[1]	šaaši[1]	šaš[1]	šašə[1]	šaš[1]	šaš[1]	šaš[1]	šaš[1]	šaši[1]	šaš[1]	šaš[1]	gufta[3]
95	heart	libb[3]	onnee[2]	xin[1]	xin[1]	xinn[1]	xʲin[1]	xin[1]	anə[2]	libb[3]	hin[1]	libb[3]	wəzənə[4]
96	heifer	gidər	waatiyyo	anǯ[1]	anǯ[1]	anǯ[1]	anǯ[1]	anǯ[1]	zəbay[2]	anǯ[1]	gʷəbəz[3]	zəba[2]
97	helped	aggəzə[1]	gargaare	agəzəm[1]	epərə[2]	aggəzəm[1]	agəzəm[3]	agəzəm[1]	epərə[2]	ərəddam[3]	aggəzə[1]	ərəddam[3]	agəzə[1]
98	hen	doro	handaaќќo[3]	kutəra[1]	ungoroʔ[2]	kuttəra[1]	kuttara[1]	kutara[1]	kutara[1]	ğəra[2]	kuttəna[1]	kuttəna[1]	inčaќo[3]
99	him	issun	isa	yəhut[1]	hudə[1]	huta[1]	xut[1]	huta[1]	huda[1]	yəkʷa[1]	yəhuti[1]	yəxʷa[1]	uhaanə[1]
100	hippopotamus	gumarre[1]	gumaarree[1]	gʷəmare[1]	gəwirə[1]	gumarre[1]	gumarʲə[1]	gumarre[1]	gowanə[1]	gomarre[1]	gumarre[1]	gʷəmare[1]	gomare[1]
101	his	yəssu	kan isaa	yəhut[1]	ihud[1]	yəxut[1]	yəxut[1]	yahut[1]	ihuda[1]	yəkʷa[1]	yəhuti[1]	yəxʷa[1]	yuha[1]
102	horse	fərəs[1]	farda[1]	fərəz[1]	fərəz[1]	fərəz[1]	fərəz[1]	fərəz[1]	fərəz[1]	fərəz[1]	fərəz[1]	fərəz[1]	fərəz[1]
103	hot	muќ[1]	hoʔaa	yəmwəkə[1]	mwoќ[1]	mwoќ[1]	mwəќ[1]	mwəќ[1]	mwoќ[1]	yəmoќə[1]	yəmwəkə[1]	mʷəʔ[1]	muќ[1]
104	hour	səʔat[1]	saʔaa[1]	sat[1]	saʔat[1]	sat[1]	sat[1]	səʔat[1]	saʔat[1]	sat[1]	sat[1]	sat[1]	sat[1]
105	how	indet	akkamitti	nəmir[1]	etəhə[2]	bəmir[1]	məmir[1]	nəmir[1]	ətəkə[2]	minkom[3]	bəmin[1]	bəmmin[1]	aynəko[4]
106	hundred	məto[2]	ďibba	bəkir[1]	bəʔər[1]	bəkir[1]	məto[2]	bəkir[1]	bəʔər[1]	məto[2]	məto[2]	bəʔil[1]	bəkkil[1]
107	hyena	ğib	waraabessa[2]	gʷənčə[1]	gončə[1]	gʷəčə[1]	gʷənčə[1]	gončə[1]	gončə[1]	gəčə[1]	gʷəčə[1]	gəčə[1]	wərabə[2]
108	I	ine[3]	ana[3]	iya[1]	iya[1]	iyya[1]	iyya[1]	iya[1]	iya[1]	ədi[2]	iya[1]	ədi[2]	əhe[3]
109	in	wist[3]	keessa[2]	dənə[1]	kəssir[2]	dənne[1]	dənə[1]	dənə[1]	kəs[2]	wišta[3]	wisitʼt[3]	wəsitʼt[3]	ʔust[3]
110	injera	inğəra[1]	biddeena	inğərə[1]	inğeʔə[1]	inğərʔa[1]	inğəra[1]	inğəra[1]	inğərʔa[1]	tʼəbeta[2]	inğera[1]	inğera[1]	tʼabita[2]

