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# Determinants of language change in the Gurage area of Ethiopia

https://doi.org/10.1515/jwl-2022-0024
Received June 20, 2022; accepted December 20, 2022; published online January 27, 2023

**Abstract:** This study aims to examine linguistic and non-linguistic determinants that contribute to language change in the Gurage area of Ethiopia. The linguistic and non-linguistic determinants were investigated by combining methods of dialectometry and mutual intelligibility. Principally, the study was interested in the potential influences of three linguistic factors (mutual intelligibility, contact-induced diffusion of linguistic features, and borrowing from dominant languages) and four non-linguistic factors (between-speakers contact, geographical distance, population size, and attitude of the speakers). Statistical analyses performed on the aforementioned factors show that the linguistic determinants significantly contribute to language change in the Gurage area. Geographical distance, attitude of the speakers, and contact among the speakers are the major non-linguistic contributors. Population size has a marginal influence.

**Keywords:** Gurage varieties; language change; language contact; linguistic determinants

## 1 Introduction

Historically, Gurage varieties belong to the South Ethiosemitic branch. Although they are often considered "languages", most of them are mutually intelligible (Ahland 2003; Banksira 2000; Feleke et al. 2020; Gutt 1980; Menuta 2015). Gurage varieties are spoken in the southwest of Ethiopia. Several speculations are associated with the origin of the Gurage people and their languages. Oral history suggests that the Gurage people originated from the present day of Eritrea, from an area called *Akale Guzay* (Menuta 2015: 4; Meyer 2011: 1221). Some speculate that the Gurage speakers migrated from the eastern part of Ethiopia during the expansion of Ahmed Gragn (1524–1543). Hetzron (1972: 7) argues against these oral traditions but generally recognizes the north to east and then the east to south migration of the Gurage people. Some scholars of Semitic languages entirely rule out the

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migration hypotheses (Hudson 2000). So far, there is no consensus among Semitists regarding the origin of the Gurage people and the languages (Feleke 2020, 2021; Feleke et al. 2020; Menuta 2015; Meyer 2011).

Determining the genetic relationship among the Gurage varieties is an ongoing enterprise (Hetzron 1972: 119; Meyer 2011: 1221). There have been several classification attempts (e.g. Demeke 2001; Hetzron 1972, 1977; Leslau 1967, 1969), but the genealogical positions of some varieties are still debatable. The classification attempts often rely on a small number of grammatical, morphological, and phonological shared features since detailed descriptions of the varieties are unavailable (see Demeke 2001; Feleke 2020; Feleke et al. 2020; Hetzron 1977; Meyer 2011, 2018). A long history of contact between the Gurage varieties and other neighboring Afroasiatic languages further complicated the classification attempts (Goldenberg 1977: 462). From a sociolinguistic perspective, some speakers of the Gurage varieties do not consider themselves as Gurage; Silt'e is a good example. The Silt'e people are predominantly Muslim, and they are incline to associate themselves with non-Gurage Muslim communities such as Harari. The Pre-2000s political campaign to establish an independent Silt'e Zone was a manifestation of this perception of identity. The identity preference of the Silt'e people may not be associated with linguistic difference; it emerges from religious and political motives. The consensus among the Semitists is that, regardless of the sociolinguistic difference, Silt'e is historically related to the Gurage languages.

The Gurage area is extremely diverse (see Figure 1). A mystery behind this diversity has remained undisclosed. Hetzron (1977: 4) argues that "clannish separatism" in the past is the main cause of the surface differentiation among the Gurage varieties, but there are several other speculations too. For instance, the Gurage people were politically unorganized (Alemayehu 2011: 2; Menuta 2015: 8) due to external invasions, and wars between local lords and religious communities (Menuta 2015: 8). The Gurage community was also administratively organized with the speakers of non-Gurage languages (Menuta 2015: 9). This might have hindered the formation of a strong Gurage administrative unit. Recently, the Gurage people obtained an independent Gurage administrative zone. Nonetheless, re-organizing the diversified Gurage ethnic groups and standardizing the languages have sustained as challenges. The biggest challenge has been the disagreement among the Gurage ethnic groups and the political elites on the linguistic materials to be considered during the standardization process (Menuta 2015: 8; Meyer 2018: 5–8).

The mobile nature of the Gurage community has also its own share (Henry 2002; Menuta 2015). The current Gurage settlement is the outcome of several social waves. According to Menuta (2015: 12), the migration of the Gurage community was largely from east (Kistane) to west. This migration was motivated by internal (political, social, and economic situations) and external factors. Pressure from the speakers of

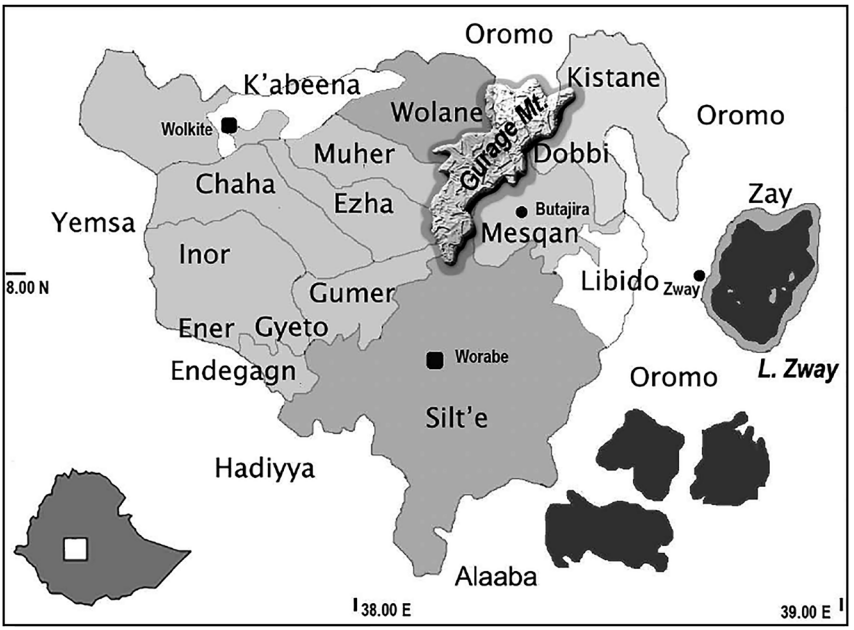


**Figure 1:** The Gurage area (Meyer 2014: 226).

neighboring languages is the main external factor. For instance, the movement of Kistane speakers from east to west (towards Mesqan, Muher, and Ezha areas) was the outcome of pressure from the speakers of Cushitic languages (Menuta 2015: 15). Frequent movement of the Gurage people from the Gurage area to other parts of Ethiopia has also a significant contribution to the current linguistic diversity in the Gurage area. Members of the Gurage community often migrate to the big cities outside the Gurage area and learn Amharic. Since Amharic has a high social status, they gradually import Amharic to the Gurage area in the form of code-switching.