111	insult (v)	səddəbə[2]	arrabse	ɾəndməm[1]	ɾənəmə[1]	ɾənnəməm[1]	ɾinema[1]	ɾəndməm[1]	ɾənəmə[1]	səddəbəm[2]	səddəbə[2]	səddəbəm[1]	sədəbə[2]
112	job/work	siɾa	hoğii	mena[1]	mena[1]	mena[1]	mena[1]	mena[1]	mena[1]	wəzəla[2]	menna[1]	merra[1]	bil[3]
113	joke (n)	ɾəld[1]	ɾeesa[1]	ɾəšə[1]	ɾəld[1]	kəšə[1]	k^{y}əšə[1]	ɾəld[1]	siya[2]	ɾəld[1]	ɾəld[1]	ɾəld[1]	ɾəld[1]
114	kettle	ğəbəna[1]	ğabana[1]	ğəbən[1]	ğəbən[1]	ğəbən[1]	ğəbən[1]	ğəbən[1]	ğəbʔən[1]	ğəbəna[1]	ğəbən[1]	ğəbəna[1]	ğəbən[1]
115	king	nigus[1]	nugusa[1]	$nig^{w}s$[1]	nugs[1]	$nig^{w}$is[1]	$nig^{w}$is[1]	nigus[1]	$nug^{w}s$[1]	nigus[1]	$nig^{w}s$[1]	$nig^{w}s$[1]	nigus[1]
116	knife	billəwa	able	sənda[3]	šətta[2]	sənda[3]	sənda[3]	wəɾara[1]	šəta[2]	galod[4]	golodo[4]	sənda[3]	golodo[4]
117	Ḳoććo	k'oććo	k'ooććoo	wissa[1]	kusə[1]	wissa[1]	wissa[1]	wisa[1]	wisʔa[1]	əkusa[1]	wissa[1]	biyə[2]	finaniččo[3]
118	ladle	ćilfa[1]	ćilfaa[1]	ćilfa[1]	ćilfə[1]	ćilfa[1]	ćilfa[1]	nikanɾəfwə[2]	yirəsəxo ankəfo[2]	ćilfa[1]	ćilfa[1]	ćilfa[1]	ćilfa[1]
119	leg	iğir[1]	milla	əğir[1]	əğir[1]	iğir[1]	əğir[1]	əğir[1]	əğir[1]	əğir[1]	əğir[1]	əğir[1]	iŋgir[1]
120	lemon	lomi[1]	loomi[1]	lomi[1]	lomi[1]	lomi[1]	lomi[1]	lomi[1]	lomin[1]	lomi[1]	lomi[1]	lomi[1]	lomi[1]
121	lentil	missir[2]	missira[2]	ɾəsəm[1]	ɾəsəm[1]	ɾəsəm[1]	ɾəsəm[1]	ɾəsim[1]	ɾəsəm[1]	mišir[2]	ɾəsəm[1]	ɾəsəm[1]	mišir[2]
122	lion	ambəssa[2]	leenća	ǯəp[1]	ambəssa[2]	ambəssa[2]	ǯəpp[1]	ǯəpə[1]	ǯəp[1]	anbəssa[2]	anbəssa[2]	anbəssa[2]	wərba[3]
123	lip	kənfər[1]	hidii	kənfər[1]	kənfər[1]	kənfər[1]	kənfər[1]	amz[2]	kənfər[1]	kənfər[1]	kənfər[1]	kənfər[1]	giɾće[3]
124	louse	ɾimal[1]	iğire	ɾimar[1]	iwan[2]	ɾimar[1]	ɾimar[1]	ɾimar[1]	imar[1]	ɾimal[1]	ɾimal[1]	ɾime[1]	ɾumal[1]
125	love	fiɾir[2]	ğaalala	nimağə[1]	nimağə[1]	nimmağə[1]	nimağə[1]	nimağə[1]	aʔimağə[1]	fiɾir[2]	dad[3]	widdan[4]	dəd[3]
126	maize	bəkɾkollo[1]	boɾkɾoollo[1]	bəkollo[1]	bəkɾkolə[1]	bəkɾkwollo[1]	bəkwəllo[1]	bəkwollo[1]	bəkollo?ə[1]	boɾkɾollo[1]	boɾkɾollo[1]	bəkɾkollo[1]	bəkɾkollo[1]
127	man	səw[1]	nama	səb[1]	səw[1]	səb[1]	mis[2]	mis[2]	səb[1]	mis[2]	mis[2]	mis[2]	səb[1]
128	mattress	firaš[2]	firaaša[2]	kap^{w}at[1]	kappad[1]	$kabb^{w}$at[1]	firaš[2]	kabbat[1]	kap^{w}at[1]	firaš[2]	firaš[2]	$kabb^{w}$at[1]	kabbat[1]
129	means	biləhat[1]	mala[3]	ayo[2]	bilat[1]	bilat[1]	bilat[1]	ayu[2]	beyə[1]	bilat[1]	bilat[1]	biləhat[1]	məla[3]
130	mirror	məstawət[1]	daawiti	məsrəwət[1]	məstawəd[1]	məsrewət[1]	məstawət[1]	məstawət[1]	məstawəd[1]	məstawət[1]	məstawət[1]	məstawət[1]	məstawat[1]
131	monday	səñño	wiťətə[1]	wiťət[1]	wiťət[1]	wiťət[1]	wiťət[1]	wiťət[1]	wiťət[1]	wiťət[1]	wiťət[1]	wiťət[1]	wiťət[1]
132	monkey	ziŋgəro[1]	ğaldeessa	zangera[1]	zangərə[1]	$zang^{w}$ərə[1]	$zang^{w}$ərə[1]	$zang^{w}$ərə[1]	$zang^{w}$ərə[1]	zangərə[1]	zangera[1]	zangərə[1]	$zang^{w}$əro[1]
133	more	bəťam[3]	daran	nikkar[1]	muʔar[1]	nikkar[1]	nikkar[1]	nikkər[1]	buše?əhə[2]	burim[3]	bəťam[3]	bəťam[3]	yəbəza[4]
134	mule	bəkilo[1]	gaange	bik^{w}ərə[1]	bakura[1]	buk^{w}ərə[1]	bikura[1]	bikura[1]	bukura[1]	bićil[1]	b^{w}əkila[1]	buʔurə[1]	boćlo[1]
135	mush	nifro[1]	šummo	nifro[1]	bušəʔə[2]	čəkoret[3]	nif^{w}ro[1]	nifro[1]	wifro[1]	nifon[1]	$čik^{w}$ərə[3]	čəkorən[3]	inšikorə[3]
136	nail	ťiɬir[1]	ɾeensa	ťiɬir[1]	inffir[1]	ťiɬir[1]	ťiɬir[1]	ťiɬir[1]	infir[1]	ťəfir[1]	ťiɬir[1]	ťiɬir[1]	ťiɬir[1]
137	neck	angət[1]	morma	angət[1]	angət[1]	angət[1]	angət[1]	angət[1]	angəd[1]	angət[1]	angət[1]	angət[1]	ang^{w}oro[1]
138	niger seeds	nug[1]	nuugi[1]	nug[1]	nug[1]	nug[1]	nug[1]	nug[1]	nug[1]	nug[1]	nug[1]	nug[1]	nug[1]
139	nine	zəťəññ[1]	sagal	ǯəťə[1]	ǯiʔə[1]	ǯəťə[1]	ǯəťə[1]	ǯəťə[1]	ǯəʔə[1]	ǯəťəñ[1]	ǯəťə[1]	ǯəťə[1]	ziťťəññe[1]
140	now	ahun[1]	amma	$əx^{w}a$[1]	akkə[1]	$əx^{w}a$[1]	$əx^{w}a$[1]	$əx^{w}a$[1]	waka[1]	axu[1]	$əx^{w}a$[1]	axuññə[1]	akku[1]
141	oat	ağğa[1]	ağğaa[1]	ağğa[1]	humbolʔə[2]	imboriyət[2]	ağğa[1]	ağğa[1]	ağa[1]	imbor[2]	ağğa[1]	ağğa[1]	ağğə[1]
142	one	and[1]	tokko	at[1]	att[1]	att[1]	at[1]	at[1]	at[1]	att[1]	att[1]	att[1]	aad[1]
143	onion	šinkurt[1]	šunkurti[1]	$šink^{w}$ərt[1]	šinkurtə[1]	$šink^{w}$ərt[1]	šinkurt[1]	šinkurt[1]	$šink^{w}$ərt[1]	šinkurt[1]	šinkurt[1]	šənkurt[1]	šunkurt[1]
144	orange	birtuk^{w}an[1]	burtukaana[1]	birtuk^{w}an[1]	b^{w}irtukan[1]	birtuk^{w}an[1]	birtukan[1]	birtuk^{w}an[1]	birtuk^{w}an[1]	birtkan[1]	birtukan[1]	birtukan[1]	birtukan[1]