Education has also a pivotal role in the expansion of Amharic throughout the Gurage area. For decades, Amharic has been used as the language of administration and medium of instruction in the Gurage area. Amharic has also become a dominant language because of two other reasons: national enforcement and forced settlement (Menuta 2015). As Amharic was the national language of the country, it was accessible to all nationalities throughout the country. Furthermore, since the early 1990s, various government employees whose language is Amharic have moved to the Gurage area. Dynamic social interaction among the Gurage tribes has also a significant contribution. Gurage tribes are interrelated through marriage and several social chains. Usually, marriages take place among couples that do not belong to the same kinship and clans. The most preferred marriage is between distant ethnic

groups within Gurage. The marriage circumstances are also dependent on several other factors. The Muslim Gurage community, for example, may prefer marriage within a clan (Zewde 2002). Monogamy is a widespread practice, but polygamy is also practiced among Muslim Gurage communities such as Mesqan and Silt'e (Menuta 2015: 12). According to Henry (2002: 6), during intermarriage and migration, men maintain their original clan affiliation. Moreover, there are several ways of social organization such as *Iqub* ('tradition saving system') which may enhance interaction among various Gurage tribes (Menuta 2015: 10; Rose 2007: 2).

Shack (1966) and Zewde (2002) also discuss different forms of traditional legal systems. According to Zewde (2002: 20–21), there are traditional systems of administration in Gurage which manifest themselves in three levels of authority: village, clan, and region. These legal systems declare different sets of laws that are practiced at various levels. Henry (2002: 6) argues that Gurage communities did not have a centralized political leadership; instead, they had a segmented political system with authorities vested in clan heads and elders. Frequent contact among the speakers of the Gurage varieties can be another factor. A survey conducted by Menuta (2015) shows that marketplace is one of the places where the Gurage communities interact.

In general, language variation in the Gurage area is the consequence of interaction among multiple factors. The present study explores some of the factors, with a particular interest in selected linguistic and non-linguistic factors. It targets only selected Gurage varieties: Chaha, Gura, Gumer, Ezha, Endegagn, Inor, Kistane, Mesqan, Muher, and Silt'e. The study aims to address three specific objectives related to linguistic factors: (a) examines the role of within-language intelligibility, (b) explores the roles of phonetic and lexical diffusion, and (c) determines the influence of Amharic and Oromo. Amharic is a Semitic language while Oromo is a Lowland East Cushitic language. Semantic Word Categorization and self-rating perception tests were used to measure the degree of intelligibility. Neighbor-net structural analysis and lexicostatistical skewing were used to determine the degree of phonetic and lexical diffusion among the Gurage varieties. The influence of Amharic and Oromo was estimated by computing the percentages of phonetic and lexical features that are shared among Oromo, Amharic, and the Gurage varieties. The study also aims at addressing three specific objectives related to the non-linguistic factors: (a) explores the frequency of contact among the speakers, (b) investigates the influence of geographical distance and population size, and (c) examines the influence of the attitude of the speakers. A background questionnaire was used to determine the degree of contact among the speakers. The influence of geographical distance and population size was estimated based on Trudgill's (1974) Gravity model. Self-rating perception test was employed to determine the influence of attitude of the speakers.

The main contents of this article are organized as follows. Following this brief introduction, Section 2 discusses the theoretical and methodological foundations of the study. Section 3 explains methods used to address the objectives. Section 4 reports the results of the study. Section 5 presents the conclusion and final remarks.

## 2 Theoretical and methodological foundations

The present study combined computational and experimental approaches. It benefited from the notions of language contact such as the Gravity model (Labov 2001; Trudgill 1974), the Dynamic model (Schneider 2003), and the Dialect Formation model (Trudgill 2004). These models assume that language change is the outcome of interactions between languages and other variables. In the Gravity model (Labov 2001; Trudgill 1974), diffusion of linguistic features is assumed to be hierarchical; the features diffuse from cities (centers) to the low populated areas. It further assumes that the diffusion of linguistic features is not always continuous; remote big centers can be affected before small intermediate areas. Hence, the diffusion of linguistic features is determined not only by territorial proximity, but also by various non-linguistic factors. The Dynamic model assumes that language change is a gradual multi-step process. It is determined by non-linguistic factors such as geographical proximity, ethnicity, social integration, and other demographic factors (see Britain 2018; Nerbonne and Heeringa 2001; Spruit 2006; Tang and van Heuven 2009). The Dialect Formation model puts more emphasis on the dynamics within the language. The present study also borrowed some assumptions in dialectometry (see Goebl 1982, 2011; Heeringa 2004; Nerbonne and Kretzschmar 2003; Seguy 1973) to determine the linguistic distance among the Gurage varieties. Dialectometry aggregates linguistic data to quantify distance among related languages. The fundamental motivation of dialectometry lies in its potential to condense a large amount of data, by deploying advanced statistical models.

The methodological orientation of the present study is dictated by these theoretical assumptions. Levenshtein algorithm was used to quantify the distance among the Gurage varieties. Neighbor-net structure analysis and lexicostatistical skewing were used to explore the degree of diffusion of linguistic features. In Neighbor-net algorithm, if the input linguistic distances reflect a horizontal relationship, the algorithm produces a net-like structure. If the input distances are additive, it gives a binary tree (Prokic and Nerbonne 2013: 152). This property is used to determine whether the similarity among the languages is due to contact. Neighbor-net representation of the lexical distance can be computed using Splits Tree. Lexicostatistical skewing predicts the proportion of borrowed features

(Hinnebusch 1996). Skewing is the difference that is observed between the similarity of one language with respect to two other languages.

Lexicostatistical skewing assumes that languages which group together will tend to have a numerical symmetry with other related languages in the comparison set if indeed the grouped languages form genetic group (Wang and Minett 2005: 128). In other words, languages within a subfamily are likely to exhibit little skewing with respect to languages of another subfamily. However, if skewing is observed between sister languages, language contact is one possible cause. Figure 2 illustrates the notion of lexicostatistical skewing proposed by Hinnebusch (1996). In Figure 2, A, B, C are sister languages while D, E, F are also sister languages in the sister subfamily. Two sister languages, for example language A and language B must have a symmetrical relationship with any of the language in other subfamily, for instance language D. Therefore, given two sister languages $L_A$, $L_B$ and a third language from another subfamily $L_D$ and given the similarity (S) among each of these languages, the lexicostatistical skewing between $L_A$ and $L_B$ with respect to $L_D$ can be denoted as: $S_{AD} - S_{BD}$.

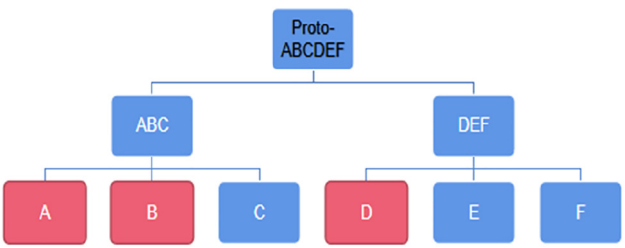


**Figure 2:** An illustration of lexicostatistical skewing.

If a contact occurs between, for example, recipient language $L_A$ and donor language $L_D$, $L_A$ will tend to be more similar to $L_D$ than $L_B$, resulting in a positive skewing between $L_A$ and $L_B$ with respect to $L_D$. This tendency of contact to have positive skewing forms the base for the skewing method (Wang and Minett 2005: 127). Wang and Minett (2005: 128) defined aggregate skewing of language $L_A$ with respect to another language $L_D$ as the average skewing between $L_A$ and each of its siblings ($L_B$ and $L_C$) with respect to $L_D$. The interpretation of the positive aggregate skewing of $L_A$ with respect to $L_D$ is that $L_A$ has more contact with $L_D$ than its siblings ($L_B$ and $L_C$) do. Negative skewing can have the opposite interpretation. It could mean that, compared to $L_B$ and $L_C$, $L_A$ has less contact with $L_D$. Wang and Minett (2005: 131–135) examined the distribution of aggregate skewing in *no contact* and *contact* conditions using Monte-Carlo simulation and concluded that, for 5%

probability of false alarm, language contact can be inferred whenever the aggregate skewing exceeds the threshold value of 3.7%.