145	our	yəñña[1]	keeñña[1]	yina[1]	inay[1]	yina[1]	yina[1]	yina[1]	inay[1]	yəñña[1]	yinna[1]	yəñña[1]	yəña[1]
146	ox	bəre[1]	dibiččа	bora[1]	bawrə[1]	bora[1]	bora[1]	bora[1]	bawəra[1]	bora[1]	bora[1]	bora[1]	kəraab[2]
147	pan	dist[1]	disti[1]	dist[1]	dist[1]	dist[1]	dist[1]	dist[1]	dist[1]	dist[1]	dist[1]	dist[1]	dist[1]
148	pancake	ɾiťťa[3]	ɾiťťaa[3]	ťirəwišə[1]	ťorəšə[1]	məťino[2]	ɾiťťa[3]	ťirwəšə[1]	ťərwəšə[1]	guns[4]	ɾiššuwə[2]	atərə[1]	ťoroš[5]
149	pea	atər[1]	atara[1]	getəra[1]	gite[1]	getərə[1]	getərə[1]	getərə[1]	gətərə[1]	ɾiššuwə[2]	atərə[1]	getərə[1]	gite[1]
150	peach	kok[1]	kooki[1]	kok[1]	kok[1]	kok[1]	kok[1]	kok[1]	kok[1]	kok[1]	kok[1]	kok[1]	kok[1]
151	pepper	ɾariya1	ɾirća	ɾare[1]	ɾareʔ[1]	ɾale[1]	ɾariya[1]	ɾari[1]	ɾonde?ə[2]	ɾariya[1]	ɾariya[1]	ɾare[1]	ťurga[3]
152	pillow	tiras[1]	boraati	tiras[1]	tiras[1]	tiras[1]	tiras[1]	ğimmə[2]	gimʔə[2]	gimmə[2]	təras[1]	tiras[1]	gimma[2]
153	plate	sahin[1]	sahaana[1]	saxin[1]	sahin[1]	disko[2]	sahin[1]	sahin[1]	sahin[1]	səhan[1]	ťaba[3]	sahən[1]	saan[1]
154	porridge	gənfo[3]	marɾaa	ozat[1]	daʔə[2]	ozat[1]	ozat[1]	owzat[1]	daʔa[2]	gənfo[3]	inɾačče[4]	ozat[1]	inɾačča[4]
155	potato	dinniččа[1]	dinniččaa[1]	diniča[1]	diniča[1]	dinniččа[1]	diniččа[1]	dinniččа[1]	diniča[1]	dinniččа[1]	dinniččа[1]	diniččа[1]	diniččə[1]
156	pumpkin	dubba[1]	dubbaa[1]	dibaɾila[1]	dəbaɾula[1]	dibaɾulla[1]	dibaɾulla[1]	diwaɾula[1]	ťəbaɾula[1]	dəbaɾulla[1]	dəbaɾula[1]	diwaʔulla[1]	dəbaɾullə[1]
157	rain	zinab[1]	rooba	zirab[1]	diyə[2]	zirab[1]	zirab[1]	zirab[1]	diyə[2]	zinab[1]	zinab[1]	zinab[1]	ziləm[1]
158	red	ɾəyy	diimaa	bišə[1]	bušə[1]	bišša[1]	bišša[1]	bišə[1]	bišə[1]	bišša[1]	bišša[1]	bišša[1]	bušo[1]
159	respected	akəbbərə	kabağe[1]	kəbərəm[1]	həbbada[2]	kəbbərəm[1]	təhəbədəm[1]	kəbərə[1]	xəbədə[1]	akəbbərəm[1]	kəbbərə[1]	kəbbərəm[1]	kəbərə[1]
160	rice	ruz[1]	ruuza[1]	ruz[1]	ruz[1]	ruz[1]	ruz[1]	ruz[1]	ruz[1]	ruz[1]	ruz[1]	ruz[1]	ruz[1]
161	rich	habtam	dureessa[2]	dəngəññə[1]	dəngəññə[1]	dəngəññə[1]	dəngənə[1]	dəngənə[1]	dəngəñña[1]	dəngəññə[1]	dəngəññə[1]	dəngəññə[1]	duressa[2]
162	roasted grain	ɾolo[1]	hunɾaa	ɾwərə[1]	ɾarə[1]	ɾwərə[1]	ɾwerə[1]	ɾwarə[1]	ɾorʔə[1]	ɾolə[1]	ɾwərə[1]	ɾwə[1]	inkolo[1]
163	road	məngəd	amna[1]	ema[1]	meya[1]	ema[1]	ema[1]	ema[1]	meʔa[1]	moćə[2]	ema[1]	zəba[3]	unga[2]
164	round	zuriya[1]	naannawa	innim[2]	bihahiʔedi[3]	zurata[1]	zuriya[1]	xipiɓar[4]	zuriya[1]	zuriya[1]	anɾe[5]	zurya[1]	zuura[1]
165	said	alə[1]	ğadə	barəm[1]	barə[1]	barəm[1]	barəm[1]	barə[1]	barə[1]	balo[1]	barə[1]	bem[1]	baala[1]
166	salt	ćəw	ašabo[1] /soogida[3]	asso[1]	bəʔəd[2]	asso[1]	asso[1]	asso[1]	bəʔəd[2]	sogida[3]	asso[1]	assəwə[1]	aruso[1]
167	saturday	ɾidame	sanbata[1]	ɾəťansənbət[1]	ennəgəyə[2]	ɾəťansənbət[1]	ɾatasənbət[1]	ɾəťansənbət[1]	ɾəťansənbət[1]	kidansənbət[1]	kidansənbət[1]	kədansənbət[1]	ansənbət[1]
168	saw	ayyə[1]	arge	aǯə[1]	aššəm[1]	aǯǯəm[1]	aššəm[1]	aǯə[1]	aǯə[1]	aǯǯə[1]	aǯǯə[1]	aǯǯəm[1]	anǯə[1]
169	seed	zər[1]	šəññi	zər[1]	zəʔə[1]	zər[1]	zər[1]	zər[1]	zər[1]	zər[1]	zər[1]	zər[1]	zər[1]
170	seven	səbatt[1]	torba	səbat[1]	səwʔat[1]	səbat[1]	səβat[1]	səbat[1]	saat[1]	səbat[1]	sebət[1]	səbat[1]	saʔabat[1]
171	she	is^{w}a[3]	išə[3]	x^{y}ita[1]	šidə[2]	x^{y}it[1]	x^{y}it[1]	x^{y}it[1]	xida[1]	kiya[1]	xiti[1]	x^{y}a[1]	išə[3]
172	sheep	bəg	hoolaa	ťə[1]	ťay[1]	ťay[1]	ťay[1]	ťe[1]	ťay[1]	əťay[1]	əťe[1]	ťe[1]	ťay[1]
173	shoe	ćamma[1]	kop'ee[2]	ćamma[1]	ćammə[1]	ćamma[1]	ćamma[1]	ćamma[1]	ćamma[1]	kobe[2]	ćamma[1]	ćamma[1]	ćammə[1]
174	short	aććir[1]	gabaabaa	aćir[1]	iʔir[1]	aćir[1]	aććir[1]	aćir[1]	eʔir[1]	aććir[1]	aććir[1]	aććir[1]	ancir[1]
175	short trouser	ɾumťa1	ɾumťaa[1]	ɾumťa[1]	ɾumťə[1]	ɾumťa[1]	ɾumťa[1]	ɾonćəru[2]	ɾumťa[1]	bogge[3]	bogge[3]	ɾumťa[1]	bogge[3]
176	six	siddist[1]	ğaha	sidist[1]	siddist[1]	sidist[1]	siddist[1]	siddist[1]	siddist[1]	sidist[1]	siddist[1]	siddist[1]	siddist[1]
177	slowly	bəkəssita[2]	suutatti	təhin[1]	kəsbərita[2]	təhin[1]	təx^{y}ix^{y}in[1]	təx^{y}ix^{y}in[1]	təhin[1]	digbəwobəl[3]	digbərəm[3]	diggibem[3]	bəllodit[4]
178	smoke	ćis	aara	tən[1]	tan[1]	tənn[1]	tən[1]	tən[1]	tən[1]	tən[1]	tənn[1]	tən[1]	tən[1]
179	snatched	nəťťəkə[1]	bute	məćəkəm[1]	nəťəkə[1]	nəťəkə[1]	nəťəkəm[1]	nəťəkə[1]	nəťťəkəm[1]	moććəkəm[1]	meććəkəm[1]	nəťťəkəm[1]	boććəkə[1]
180	so	siləzzih[5]	kanaafu	ikka[1]	hənətə[2]	yəxərə[3]	yəxərə[3]	əxir[3]	buʔukti[4]	siləzzi[5]	siləhənə[5]	siləzzih[5]	loonəmko[6]

181	song	zəfən	sirba	lale[1]	das[2]	lale[1]	weg[3]	lale[1]	lale[1]	dərs[2]	dərs[2]	dərrɨs[4]	šɨbət[5]
182	soon	wədiyaw[4]	battalumatti	hɨmtəhm[1]	hamgizzi[2]	hingizᵛe[2]	xɨmtəxɨm[1]	kiməga[2]	himəga[2]	zagizze[2]	kəmo[3]	wədiyaw[4]	wəktəy[5]
183	sorghum	mašilla[1]	bɨšiŋgaa	mašilla[1]	mašullə[1]	mašilla[1]	mašilla[1]	mašilla[1]	mʷašɨna[1]	mašilla[1]	mašilla[1]	mašilla[1]	mašulle[1]
184	steer	wəyfən[1]	waatiyyo	wəfer[1]	wənfɨr[1]	wəfɨr[1]	wəfer[1]	wəfɨr[1]	wənfɨr[1]	mofen[1]	wəfɨn[1]	wəfen[1]	mofən[1]
185	stew	wət[1]	ittoo	wət[1]	wət[1]	wət[1]	wət[1]	wət[1]	wət[1]	wət[1]	wət[1]	wət[1]	wət[1]
186	stirring rod	mamasəya[2]	kokorsaa	wəgənğa[1]	mammase[2]	wəgənğa[1]	wəgənğa[1]	wəgənğa[1]	wəgənğa[1]	wəngəğa[1]	wəlgəğa[1]	wəlgəğa[1]	hunkutma[3]
187	stone	dingay	ɗagaa	ɨmɨr[1]	əwn[2]	ɨmɨr[1]	ɨmɨr[1]	ɨmɨr[1]	ɨmɨr[1]	yimɨr[1]	ɨmɨr[1]	ɨmaññə[1]	uun[2]
188	stool	bərćuma[1]	barćuma[1]	bʷərćuma[1]	barćumma[1]	bʷərćuma[1]	borćuma[1]	wərćuma[1]	bərćɨma[1]	wənbər[2]	borćuma[1]	bʷərćɨmma[1]	ќattə[3]
189	stronger	bət'am t'ənkarra[4]	irra ćimaa	ğədənə[1]	tu?ə[2]	tɨwwə[2]	tuwə[2]	tɨwwə[2]	tu?ə[2]	bərtu[3]	bərtu[3]	t'ənkarra[4]	ğədɨt[1]
190	sucked	t'əbba[1]	luuge	təpʷəm[1]	t'oppə[1]	t'əbbʷəm[1]	t'ə ppʷəm[1]	təpʷəm[1]	t'əpʷə[1]	t'obbəm[1]	t'obbə[1]	t'əbbʷəm[1]	tobe[1]
191	suddenly	dingət[2]	tasa	mətəga[1]	ɨmmatəg[1]	ɨmmatingi[1]	dingət[2]	himəga[1]	dingət[2]	dingət[2]	dingət[2]	dingət[2]	dinbut[2]
192	sun	śəhay	aduu[2]	ćet[1]	ayed[2]	ćet[1]	ćet[1]	ćet[1]	ɨwəyə[1]	yimɨr[2]	ćet[1]	aret[3]	ayɨr[2]
193	sunday	ɨhud	dilbata	wursənbət[1]	abbə[2]	wɨrsənbət[1]	wɨrsənbət[1]	wursənbət[1]	wursənbət[1]	wursənbət[1]	wursənbət[1]	wursənbət[1]	gɨdɨrsənbət[1]
194	sunflower	suf[1]	suufi[1]	suf[1]	suf[1]	suf[1]	suf[1]	suf[1]	suf[1]	suf[1]	suf[1]	suf[1]	suf[1]
195	sweat	lab	hurkaa	wɨzat[1]	azat[1]	wɨzat[1]	wɨzat[1]	lab[2]	azat[1]	wɨzat[1]	wɨzat[1]	wɨzat[1]	wɨzət[1]
196	takeoff	awəlləќə[2]	baase	watmənɨg[1]	awənəga[2]	at'am[1]	awt'ot[1]	wawt'a[1]	atwanukt[1]	awəlləќo[3]	wawlək[2]	awəllə?əm[2]	šeelətə[4]
197	tangerine	məndərin[1]	mandariina[1]	məndərəni[1]	məndərin[1]	məndərəni[1]	məndərin[1]	məndərəni[1]	məndərəni[1]	məndərin[1]	məndərin[1]	məndərəni[1]	məndərəni[4]
198	teff	t'ef[1]	t'aafi[1]	t'afi[1]	t'ef[1]	t'afi[1]	t'afi[1]	t'afi[1]	t'afi[1]	t'afi[1]	t'afi[1]	t'afi[1]	t'afe[1]
199	ten	assɨr[1]	kuɗan	asɨr[1]	assɨr[1]	asɨ[1]	assɨr[1]	asɨr[1]	asɨr[1]	asɨr[1]	asɨr[1]	assɨr[1]	assɨr[1]
200	that	ya[2]	san	xɨx[1]	xadə[1]	za[2]	xɨx[1]	hata[1]	xada[1]	za[2]	za[2]	za[2]	hattay[1]
201	then	kəzziya	sanbooda	təhanќe[1]	təha?egəd[1]	təhanќye[1]	təxanќe[1]	təh?angᵛe[1]	təhim[1]	təkʷa[2]	bəhi[3]	təhimange[4]	tə?izof[6]
202	they	innəssu	isaan	xino[1]	huno[1]	xino[1]	xino[1]	xinu[1]	xinowa[1]	kinnəm[1]	xinno[1]	xinnəw[1]	uxun[1]
203	thick	wəfram	furdaa	ğəŋğɨr[1]	gušɨr[1]	ğəŋğɨr[1]	ğəŋğɨr[1]	ğəŋğɨr[1]	ğəŋğɨr[1]	dədan[2]	ğəŋğin[1]	ğəŋğin[1]	məgərri[3]
204	thief	leba[1]	hattuu	neba[1]	fangaya[2]	sərəññə[3]	nəba[1]	neba[1]	fəngəya[2]	leba[1]	leba[1]	leba[1]	rangɨ[4]
205	thin	ќəććɨn[2]	ќallaa	sɨsa[1]	ќəććɨn[2]	sɨssə[1]	sɨsa[1]	sɨsə[1]	ќəčɨr[2]	asťaťɨb[3]	ќɨččɨn[2]	səssə[1]	ќəčɨn[2]
206	this	yɨh[1]	kun	zɨ[1]	wa[2]	zɨx[1]	zɨ[1]	zɨ[1]	wəda[2]	zi[1]	zi[1]	zi[1]	innə[3]
207	three	sost[1]	sadi[1]	sost[1]	sost[1]	sost[1]	sost[1]	sost[1]	so?ost[1]	sost[1]	sost[1]	sost[1]	šešt[1]
208	thursday	hamus[1]	kamisa[1]	amus[1]	amus[1]	amus[1]	amʷɨs[1]	amus[1]	amus[1]	xamus[1]	amus[1]	amus[1]	xamus[1]
209	tiger	nəbɨr[3]	ќerreensa	ǯəgʷarə[1]	zagorə[1]	zəgʷara[1]	zəgʷara[1]	zəgʷərə[1]	zagora[1]	buswa[2]	zogara[1]	zogara[1]	nawr[3]
210	till	dɨrəs[1]	haanga	hihedar[1]	ha?ed[2]	dar[1]	dar[1]	dar[1]	sənəga[3]	dɨrəs[1]	sinn[4]	dɨrəs[1]	ğaango[5]
211	time	gizze[1]	yaroo	əga[2]	gidad[3]	əga[2]	gamʷə[1]	gize[1]	giziyə[1]	gizᵛe[1]	gizᵛe[1]	ge[1]	wəkt[4]
212	to	lə[3]	f	yə[1]	?ə[2]	lə[3]	yə[1]	yə[1]	?ə[2]	lə[3]	yə[1]	yə[1]	lə[3]
213	today	zare	harra	əkkʷa[1]	akka[1]	əkkʷa[1]	əkkʷa[1]	əkʷa[1]	okʷa[1]	axuh[1]	akʷa[1]	əkkʷa[1]	awğe[2]
214	tomato	timatim[1]	timaatiim[1]	timatim[1]	timatim[1]	timatim[1]	timatim[1]	timatim[1]	timatim[1]	tumtum[1]	timatim[1]	timatim[1]	timatim[1]
215	tomorrow	nəgə[1]	boru	nəgə[1]	nəgə[1]	nəgə[1]	nəgə[1]	nəgə[1]	nəgə[1]	nəgə[1]	nəgə[1]	nəgə[1]	gees[2]
216	too	bət'am[3]	baay'ee	nɨќќar[1]	hamə?ad[2]	nɨќќar[1]	nɨќќar[1]	nɨќќar[1]	buše?əhə[2]	burɨm[3]	bət'am[3]	lɨќќe4	sɨrəm[5]
217	traveler	məngədəñña[3]	eemala[1]	emənə[1]	meññə[1]	emənnə[1]	emənə[1]	emənə[1]	emañə[1]	əngədəñña[3]	ɨmatəñña[1]	məngədəña[3]	ungawərə[4]
218	trivet	gulliččа[3]	sumsuma	gonziyə[1]	gamziye[1]	gəmziyə[1]	gulliččа[3]	gʷamziyye[1]	midačča[2]	gawziyə[1]	aќufə[4]	gonziyə[1]	šɨštќər[5]
219	trouser	surri[2]	kofoo	bolale[1]	sure?[2]	sulle[2]	sulle[2]	bolale[1]	bolale[1]	bolale[1]	luxo[3]	surri[2]	bolale[1]
220	two	hulətt[2]	lama	xʷet[1]	hur?ət[1]	xʷett[1]	xʷet[1]	xʷet[1]	wɨr?et[1]	kitt[1]	xʷett[1]	xʷett[1]	ošt[2]
221	upon	ɨlayulay	gubbaarra	bəforətə[1]	bəforfor[1]	bəforətə[1]	bəforətə[1]	bəforətə[1]	bəforuha[1]	bəlaləhʷan[2]	bəforəhufʷər[1]	bəfʷehuta[1]	bəddərkə[3]
222	us	iññan[1]	nu	yina[1]	inə[1]	yina[1]	yina[1]	ina[1]	ina[1]	iññа[1]	inna[1]	iññan[1]	yəñə[1]
223	waist-band	məќənət	sabbata	azgart[1]	azgattə[1]	azgard[1]	azgart[1]	azgart[1]	azgat[1]	dəќot[2]	azlagidd[1]	azgalidd[1]	iitə[3]
224	war	t'or	waraana	gaz[1]	ariw[2]	arb[2]	gaz[1]	gaz[1]	gaz[1]	tiğə[3]	arɨb[2]	gaz[1]	arb[2]
225	was	nəbbər[2]	ture	banə[1]	banədə[1]	baannə[1]	banə[1]	banə[1]	banədə[1]	nəbbərə[1]	bannə[1]	banno[1]	narə[2]
226	water	wɨha	bišaan	ɨxa[1]	ɨxə[1]	ɨxa[1]	ɨxa[1]	ɨxa[1]	ɨxa[1]	yiga[1]	əga[1]	ɨga[1]	məy[2]
227	wednesday	ɨrob[1]	roobii[1]	ərə[1]	arbe[1]	ərəw[1]	ərə[1]	ərə[1]	ərə[1]	xərob[1]	ərob[1]	ərob[1]	harbe[1]
228	were	nəbbəru[2]	turan	banəwə[1]	banowəttə[1]	bannəbə[1]	banəbə[1]	banəwə[1]	banowatə[1]	nəbbərɨm[2]	banno[1]	banɨmutt[1]	naru[2]
229	what	min[1]	maal[1]	mɨrќar[1]	mɨrafər[1]	mə?e[1]	mɨrќar[1]	mɨrќar[1]	mɨr?ar[1]	min[1]	mɨrќar[1]	mɨ?e[1]	min[1]
230	wheat	sinde[1]	ќamadi	sina[1]	sine?[1]	sinne[1]	sinay[1]	sine[1]	sinə?[1]	sɨrre[1]	sɨrre[1]	sɨrre[1]	sɨrəy[1]
231	which	yətiññaw	kam	əndehuta[2]	ətədə[1]	ɨndeyəta[1]	etəta[1]	etəta[1]	ətədo[1]	yitta[1]	etti[1]	ɨnt'ewe[1]	aytay[1]
232	who	man[1]	eeññu	mʷan[1]	man[1]	mʷan[1]	mʷan[1]	mʷan[1]	man[1]	ma[1]	mʷa[1]	ma[1]	maani[1]
233	whoever	maniññawm[2]	kamiyyu	mʷanimənda[2]	attimanir[1]	ɨndeyənda[2]	etəta[1]	etənda[1]	itindra[1]	yittaññа[1]	ettənna[1]	mannimina[2]	aynaannə[3]
234	wide (adj)	səffi	bal?a	bətɨt[1]	bəttəd[1]	bətɨt[1]	bətɨt[1]	bətɨt[1]	bətɨt[1]	bətət[1]	bəttət[1]	bətɨt[1]	fətt[2]
235	wind	nɨfas[1]	ќilleensa	ɨnfas[1]	ɨnfas[1]	nəfas[1]	nɨfas[1]	ɨnfas[1]	nəfas[1]	nəfas[1]	nɨfas[1]	ɨnfas[1]	nɨfas[1]
236	with	gar[1]	wağğiin	təhut[2]	tihudə[2]	gi[1]	gamwə[1]	gamʷa[1]	gəzᵛə[1]	goy[1]	təge[1]	ge[1]	tuuha[2]
237	woman	setiyyo	ğaarti	mɨšt[1]	mist[1]	mɨšt[1]	mɨšt[1]	mɨšt[1]	mɨšt[1]	mɨšt[1]	mɨšt[1]	mɨšt[1]	mɨšt[1]
238	word	ќal[1]	ğačča	ќar[1]	ќal[1]	ќar[1]	ќar[1]	ќar[1]	ќar[1]	ќal[1]	ќal[1]	ќal[1]	ќal[1]
239	wrapped (adj)	t'ɨќɨll[1]	maramaa	t'ɨќɨll[1]	dububɨl[2]	t'əќɨlɨl[1]	t'ɨbarɨr[1]	dɨbɨbɨl[2]	t'ɨќɨll[1]	dɨbɨbɨl[2]	t'umt'um[3]	t'ɨќəlɨl[1]	t'ɨќəl[1]
240	you (2.M.SG)	antə[1]	ati[1]	axə[1]	axə[1]	zahə[1]	axə[1]	axə[1]	axə[1]	dəxə[1]	axa[1]	atə[2]	atə[2]