The influence of Amharic and Oromo was determined by computing the lexical and phonetic similarities between the two languages and the Gurage varieties. There were theoretical and practical justifications for examining the influence of the two languages. First, the Gurage area is encircled by Oromo speakers; hence, due to the geographical proximity, Oromo has the potential to influence the Gurage varieties. Amharic has been the most influential language in the Gurage area. Hence, it is likely that these two languages influence changes in the Gurage languages. The non-linguistic factors were examined in light of the assumption of the Dynamic model that contacts among the speakers is an influential factor contributing to language change. The influence of geographical distance and population size was viewed in terms of Trudgill's (1974) Gravity model. In the Gravity model, population size is one of driving forces behind the spread of linguistic innovation (Nerbonne et al. 2005: 2). The model predicts that as geographical distance increases the degree of contact declines quadratically. In the Gravity model, the relationships between geographical distance, population size, and language similarity are formulated as: $I_{ij} = s{\cdot}((P_iP_j)/(d_{ij})^2)$.[1]

The investigation of the speakers' attitudes was motivated by the Dynamic model and other several recent studies. For instance, Abu-Rabia (1996, 1998), Feleke (2017), Golubović and Sokolić (2013), Pavlenko (2006), Schüppert and Gooskens (2011), Schüppert et al. (2015), Van Bezooijen and Gooskens (2007) and Wolyie (2008) emphasize the role attitude plays in language change.

# 3 Materials and methods

## 3.1 Determining linguistic distance

The linguistic distances were measured from two perspectives: lexical and phonetic. Words for the linguistic distance measure were collected from various sources: a list of words gathered for the Word Categorization test, a fable entitled "The North wind and the Sun" and other published materials. A total of 240 words were compared to determine the two distances. The list of words was presented to research assistants from each language area, and they were asked to provide

1 $I_{ij}$ = the influence of center $i$ on center $j$; $P_i$ = the population size of center $i$; $P_j$ = the population size of center $j$; $d$ = the geographical distance between center $i$ and $j$; $s$ = index of linguistic similarity or constant needed to allow the change.

equivalents of their native language. The provided equivalents were phonetically transcribed. Cases of translation disagreements were resolved by majority rule (2/3).

### 3.1.1 Phonetic distance

Following Kessler (1995), the phonetic distance was computed only between cognates. In the present study, cognates are equivalent to the lexical items that are shared between languages. They were identified based on form similarity, combined with intuitive judgment. In all Semitic languages, sequence of consonants forms the basic word meaning. Therefore, the similarity of the consonantal roots was taken as a core parameter. False friends were excluded using semantic parameters, based on the meaning provided by the native speakers. Cognates that are shared at least by six of the ten language varieties were considered for phonetic distance measure. In this way, more than 85% of the wordlists were included in the analysis. The cognates were aligned, and the between-cognate distance was computed using the Levenshtein algorithm, based on the number of phones that were inserted, deleted, or substituted. The distance computation was made using the simplest cost assignment; equal cost (1 unit) was assigned to all operations. The Levenshtein distance was computed using Gabmap (see Heeringa 2004; Nerbonne et al. 2011). Table 1 presents an example of Levenshtein distance between Gura and Endegagn based on a cognate verb *add*. The Levenshtein distance is 3; addition of [a], substitution of [ə] by [p] and omission of [m]. This distance value was divided by the longest alignment (7 in this case), to obtain the normalized distance which is 0.43 (3/7).

**Table 1:** Phonetic distance, using Levenshtein Algorithm.

| Gura – Endegagn "add" | | | | | | | |
|---|---|---|---|---|---|---|---|
| d | | ə | p | ə | r | ə | m |
| d | a | p | p | ə | r | ə | |
| | 1 | 1 | | | | | 1 |
| Absolute | | | | | | 3 | |
| Relative | | | | | | 0.43 | |

### 3.1.2 Lexical distance

The lexical distance among the selected Gurage varieties was determined by computing the percentage of non-cognates in the total lexical items. Non-cognates are words that share meaning but have different forms.

## 3.2 Measure of mutual intelligibility

### 3.2.1 The participants

The participants were recruited by the research assistants; secondary school teachers who were selected from ten schools in nine districts in the Gurage and Silt'e areas. Thirty participants (secondary school students) were recruited from each school, 300 in total. They were selected in a two-step screening process. First, several native speakers of the local variety were requested to complete a registration form. Once the proper native speakers were identified, they were submitted to the second screening phase. Questionnaires were employed during this phase. The questionnaires contained items regarding the participants' language background, personal information, and their contact with speakers of neighboring language varieties. The questionnaires were coded for each school and for each study area so that they could be easily identified during the analysis. Then, based on the information obtained through the questionnaires, 300 participants (30 from each variety), who were native speakers of the varieties of interest, were selected. Furthermore, it was assured that the participants had lived their whole life in the area where their variety is spoken and that their parents are native speakers of the variety. Since the Word Categorization and perception tests were administered at separate times, in some language sites, the number of participants that completed the Word Categorization test and the perception test was not exactly the same. In sum, 285 participants completed the Word Categorization test. Among these, 171 were male and 114 were female. Moreover, 289 participants took part in the perception test: 171 male and 118 female.

### 3.2.2 Degree of intelligibility

The Word Categorization test was adapted from Tang and van Heuven (2009) to measure the degree of intelligibility among the languages.

**Materials:** Before the test, ten semantic categories were identified (see Appendix B1). Word-frequency was computed for each word in the semantic categories. The Gurage varieties under investigation do not have a structured corpus. They do not also have online oral and written documents. Hence, as the only language in the area with easily available language data is Amharic, an Amharic language corpus containing about 100,000 written words was created using AntConc software (Anthony 2005). This corpus was used to estimate the frequency of the lexical items. Based on the corpus, words with relatively high frequency were selected. Finally, ten semantic categories, each containing ten most frequent words, were identified (see Appendix B2). Then, words under each semantic category

were translated from Amharic to the ten varieties. After the translation, each translator pronounced the translated words, 100 words for each variety, for sound recording with Adobe Audition running on a personal computer. Then, the translators of each variety were asked to rate their recordings of the 100 words on a Likert scale that ranged from 0 (not natural) to 5 (natural). Finally, the recording with the highest rating score was selected for the intelligibility test.

**Procedure:** In the test, the degree of intelligibility was tested through semantic multiple-choice categorization. The participants indicated to which of the ten given semantic categories a spoken word belongs to. For instance, the participants heard *banana* and were asked to categorize the word under one of the ten semantic categories (*fruits* in this case). As there were ten semantic categories for each word, the probability of categorizing the words by chance was small (10%). During the test preparation, the primary concern was preparing audio input so that the participants 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 controlled for. Following Tang and van Heuven (2009), the Latin Square system was used for this purpose.

In total, there were ten semantic categories, each semantic category consisted of ten lexical items, a total of 100 (10*10) words. Based on these words, 10 CDs were created. On the first CD, the selected list of 100 words was presented in a fixed random order (1–100) in such a way that every subsequent word is spoken in a different variety. This was 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. l to no. 99 were spoken. Due to this rotation, every word in CD2 was spoken in a different variety as compared to CD l. The third CD began with the variety in which no. 99 was spoken followed by the variety in which no. 100 was spoken, followed by varieties in which no. 1 to no. 98 were spoken. Through this rotation, ten CDs were created, each CD containing l00 words in ten semantic categories.