5.0.1 B.2 List of words for Word Categorization test

The following list of words were used in the Word categorization test to measure mutual intelligibility and to determine the functional distance among the selected language varieties.

cloths	**Body parts**	**Kitchen utilities**	**Fruits**	**Food type**
shoes	finger	spoon	banana	bread
shirt	lip	ladle	mango	'kocho'
hat	eye	pan	orange	'injera'
belt	arm	knife	berry	stew
trouser	breast	cutting board	guava	pancake
handkerchief	leg	griddle	cherimoya	roasted meat
dress	chest	stirring rod	coke	mush
shorts	eye	kettle	tangerine	'besso'
waist-band	hair	food-table	lemon	porridge
headdress	neck	plate	doviyalis abyssnica	roasted grain
Domestic animal	**Furniture**	**Vegetables**	**Wild animal**	**Cereals**
hen	table	cabbage	elephant	barely
ox	chair	pepper	lion	wheat
camel	shelf	tomato	tiger	maize
donkey	locker	onion	hyena	pea
goat	bed	potato	crocodile	fava bean
sheep	sofa	carrot	giraffe	sorghum
dog	stool	garlic	monkey	'teff'
cat	chassis	pumpkin	ape	bean
horse	mirror	sweet potato	fox	lentil
mule	box	basil	gazelle	chickpea

B.3 Word Categorization, word order

Description: words used for word categorization were listed in different orders to block the priming effect. Different CDs were created by changing the order of the varieties in which the words are spoken. One CD was used for one language area. Each CD consists of ten tracks. One participant matched 10 list of words within a track with their semantic categories provided on the answer sheet. Matching the full CD requires the involvement 10 participants. In our case, each CD was repeated 3 times and administered to the total of around 30 students.

	CDs	CD1	CD2	CD3	CD4	CD5	CD6	CD7	CD8	CD9	CD10
No	Words	TR1	TR1	TR1	TR1	TR1	TR1	TR1	TR1	TR1	TR1
1	shoe	Endegagn	Chaha	Kistane	Silte	Muher	Mesqan	Gura	Gumer	Ezha	Inor
2	finger	Inor	Endegagn	Chaha	Kistane	Silte	Muher	Mesqan	Gura	Gumer	Ezha
3	spoon	Ezha	Inor	Endegagn	Chaha	Kistane	Silte	Muher	Mesqan	Gura	Gumer
4	banana	Gumer	Ezha	Inor	Endegagn	Chaha	Kistane	Silte	Muher	Mesqan	Gura
5	bread	Gura	Gumer	Ezha	Inor	Endegagn	Chaha	Kistane	Silte	Muher	Mesqan
6	hen	Mesqan	Gura	Gumer	Ezha	Inor	Endegagn	Chaha	Kistane	Silte	Muher
7	table	Muher	Mesqan	Gura	Gumer	Ezha	Inor	Endegagn	Chaha	Kistane	Silte
8	cabbage	Silte	Muher	Mesqan	Gura	Gumer	Ezha	Inor	Endegagn	Chaha	Kistane
9	elephant	Kistane	Silte	Muher	Mesqan	Gura	Gumer	Ezha	Inor	Endegagn	Chaha
10	barley	Chaha	Kistane	Silte	Muher	Mesqan	Gura	Gumer	Ezha	Inor	Endegagn
		TR2	TR2	TR2	TR2	TR2	TR2	TR2	TR2	TR2	TR2
11	lip	Endegagn	Chaha	Kistane	Silte	Muher	Mesqan	Gura	Gumer	Ezha	Inor
12	ladle	Inor	Endegagn	Chaha	Kistane	Silte	Muher	Mesqan	Gura	Gumer	Ezha
13	mango	Ezha	Inor	Endegagn	Chaha	Kistane	Silte	Muher	Mesqan	Gura	Gumer
14	koc'c'o	Gumer	Ezha	Inor	Endegagn	Chaha	Kistane	Silte	Muher	Mesqan	Gura
15	Ox	Gura	Gumer	Ezha	Inor	Endegagn	Chaha	Kistane	Silte	Muher	Mesqan
16	chair	Mesqan	Gura	Gumer	Ezha	Inor	Endegagn	Chaha	Kistane	Silte	Muher
17	pepper	Muher	Mesqan	Gura	Gumer	Ezha	Inor	Endegagn	Chaha	Kistane	Silte
18	lion	Silte	Muher	Mesqan	Gura	Gumer	Ezha	Inor	Endegagn	Chaha	Kistane
19	wheat	Kistane	Silte	Muher	Mesqan	Gura	Gumer	Ezha	Inor	Endegagn	Chaha
20	shirt	Chaha	Kistane	Silte	Muher	Mesqan	Gura	Gumer	Ezha	Inor	Endegagn
		TR3	TR3	TR3	TR3	TR3	TR3	TR3	TR3	TR3	TR3
21	pan	Endegagn	Chaha	Kistane	Silte	Muher	Mesqan	Gura	Gumer	Ezha	Inor
22	orange	Inor	Endegagn	Chaha	Kistane	Silte	Muher	Mesqan	Gura	Gumer	Ezha
23	inǧəra	Ezha	Inor	Endegagn	Chaha	Kistane	Silte	Muher	Mesqan	Gura	Gumer
24	camel	Gumer	Ezha	Inor	Endegagn	Chaha	Kistane	Silte	Muher	Mesqan	Gura
25	shelf	Gura	Gumer	Ezha	Inor	Endegagn	Chaha	Kistane	Silte	Muher	Mesqan
26	tomato	Mesqan	Gura	Gumer	Ezha	Inor	Endegagn	Chaha	Kistane	Silte	Muher
27	tiger	Muher	Mesqan	Gura	Gumer	Ezha	Inor	Endegagn	Chaha	Kistane	Silte
28	maize	Silte	Muher	Mesqan	Gura	Gumer	Ezha	Inor	Endegagn	Chaha	Kistane
29	hat	Kistane	Silte	Muher	Mesqan	Gura	Gumer	Ezha	Inor	Endegagn	Chaha
30	eye	Chaha	Kistane	Silte	Muher	Mesqan	Gura	Gumer	Ezha	Inor	Endegagn
		TR4	TR4	TR4	TR4	TR4	TR4	TR4	TR4	TR4	TR4
31	berry	Endegagn	Chaha	Kistane	Silte	Muher	Mesqan	Gura	Gumer	Ezha	Inor
32	type of stew	Inor	Endegagn	Chaha	Kistane	Silte	Muher	Mesqan	Gura	Gumer	Ezha

33	donkey	Ezha	Inor	Endegagn	Chaha	Kistane	Silte	Muher	Mesqan	Gura	Gumer
34	locker	Gumer	Ezha	Inor	Endegagn	Chaha	Kistane	Silte	Muher	Mesqan	Gura
35	onion	Gura	Gumer	Ezha	Inor	Endegagn	Chaha	Kistane	Silte	Muher	Mesqan
36	hyena	Mesqan	Gura	Gumer	Ezha	Inor	Endegagn	Chaha	Kistane	Silte	Muher
37	pea	Muher	Mesqan	Gura	Gumer	Ezha	Inor	Endegagn	Chaha	Kistane	Silte
38	belt	Silte	Muher	Mesqan	Gura	Gumer	Ezha	Inor	Endegagn	Chaha	Kistane
39	arm	Kistane	Silte	Muher	Mesqan	Gura	Gumer	Ezha	Inor	Endegagn	Chaha
40	knife	Chaha	Kistane	Silte	Muher	Mesqan	Gura	Gumer	Ezha	Inor	Endegagn
		TR5	TR5	TR5	TR5	TR5	TR5	TR5	TR5	TR5	TR5
41	pancake	Endegagn	Chaha	Kistane	Silte	Muher	Mesqan	Gura	Gumer	Ezha	Inor
42	goat	Inor	Endegagn	Chaha	Kistane	Silte	Muher	Mesqan	Gura	Gumer	Ezha
43	bed	Ezha	Inor	Endegagn	Chaha	Kistane	Silte	Muher	Mesqan	Gura	Gumer
44	potato	Gumer	Ezha	Inor	Endegagn	Chaha	Kistane	Silte	Muher	Mesqan	Gura
45	crocodile	Gura	Gumer	Ezha	Inor	Endegagn	Chaha	Kistane	Silte	Muher	Mesqan
46	fava bean	Mesqan	Gura	Gumer	Ezha	Inor	Endegagn	Chaha	Kistane	Silte	Muher
47	trouser	Muher	Mesqan	Gura	Gumer	Ezha	Inor	Endegagn	Chaha	Kistane	Silte
48	breast	Silte	Muher	Mesqan	Gura	Gumer	Ezha	Inor	Endegagn	Chaha	Kistane
49	cutting board	Kistane	Silte	Muher	Mesqan	Gura	Gumer	Ezha	Inor	Endegagn	Chaha
50	guava	Chaha	Kistane	Silte	Muher	Mesqan	Gura	Gumer	Ezha	Inor	Endegagn
		TR6	TR6	TR6	TR6	TR6	TR6	TR6	TR6	TR6	TR6
51	sheep	Endegagn	Chaha	Kistane	Silte	Muher	Mesqan	Gura	Gumer	Ezha	Inor
52	sofa	Inor	Endegagn	Chaha	Kistane	Silte	Muher	Mesqan	Gura	Gumer	Ezha
53	carrot	Ezha	Inor	Endegagn	Chaha	Kistane	Silte	Muher	Mesqan	Gura	Gumer
54	giraffe	Gumer	Ezha	Inor	Endegagn	Chaha	Kistane	Silte	Muher	Mesqan	Gura
55	sorghum	Gura	Gumer	Ezha	Inor	Endegagn	Chaha	Kistane	Silte	Muher	Mesqan
56	handkerchief	Mesqan	Gura	Gumer	Ezha	Inor	Endegagn	Chaha	Kistane	Silte	Muher
57	leg	Muher	Mesqan	Gura	Gumer	Ezha	Inor	Endegagn	Chaha	Kistane	Silte
58	griddle	Silte	Muher	Mesqan	Gura	Gumer	Ezha	Inor	Endegagn	Chaha	Kistane
59	cherimoya	Kistane	Silte	Muher	Mesqan	Gura	Gumer	Ezha	Inor	Endegagn	Chaha
60	roasted meat	Ch's aha	Kistane	Silte	Muher	Mesqan	Gura	Gumer	Ezha	Inor	Endegagn
		TR7	TR7	TR7	TR7	TR7	TR7	TR7	TR7	TR7	TR7
61	stool	Endegagn	Chaha	Kistane	Silte	Muher	Mesqan	Gura	Gumer	Ezha	Inor
62	garlic	Inor	Endegagn	Chaha	Kistane	Silte	Muher	Mesqan	Gura	Gumer	Ezha
63	monkey	Ezha	Inor	Endegagn	Chaha	Kistane	Silte	Muher	Mesqan	Gura	Gumer
64	'teff'	Gumer	Ezha	Inor	Endegagn	Chaha	Kistane	Silte	Muher	Mesqan	Gura
65	females' dress	Gura	Gumer	Ezha	Inor	Endegagn	Chaha	Kistane	Silte	Muher	Mesqan
66	chest	Mesqan	Gura	Gumer	Ezha	Inor	Endegagn	Chaha	Kistane	Silte	Muher
67	stirring rod	Muher	Mesqan	Gura	Gumer	Ezha	Inor	Endegagn	Chaha	Kistane	Silte
68	coke	Silte	Muher	Mesqan	Gura	Gumer	Ezha	Inor	Endegagn	Chaha	Kistane
69	mush	Kistane	Silte	Muher	Mesqan	Gura	Gumer	Ezha	Inor	Endegagn	Chaha
70	dog	Chaha	Kistane	Silte	Muher	Mesqan	Gura	Gumer	Ezha	Inor	Endegagn