One CD was administered to participants from a language area. 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. These procedures meant that: (1) each listener experienced each word only once, (2) a listener from every language area heard each word in ten different varieties, and (3) every member of a group heard one-tenth (1/10) of the total lexical items. There was 10 s response time after each item. Before the test, 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 the test. For each track of the CDs, there was an answer sheet containing the list of ten semantic categories. 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. After listening to the orally presented words, the participants responded by selecting the appropriate match from lists of categories provided on the answer sheet. The test was administered in quiet classrooms. The intelligibility measure was the percentage of words correctly matched with the semantic categories provided.

### 3.2.3 Perceptual similarity and speakers' attitude

**The materials:** The fable "The North Wind and the Sun" was used as an input to determine the perceived intelligibility, perceived similarity, and attitude of the speakers towards each other's variety. The fable was chosen because of three reasons: (1) it contains simple words that are culture-neutral, (2) it has been consistently used in previous studies, and (3) it is not familiar to the study subjects. As to the procedures, first, the fable was translated from English to each of the local varieties. After the translation, the translated version of each variety was orally presented by each of the assistants. The presentation of each assistant was recorded using Adobe Audition running on a personal computer. Then, three assistants listened to each recording and rated the readings on a Likert scale that ranged from l (not natural) to 5 (natural). Finally, among the readings, the one which received the highest rating score was selected for the test.

**The tests and test procedures:** The three types of tests: perceived intelligibility, perceived similarity, and the attitude of the speakers were mixed and administered at the same time. Each test was represented by one item with its own rating scales. This means that the mixed 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 with the test material; the participants 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 with the test, the test items were arranged in three different orders; order A: (1) attitude test item, (2) perceived intelligibility test item, and (3) perceived similarity test item; order B: (1) perceived intelligibility test item, (2) perceived similarity test item, and (3) attitude test item; and order C: (l) perceived similarity test item, (2) attitude test item, and (3) perceived intelligibility test item. Due to these arrangements, each test item appeared in three different orders. Before the test administration, the 30 participants of each variety were randomly divided into three groups, each group containing ten

members. Then, the tests were administered in such a way that members of the same group received tests in the same order: the first group received order A, the second group order B, and the third group order C. The audio inputs were presented using a loudspeaker so that it would be possible to follow each response.

During the test, the participants listened to the recording of each variety and responded to the three successive questions. They responded by putting an 'X' on the Likert scale provided for each question. To measure the perceived intelligibility, the participants were asked to determine to what extent they understood the speaker in the recordings. After listening to each of the recordings, the participants indicated their judgment on the Likert scales that ranged from 0 ('do not understand at all') to 10 ('completely understand'). For perceived similarity, the participants were asked to determine to what extent each of the presented recordings was similar to their own variety and to express their judgment using 11-point Likert scales that ranged from 0 ('not similar') to 10 ('completely similar'). Regarding the language attitude, the participants were instructed to determine whether the language in which the story was presented was *beautiful* or *not*, and to provide their responses on 11-point Likert scales that ranged 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. 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 a response time of 3 min, 1 min for each test item. For the sake of uniformity, the instruction was given in Amharic, either by the investigator or by one of the research assistants. In cases of misunderstanding, further explanation was provided in the participants' native language. The recordings were presented on a personal computer attached to a loudspeaker. After listening to each recording, the participants provided their responses by marking 'X' on the scale provided. For each recording, there was a separate answer sheet. In other words, each participant received ten pages of response sheets, one page for each recording. The participants took part in the perception tests after they had taken part in the intelligibility test.

## 3.3 Determining linguistic determinants

The degree of diffusion of lexical features was determined using the Neighbor-net algorithm. Lexicostatistical skewing was used to estimate the proportion of phonetic and lexical items borrowed by the Gurage varieties. The Neighbor-net algorithm provides different types of classifications based on the nature of the distance matrix. If the distance matrix shows certain degree of contact, it produces a collection of circular splits. Otherwise, it returns tree-tree like structure. The lexicostatistical

skewing was used to examine to what extent the variation in the Gurage languages is influenced by intrusion of the phonetic and lexical features of the neighboring languages. Positive skewing was considered as a predictor of borrowing. The influence of Amharic and Oromo on the selected Gurage languages was determined by computing the percentage of shared phonetic and lexical features between the two languages and the Gurage varieties.

Contact among the Gurage speakers was determined based on data obtained from the background questionnaire (see Appendix A). The participants were asked four questions that are related to between-speaker contact: (1) what other languages do they speak other than their native language (Part II, Q2), (2) which languages do their parents speak (Part II, Q3), (3) what languages are frequently spoken by their close friends (Part II, Q4), and (4) what languages are spoken in most of the schools they attended (Part II, Q7). The attitude test was discussed in Section 3.2.3. The population size of each language area was obtained from EPCC (2007). EPCC (2007) does not directly provide the number of native Gurage speakers, but it provides the number of residents in each district. Since the division of the districts was based on the ethnic background of the residents, the number of residents of the ethnically defined districts (e.g. Ezha Wereda, population 84,905) was taken as the number of speakers of the varieties. The population of Gura was not reported in EPCC (2007). Hence, Gura was not included in the analysis. Traveling distance (the length of the main road which public buses use) and traveling time (time that the public buses take to connect the language areas) between each of the language sites were taken as measures of geographical distance. Both traveling distance and traveling time were obtained from the Google map. The traveling distance was opted since the direct geographical distance among the study sites does not reflect the actual communication of the speakers (see Gooskens 2005; Nerbonne et al. 2005). Phonetic similarity (Appendix C2) and lexical similarity (Appendix C3) were taken as measures of similarity indexes.

# 4 Results

Various distance matrices were obtained from the linguistic distances (phonetic and lexical), mutual intelligibility, and perceptual measures. For the sake of space, the matrices of these measures are presented in Appendices Cl–C4. The classifications obtained from the phonetic and lexical measures are presented below (see Figure 3). The remaining results are presented in the next two sections. Section 4.1 presents the results of the linguistic determinants. Section 4.2 presents the results of the non-linguistic factors.

Figure 4 presents the combined classification. In the classification, Kistane and Silt'e are separate languages. Inor forms a group with Endegagn. Gura, Gumer, Ezha, and Chaha also form a group. Mesqan is associated with Muher (see Feleke 2020 for a detailed discussion).

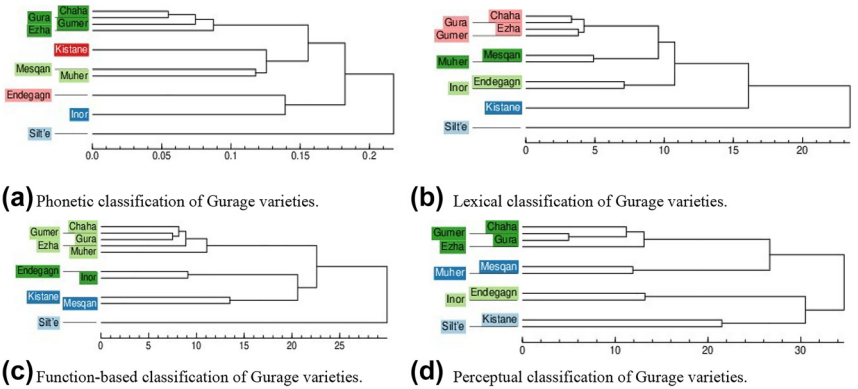


**Figure 3:** Classifications based on linguistic, functional (intelligibility), and perceptual similarity.

## 4.1 Linguistic determinants

Table 2 illustrates the correlation coefficients of the two linguistic distances (phonetic and lexical), degree of intelligibility, and perceptual similarity. There is a strong correlation between the two linguistic distances. Furthermore, there is a strong correlation between the two linguistic distances and perceptual similarity. Compared to other correlation coefficients, the correlation between the degree of intelligibility and perceptual similarity is small. This suggests that the participants' judgment of similarity and their actual score on the intelligibility test are not the same. In general, there are strong correlations among the measures compared in Table 2. Hence, in Table 3, these correlation coefficients are compared to each other.

Fisher's $r$ to $z$ transformation was employed to compare the correlation coefficients among the linguistic distance, degree of intelligibility, and perceptual similarity. As Table 3 illustrates, there is no statistically significant difference among the correlation coefficients.

The result of the Neighbor-net analysis is illustrated in Figure 5. The figure shows three broad groups of languages: one group consisting of {Gura, Chaha, Ezha, and Gurner}, the second group consisting of {Muher, Mesqan, Silt'e, and Kistane} and the third of {Edegagn and Inor}. The net-like structure of the Neighbor-net presentation indicates the potential influence of lexical diffusion on the distance among the

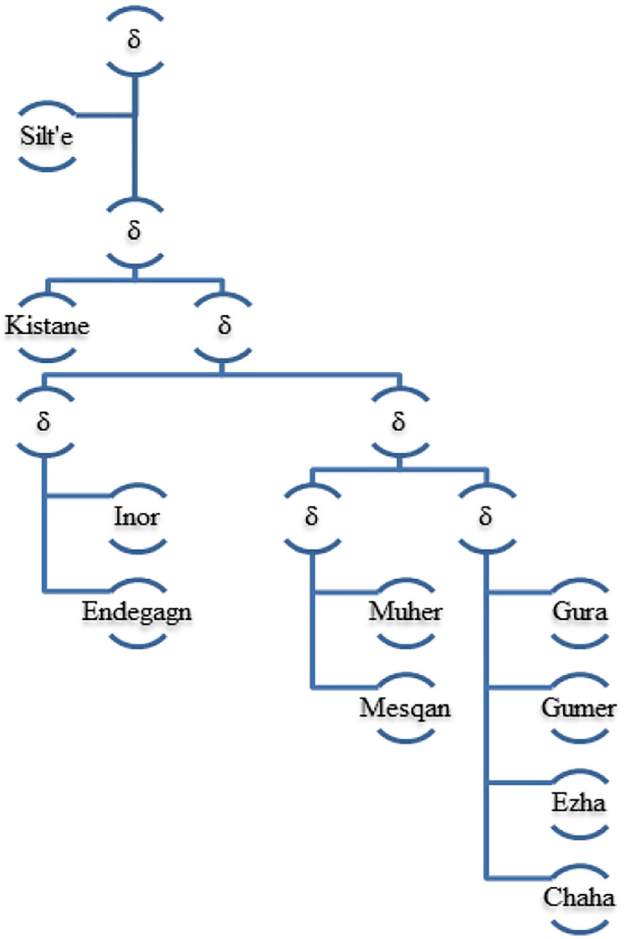


**Figure 4:** The combined classification of Gurage varieties.

**Table 2:** Correlation coefficients: linguistic, intelligibility, and perceptual similarity.

| | | Phonetic | Lexical | Intelligibility[a] | Perceptual |
|---|---|---|---|---|---|
| Linguistic | Phonetic | | 0.874 | −0.804 | −0.853 |
| | Lexical | | | −0.849 | −0.777 |
| | Intelligibility | | | | 0.747 |

[a]The upper and lower halves of the matrix were averaged for both intelligibility and perceptual similarity matrices. The participants' intelligibility and perception test scores on their own native languages were excluded. The negative correlation coefficients indicate that as the linguistic distance (phonetic and lexical) increases, the degree of intelligibility and perceptual similarity decreases. The positive correlation between the perceptual similarity and degree of intelligibility indicates that the more the speakers believe that the varieties similar, the better they perform on the intelligibility task.

**Table 3:** Comparison of correlation coefficients.

| Compared coefficients | *z*-values | *p* values |
|---|---|---|
| $r_{PcpS}$ $r_{pD}$ versus $r_{PcpS}r_{LD}$ | 1.051 | 0.293 |
| $r_{DI}r_{pD}$ versus $r_{M1}r_{LD}$ | −0.654 | 0.513 |

PcpS, perceptual similarity; LD, Lexical distance; DI = Degree of intelligibility; PD, Phonetic distance.

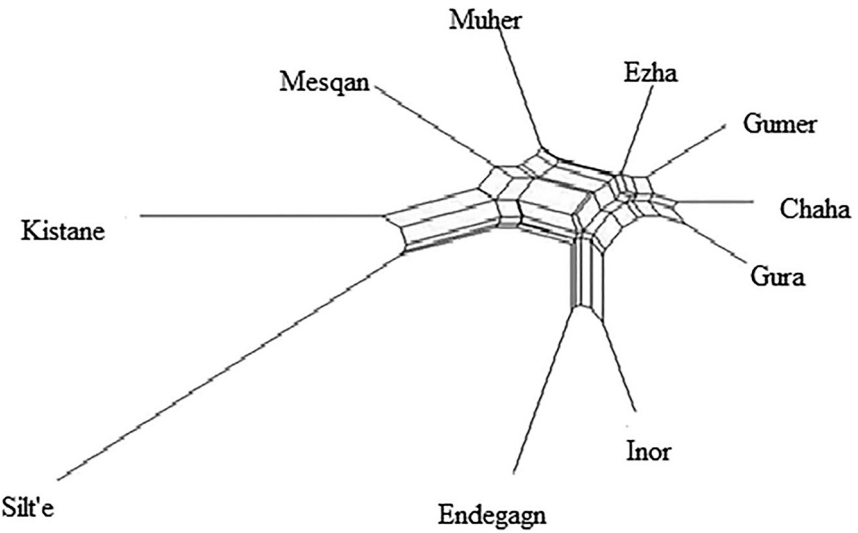


**Figure 5:** Neighbor-net dialects, Network-like structure, based on lexical differences Silte refers to Silt'e.

Gurage languages. This diffusion could be the result of geographical proximity. The classical example is the affinity between Kistane and Silt'e. As the two languages are genealogically only remotely related (see Hetzron 1972), the observed close similarity must be due to area diffusion.