		TR8	TR8	TR8	TR8	TR8	TR8	TR8	TR8	TR8	TR8
71	pumpkin	Endegagn	Chaha	Kistane	Silte	Muher	Mesqan	Gura	Gumer	Ezha	Inor
72	ape	Inor	Endegagn	Chaha	Kistane	Silte	Muher	Mesqan	Gura	Gumer	Ezha
73	bean	Ezha	Inor	Endegagn	Chaha	Kistane	Silte	Muher	Mesqan	Gura	Gumer
74	shorts	Gumer	Ezha	Inor	Endegagn	Chaha	Kistane	Silte	Muher	Mesqan	Gura
75	Eye	Gura	Gumer	Ezha	Inor	Endegagn	Chaha	Kistane	Silte	Muher	Mesqan
76	kettle	Mesqan	Gura	Gumer	Ezha	Inor	Endegagn	Chaha	Kistane	Silte	Muher
77	tangerine	Muher	Mesqan	Gura	Gumer	Ezha	Inor	Endegagn	Chaha	Kistane	Silte
78	'bəsso'	Silte	Muher	Mesqan	Gura	Gumer	Ezha	Inor	Endegagn	Chaha	Kistane
79	cat	Kistane	Silte	Muher	Mesqan	Gura	Gumer	Ezha	Inor	Endegagn	Chaha
80	chassis	Chaha	Kistane	Silte	Muher	Mesqan	Gura	Gumer	Ezha	Inor	Endegagn
		TR9	TR9	TR9	TR9	TR9	TR9	TR9	TR9	TR9	TR9
81	fox	Endegagn	Chaha	Kistane	Silte	Muher	Mesqan	Gura	Gumer	Ezha	Inor
82	lentils	Inor	Endegagn	Chaha	Kistane	Silte	Muher	Mesqan	Gura	Gumer	Ezha
83	waist-band	Ezha	Inor	Endegagn	Chaha	Kistane	Silte	Muher	Mesqan	Gura	Gumer
84	hair	Gumer	Ezha	Inor	Endegagn	Chaha	Kistane	Silte	Muher	Mesqan	Gura
85	food-table	Gura	Gumer	Ezha	Inor	Endegagn	Chaha	Kistane	Silte	Muher	Mesqan
86	lemon	Mesqan	Gura	Gumer	Ezha	Inor	Endegagn	Chaha	Kistane	Silte	Muher
87	porridge	Muher	Mesqan	Gura	Gumer	Ezha	Inor	Endegagn	Chaha	Kistane	Silte
88	horse	Silte	Muher	Mesqan	Gura	Gumer	Ezha	Inor	Endegagn	Chaha	Kistane
89	mirror	Kistane	Silte	Muher	Mesqan	Gura	Gumer	Ezha	Inor	Endegagn	Chaha
90	sweet potato	Chaha	Kistane	Silte	Muher	Mesqan	Gura	Gumer	Ezha	Inor	Endegagn
		TR10	TR10	TR10	TR10	TR10	TR10	TR10	TR10	TR10	TR10
91	chick-pea	Endegagn	Chaha	Kistane	Silte	Muher	Mesqan	Gura	Gumer	Ezha	Inor
92	headdress	Inor	Endegagn	Chaha	Kistane	Silte	Muher	Mesqan	Gura	Gumer	Ezha
93	neck	Ezha	Inor	Endegagn	Chaha	Kistane	Silte	Muher	Mesqan	Gura	Gumer
94	Plate	Gumer	Ezha	Inor	Endegagn	Chaha	Kistane	Silte	Muher	Mesqan	Gura
95	doviyalis abysinica	Gura	Gumer	Ezha	Inor	Endegagn	Chaha	Kistane	Silte	Muher	Mesqan
96	roasted grain	Mesqan	Gura	Gumer	Ezha	Inor	Endegagn	Cheha	Kistane	Silte	Muher
97	mule	Muher	Mesqan	Gura	Gumer	Ezha	Inor	Endegagn	Chaha	Kistane	Silte
98	box	Silte	Muher	Mesqan	Gura	Gumer	Ezha	Inor	Endegagn	Chaha	Kistane
99	basil	Kistane	Silte	Muher	Mesqan	Gura	Gumer	Ezha	Inor	Endegagn	Chaha
100	gazelle	Chaha	Kistane	Silte	Muher	Mesqan	Gura	Gumer	Ezha	Inor	Endegagn

C. Additional Results

C.1 Phonetic similarity index

Language	CH	EN	EZ	GM	GU	IN	KS	MS	MU	SI
Chaha	100									
Endegagn	82	100								
Ezha	92	81	0							
Gumer	92	82	92	100						
Gura	95	82	90	93	100					
Inor	88	86	85	86	88	100				
Kistane	82	79	82	81	81	79	100			
Mesqan	89	80	88	87	88	83	87	100		
Muher	86	79	87	85	85	81	88	88	100	
Silt'e	80	77	79	78	80	76	82	81	78	100

C.2 Lexical similarity index

Language	CH	ED	EZ	GM	GU	IN	KS	MS	MU	SI
Chaha	0									
Endegagn	74	100								
Ezha	87	75	0							
Gumer	88	73	87	100						
Gura	89	73	85	88	100					
Inor	78	82	77	80	80	100				
Kistane	61	59	66	67	63	63	100			
Mesqan	76	69	78	79	76	72	70	100		
Muher	79	67	80	80	76	72	72	82	100	
Silt'e	52	50	53	52	51	53	56	54	53	100

C.3 Perceptual similarity index

Language	CH	EN	EZ	GM	GU	IN	KS	MS	MU	SI
Chaha	81	13	52	95	96	38	12	23	29	2
Endegagn	37	100	44	49	51	91	57	51	42	34
Ezha	86	10	89	93	90	27	25	66	51	7
Gumer	78	19	70	95	92	40	20	54	43	10
Gura	84	35	72	85	89	57	18	47	37	10
Inor	47	72	36	60	55	99	25	44	36	8
Kistane	30	33	30	21	23	33	99	54	76	20
Mesqan	38	21	63	59	71	17	58	96	78	11
Muher	58	10	35	72	72	22	40	59	96	13
Silt'e	23	32	35	33	30	20	63	52	45	100

C.4 Attitude test results

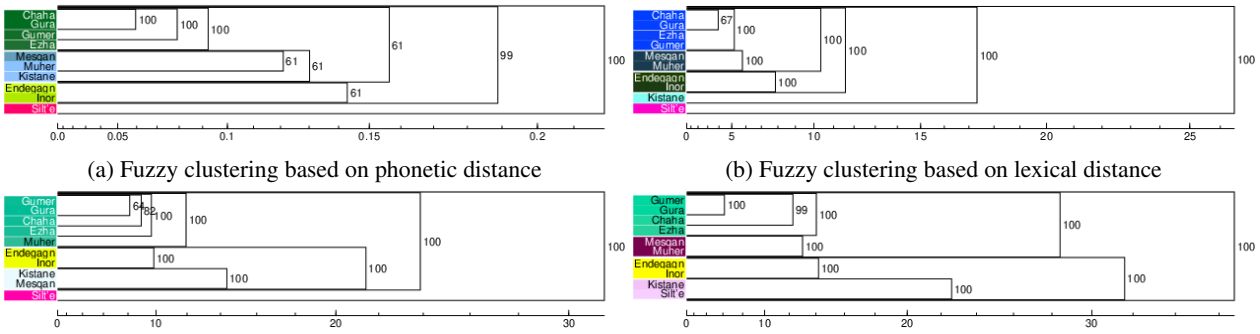
Language	ED	IN	EZ	GM	GU	MS	MU	SI	KS	CH
Endegagn	99	93	47	61	60	53	61	42	58	48
Inor	75	99	49	76	72	48	41	23	24	54
Ezha	19	25	84	91	88	55	50	11	29	81
Gumer	40	44	64	92	87	40	42	17	21	74
Gura	31	48	65	79	87	33	21	07	09	75
Mesqan	34	33	62	58	65	91	73	36	66	48
Muher	28	41	48	82	81	49	95	33	48	74
Silt'e	50	39	45	49	45	53	52	95	68	34
Kistane	49	52	48	46	43	65	73	38	91	46
Chaha	10	32	46	96	96	18	25	03	10	81