Lexicostatistical skewing was applied to the combined classification (see Figure 4) to determine the potential influence of borrowing. Figure 4 shows five groups of languages: Central West Gurage – {Chaha, Gura, Gurner, Ezha}, {Muher and Mesqan}, Peripheral West Gurage – {Endegagn, Inor}, {Silt'e} and {Kistane}. Only the first three groups were examined. Silt'e and Kistane were excluded since they are different from other Gurage varieties. Tables 4 and 5 present the percentage of phonetic skewing among the Central West, Peripheral West and Mesqan–Muher. The skewed phonetic features were estimated based on the phonetic similarity index (see Appendix C2). The phonetic similarity index was obtained by subtracting the

**Table 4:** Aggregate phonetic skewing of Central West Gurage languages (CWG) with respect to Peripheral West Gurage (PWG) and Mesqan–Muher.

| ∫ CWG & Mesqan–Muher / Central West | PWG | | Mesqan–Muher | |
|---|---|---|---|---|
| | Endegagn | Inor | Mesqan | Muher |
| Chaha | 0.3 | 1.7 | 1.3 | 0.7 |
| Ezha | −1.0 | −2.3 | 0.0 | 1.7 |
| Gumer | 0.3 | −1.0 | −1.3 | −1.0 |
| Gura | 0.3 | 1.7 | 0.0 | −1.0 |

**Table 5:** Aggregate phonetic skewing from Peripheral West and Mesqan–Muher with respect to other varieties.

| ∫ CWG & Mesqan–Muher / Peripheral West | CWG | | | | Mesqan–Muher | |
|---|---|---|---|---|---|---|
| | CH | EZ | GM | GU | MS | MU |
| Endegagn | −6.0 | −4.0 | −4.0 | −6.0 | −3.0 | −2.0 |
| Inor | 6.0 | 4.0 | 4.0 | 6.0 | 3.0 | 2.0 |
| | CWG | | | | PWG | |
| ∫ CWG & Mesqan–Muher / Mesqan–Muher | CH | EZ | GM | GU | EN | IN |
| Mesqan | 3.0 | 1.0 | 2.0 | 3.0 | 1.0 | 2.0 |
| Muher | −3.0 | −1.0 | −2.0 | −3.0 | −1.0 | −2.0 |

(1) EN, Endegagn; IN, Inor; EZ, Ezha; GM, Gumer; GU, Gura; MS, Mesqan; MU, Muher; CH, Chaha. (2) The results are in percentage.

phonetic distance from 100 ($s_{\text{index}}$ = 100 – phonetic distance). Table 4 presents the aggregate phonetic skewing of the Central West Gurage with respect to the Peripheral West and Mesqan–Muher.

Table 4 shows a small percentage of phonetic skewing (1.7%) between Inor and Chaha, Gura and Inor, and Ezha and Muher. The percentage of borrowed phonetic features among the remaining language varieties is even extremely small. Some skewing results are negative. For instance, the negative skewing between Ezha and Inor (–2.3%) shows that Ezha might have been influenced by neighboring languages that may not have a similar influence on other sister Central West Gurage languages. In general, Table 4 shows that the Central West Gurage languages borrowed only a small percentage of phonetic features from Mesqan–Muher and Peripheral West Gurage languages.

The first half of Table 5 shows the aggregate phonetic skewing of Peripheral West Gurage with respect to the Central West Gurage and Mesqan–Muher. The

table shows a high percentage of skewed phonetic features between Inor and Chaha (6%), Inor and Ezha (4%), Inor and Gurner (4%), and Inor and Gura (6%). In general, there is a high percentage of skewed phonetic features between Inor and the Central West Gurage languages. The relationship between Endegagn and the Central West Gurage languages is quite the opposite. There is a negative skewing between Endegagn and Chaha (–6%), Endegagn and Ezha (–4%), Endegagn and Gurner (–4%), and Endegagn and Gura (–6%). The negative skewing between Endegagn and Central West languages could be due to the influence of the neighboring non-Semitic languages on Endegagn. The second half of Table 5 presents aggregate phonetic skewing of the Mesqan–Muher with respect to the Central West and Peripheral West Gurage languages. The table shows positive skewing between Mesqan and Chaha (3%) and Mesqan and Gura (3%). Contrary to Mesqan, there is a negative skewing between Muher and Chaha (–3%), Muher and Gura (3%). However, the percentage of skewed phonetic features is insignificant in both positive and negative skewing cases.

The percentage of skewed lexical items was also estimated using the lexicostatistical skewing. Tables 6 and 7 present the results of this estimation. Table 6 presents the aggregate lexical skewing of the Central West Gurage languages with respect to the Peripheral West and Mesqan–Muher. The table shows a significant negative lexical skewing between Gura and Muher (–4.0%) and Gumer and Muher (–3.7%). The lexical skewing among other languages is insignificant. The table also shows other insignificant negative skewing results.

The first part of Table 7 presents aggregate lexical skewing of the Peripheral West Gurage languages with respect to the Central West and Mesqan–Muher. The table shows a significantly high percentage of phonetic skewing between Inor and Chaha (4%), Inor and Gurner (7%), Inor and Gura (7%) and Inor and Muher (5%). Contrary to this, there is a significantly high negative skewing between Endegagn and Chaha (–4%), Endegagn and Gurner (–7%), Endegagn and Gura (7%), and

**Table 6:** Aggregate lexical skewing of Central West Gurage with respect to Peripheral West Gurage and Mesqan–Muher.

| ∫ CWG & Mesqan–Muher / Peripheral West | PWG | | Mesqan–Muher | |
|---|---|---|---|---|
| | **Endegagn** | **Inor** | **Mesqan** | **Muher** |
| Chaha | 0.3 | –1.0 | –1.7 | 0.3 |
| Ezha | 1.7 | –2.0 | 1.7 | 1.7 |
| Gumer | –1.0 | 0.3 | –1.7 | –3.7 |
| Gura | –1.0 | 2.0 | –2.0 | –4.0 |

**Table 7:** Aggregate lexical skewing from Peripheral West and Mesqan–Muher with respect to other varieties.

| CWG & Mesqan–Muher / Peripheral West | CWG | | | | Mesqan–Muher | |
|---|---|---|---|---|---|---|
| | CH | EZ | GM | GU | MS | MU |
| Endegagn | −4.0 | −2.0 | −7.0 | −7.0 | −3.0 | −5.0 |
| Inor | 4.0 | 2.0 | 7.0 | 7.0 | 3.0 | 5.0 |
| **CWG & PWG / Meqan–Muher** | **CWG** | | | | **PWG** | |
| | **CH** | **EZ** | **GM** | **GU** | **EN** | **IN** |
| Mesqan | 3.0 | −2.0 | −1.0 | 0.0 | 3.0 | 0.0 |
| Muher | −3.0 | 2.0 | 1.0 | 0.0 | −3.0 | 0.0 |

(1) EN, Endegagn; IN, Inor; EZ, Ezha; GM, Gumer; GU, Gura; MS, Mesqan; MU, Muher; CH, Chaha. (2) The results are in percentage.

Endegagn and Muher (−5%). In general, the results show that Inor has strong contact with the Central West Gurage languages, contrary to Endegagn. It has also some degree of contact with Mesqan–Muher. The negative lexical skewing between Endegagn and the Central West, and Mesqan–Muher languages shows that Endegagn might have been influenced by other neighboring languages, compared to Inor.

The second half of Table 7 presents the aggregate lexical skewing of Mesqan–Muher with respect to the Central West and the Peripheral West Gurage languages. Both Mesqan and Muher have a marginal contact with the Central West and Peripheral West Gurage languages. In general, the lexicostatistical skewing results indicate a strong tendency of borrowing between Inor and Mesqan–Muher.

The degree of phonetic and lexical similarity between Amharic, Oromo and ten Gurage varieties was computed to determine the extent of the influence of Amharic and Oromo. Figure 6a shows the percentages of phonetic features that are shared between Amharic, Oromo, and the Gurage varieties. The figure shows more than 60% phonetic similarity between Amharic and the Gurage varieties. Relatively, Kistane, Mesqan, and Muher have a large phonetic similarity with Amharic. Given that Amharic is also a Semitic language, this high degree of similarity is not a surprise. Oromo shares about 50% phonetic similarity with almost all the Gurage varieties. There is no difference among the Gurage varieties in terms of the degree of their phonetic similarity with Oromo. This uniformity can be due to two reasons. First, in the Gurage area, there are several Cushitic languages such as Libido and Alabaa which could influence Gurage varieties. Second, this uniformity may indicate the influence of Afroasiatic in general, not just the influence of Oromo.

Figure 6b shows the percentage of shared lexical items between the two dominant languages and the Gurage varieties. The figure shows that many Gurage

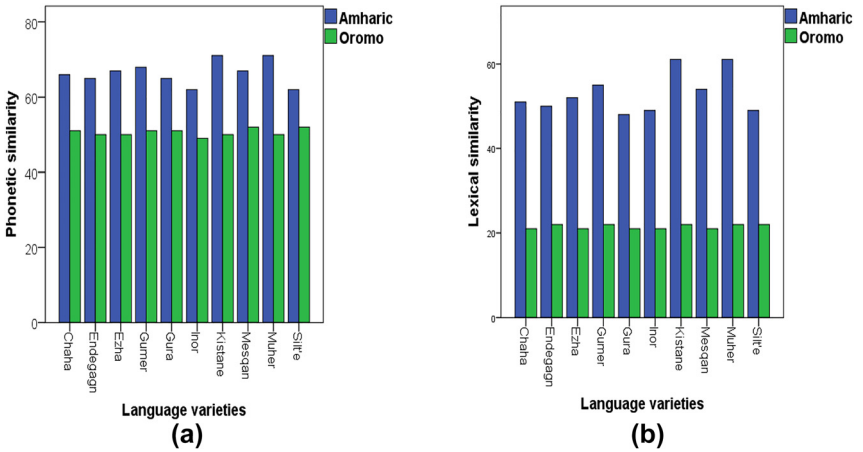


**Figure 6:** Shared phonetic and lexical features between two dominant languages and Gurage varieties. (a) Percentage of shared phonetic similarity between Gurage varieties and the dominant languages. (b) Percentage of shared lexical similarity between Gurage varieties and the dominant languages.

varieties share more than 50% of the lexical items with Amharic. Comparatively, there is a high lexical similarity between Amharic and Kistane, Muher, and Mesqan. The superior lexical similarity between Amharic and the Gurage varieties could be due to the genealogical relationship and the contact between Amharic and the Gurage varieties. Furthermore, each Gurage variety shares at least 20% lexical items with Oromo. Compared to other Gurage varieties, Silt'e shares slightly higher number of lexical items with Oromo. This lexical similarity can be due to the long history of contact between the Gurage varieties and Oromo. Both the phonetic and lexical evidence indicate that, compared to other Gurage varieties, Muher, Mesqan, and Kistane have a strong similarity with Amharic.

The results presented in Figure 6 do not explain whether the similarity between the two dominant languages (Amharic and Oromo) and the Gurage varieties is due to borrowing. Hence, to rule out the possibility of borrowing, further analyses were performed on the phonetic and lexical skewing between each of the Gurage varieties with respect to Oromo and Amharic. For the sake of convenience, the Gurage varieties were divided into three groups based on the degree of phonetic and lexical similarity: *similar* (if the varieties share 80% or more phonetic/lexical similarity), *partially similar* (if they share 70%–80% phonetic/lexical similarity) and *not similar* (if they share less than 70% phonetic/lexical similarity). Then, the impact of phonetic and lexical skewing on the similarity among the Gurage varieties was predicted using Multiple Linear Regression. In the analysis, the phonetic and lexical skewing from the two dominant languages (Amharic and Oromo) were considered as

independent variables. Since there were two dependent variables (phonetic similarity and lexical similarity), the regression analysis was performed twice, once for each dependent variable.

First, the regression model was fitted with two independent variables (phonetic skewing from Amharic and phonetic skewing from Oromo) and with one dependent variable (phonetic similarity). The analysis performed on these variables showed a statistically significant influence of phonetic skewing from Oromo ($\beta$ = –3.479, $t$ = –3.944, $p$ < 0.001). However, there was no significant influence of the phonetic skewing from Amharic ($\beta$ = –0.167, $t$ = 0.490, $p$ = 0.627). In the second analysis, the model was fitted with two independent variables (lexical skewing from Amharic and lexical skewing from Oromo) and with one dependent variable (lexical similarity). The analysis performed on these factors showed a significant influence of lexical skewing from Oromo ($\beta$ = –2.655, $t$ = –6.574, $p$ < 0.001), and a marginally significant influence of lexical skewing from Amharic ($\beta$ = –0.466, $t$ = –1.784, $p$ = 0.084). The regression analyses confirm a possibility of diffusion of lexical features from Oromo and Amharic to the Gurage varieties. Figure 7a shows that as the lexical skewing between Amharic and the Gurage varieties decreases, the lexical similarity among the languages increases. It also illustrates that there is a marginal diffusion of phonetic features from Amharic to the Gurage varieties.

Figure 7b shows the link between the degree of skewing from Oromo and the similarity among the Gurage varieties. The figure shows that as the lexical skewing between Oromo and the Gurage varieties decreases, the lexical similarity among the languages increases. Likewise, as the phonetic skewing between Oromo and

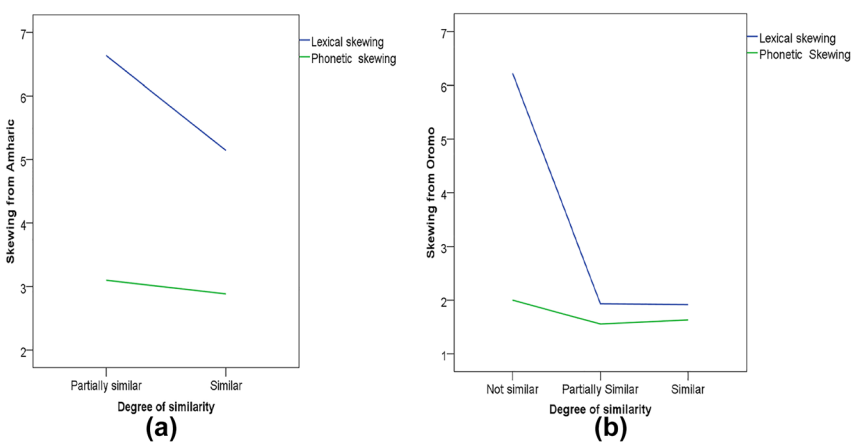


**Figure 7:** Relationship between degree of skewing, and phonetic and lexical similarity.
(a) Relation between skewing from Amharic and degree of similarity.
(b) Relation between skewing from Oromo and degree of similarity.

each of the Gurage languages decreases, phonetic similarity between the languages increases. In general, Figure 7b illustrates that both the lexical and phonetic skewing between Oromo and the Gurage varieties contribute to the dynamics in the Gurage languages.

## 4.2 Non-linguistic determinants

Four non-linguistic factors were examined: contact among the speakers, geographical distance, population size, and speakers' attitudes. Between-speakers contact data was obtained from the background questionnaire (see Appendix A). Figure 8 shows the number of languages that the speakers of each variety have contact with. The figure shows that many speakers of the Gurage varieties have exposure to Oromo. Moreover, Silt'e, Kistane, and Chaha speakers have notable contact with speakers of other Gurage varieties. Figure 8 further shows that most speakers of the Gurage varieties have exposure to Amharic.