838 **C.5 Cophenetic distance among the nodes**

No	Pairs of Varieties	Combined	Hetzron (1972)	Demeke (2001)
1	CH-EN	5	4	4
2	CH-EZ	2	2	2
3	CH-GM	2	2	2
4	CH-GU	2	2	2
5	CH-IN	5	4	2
6	CH-KS	5	8	7
7	CH-MS	4	4	6
8	CH-MU	4	5	2
9	CH-SI	6	10	8
10	EZ-EN	4	4	3
11	EZ-IN	5	4	2
12	GM-EN	4	4	3
13	GM-EZ	2	2	2
14	GM-IN	5	4	2
15	GU-EN	5	4	3
16	GU-EZ	2	2	2
17	GU-GM	2	2	2
18	GU-IN	5	4	2
19	IN-EN	2	2	3
20	KS-EN	5	8	7
21	KS-EZ	5	8	7
22	KS-GM	5	8	7
23	KS-GU	4	8	7
24	KS-IN	5	8	7
25	KS-MS	5	6	3
26	KS-MU	5	7	7
27	KS-SI	3	8	9
28	MS-EN	5	4	6
29	MS-EZ	4	4	6
30	MS-GM	4	5	6
31	MS-GU	4	4	6
32	MS-IN	5	4	6
33	MU-EN	5	5	4
34	MU-EZ	4	5	2
35	MU-GM	4	5	2
36	MU-GU	4	4	2
37	MU-IN	5	5	2
38	MU-MS	2	3	4
39	SI-EZ	6	10	8
40	SI-GM	6	10	8
41	SI-GU	6	10	8
42	SI-IN	6	10	8
43	Silté-EN	6	10	8
44	SI-MS	5	8	8
45	SI-MU	6	8	8

Figure 11: Cophenetic distance

C.6 Results of Fuzzy Clustering



(a) Fuzzy clustering based on phonetic distance

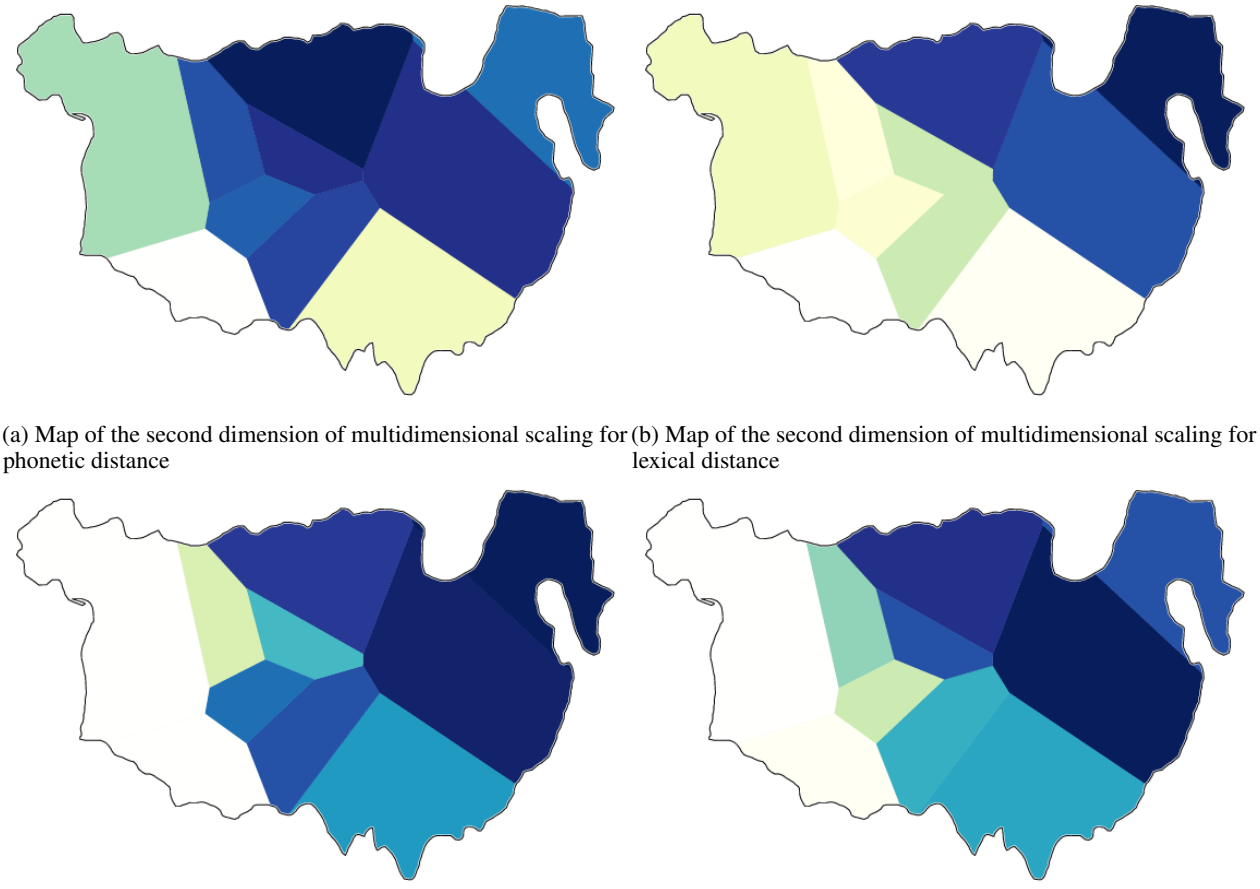
(b) Fuzzy clustering based on lexical distance

(c) Fuzzy claustering based on functional distance

(d) Fuzzy clustering based on the perceptual distance

Figure 12: Fuzzy clustering based on the structural, functional and perceptual distances

C.7 Multidimensional scaling-second dimension



(a) Map of the second dimension of multidimensional scaling for phonetic distance

(b) Map of the second dimension of multidimensional scaling for lexical distance

(c) Map of the second dimension of multidimensional scaling for the functional distance

(d) Map of the second dimension of multidimensional scaling for perceptual distance

Figure 13: Map of the second dimension of multidimensional scaling for the structural, functional and perceptual distances

C.8 Test Participants

Note that the number of participants of the perception test and the mutual intelligibility is slightly different. This is because, the two tests were administered at different times in some of the areas, and the respondents who were absent on one of the tests can be present on the other.

C.1. Participants of the word categorization test

The table contains CD number administered in each area (CD No.), the range of age of the participants (Age), the participants' grade level (G.9 = Grade nine, G.10 = Grade 10, G. 11 = Grade 11, G. 12 = Grade 12), the participants whose responses were considered for the analysis (considered), the participants whose responses were not considered (excluded- because sometimes some respondents stacked on the first page of the response sheet while the CD was playing).

Area	CD No.	Age	Sex		Grade				Total	Considered	Excluded
			M	F	G.9	G.10	G.11	G.12			
Gura	01	15-22	23	6	1	6	7	15	29	29	-
Gumer	02	17-21	17	12	-	-	29	-	29	28	1
Inor	03	16-21	24	5	-	29	-	-	29	22	7
Chaha	04	16-23	18	11	-	-	15	11	29	26	3
Muher	05	18-21	14	15	-	-	17	12	29	24	5
Ezha	06	16-23	14	16	-	-	9	21	30	26	4
Endegagn	07	18-24	21	7	-	-	22	6	28	22	6
Kistane	08	17-22	20	10	-	-	30	-	30	23	7
Mesqan	09	16-21	8	21	12	19	-	-	29	25	4
Silt'e	10	18-24	12	11	-	-	-	23	23	23	-
			171	114	13	54	129	88	285	248	37

C.2. Participants of the Perceptual Test

The partcipants who did not follow the instruction properly were excluded.

Area	Age	Sex		Grade				Total	Considered	Excluded
		M	F	G.9	G.10	G.11	G.12			
Gura	15-22	23	5	1	7	7	15	30	28	2
Gumer	17-21	15	14	-	-	30	-	30	25	5
Inor	16-22	21	7	-	28	-	-	28	20	8
Chaha	16-23	18	10	-	-	17	11	28	25	3
Muher	18-21	15	15	-	-	18	12	30	26	4
Ezha	16-23	16	14	-	-	10	20	30	27	3
Endegagn	18-24	21	7	-	-	23	5	28	28	-
Kistane	17-23	19	11	-	-	30	-	30	30	-
Mesqan	16-21	8	21	12	19	-	-	29	25	4
Silt'e	18-23	15	14	-	-	-	29	29	24	5
Total		171	118	13	54	135	92	289	258	34