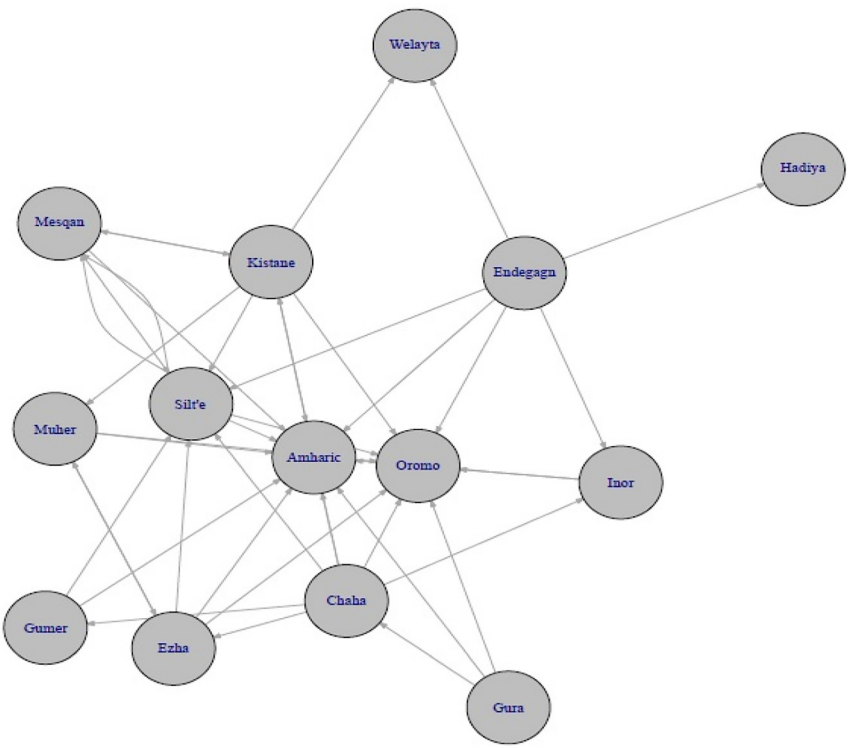


**Figure 8:** Contact among the speakers of the Gurage varieties.

The figure also shows that Gurage speakers have contact with Oromo speakers. Muher, Kistane, and Silt'e speakers are among those that have contact with the Oromo speakers. Speakers of Endegagn have contact with the speakers of Welayta, presumably because of migration. Endegagn speakers have also contact with the speakers of Hadiyya, another Cushitic language. Figure 8 also shows that there is a contact among the Gurage speakers themselves. The figure further shows that most Gurage varieties have contact with Chaha and Silt'e speakers. This is because the two areas are located on the main roads that connect different Gurage areas. Besides, Chaha has been the center of education. Until the recent expansion of schools across the Gurage areas, students from various parts of Gurage had to travel to Chaha area to attend secondary schools. The contact between Kistane-Oromo and Silt'e-Oromo speakers is the outcome of geographical distribution of Kistane and Silt'e languages; they border the Oromiya Region where Oromo is spoken.

Figure 9 illustrates the number of speakers that have contact with speakers of other varieties. The figure shows that many speakers of each Gurage variety have contact with Amharic. Moreover, several Gurage speakers have contact with the speakers of Chaha. More importantly, several Kistane speakers have contact with the speakers of Oromo. Many speakers of Silt'e have contact with the speakers of

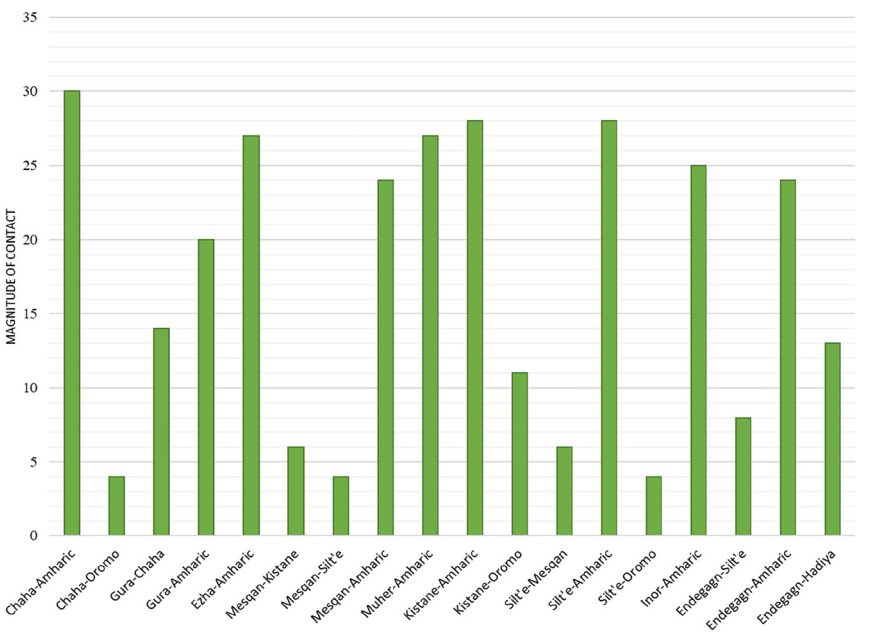


**Figure 9:** Magnitude of contact, contact that involves < 2 speakers was excluded.

Mesqan. This is not surprising since the two languages are spoken adjacent to each other, and they are connected by the main road that crosses the two language areas. Silt'e speakers also have some degree of contact with the speakers of Oromo. Some speakers of Endegagn have contact with the speakers of Hadiyya.

The validity of the Gravity model was tested based on two types of geographical distance measures: the driving time between each site (in minute) and the driving distance between the sites (in km). The phonetic and lexical similarities among the Gurage languages were used as the similarity indices. Gura was not included in this analysis since it is spoken in the Chaha district, and there is no data available about the population size of the speakers of Gura. Table 8 presents predictions of the Gravity model, based on driving distance (km) and phonetic and lexical similarity indices. The coefficient of Pearson's correlation was computed for the distance between the language areas, and the square of the distance between the language areas.

The table shows an inverse relationship between the product of population size and the phonetic similarity, $r = -0.461$. Contrary to the prediction of the Gravity model, the table shows that as the size of population increases, the phonetic similarity between pairs of languages decreases. The same is true for the lexical similarity; as the population size increases, the lexical similarity decreases, $r = -0.721$. On the other hand, Table 8 shows that there is an inverse relationship between the geographical distance and the linguistic similarity. This is true for both phonetic and lexical similarities; as the geographical distance between two sites increases, the phonetic and lexical similarity between pairs of languages decreases. This is the case both for the correlation between the linguistic similarity (lexical and phonetic) and the geographical distance, and for the linguistic similarity and the square of the geographical distance. Hence, the correlation between the linguistic similarity and the geographical distance is in line with the Gravity model whereas the correlation between the linguistic similarity and the population size is against the Gravity model. Table 9 presents the result of the correlation coefficients of the two linguistic distances (phonetic and lexical) and the geographical distance which was measured

**Table 8:** The influence of population size and geographical distance.

| | Phonetic similarity | Lexical similarity |
|---|---|---|
| Product[a] of population size | −0.461 | −0.721 |
| Distance in km | −0.600 | −0.637 |
| Square of distance in km | −0.631 | −0.671 |

[a]The product of population size means the number of populations of one area multiplied by the number of populations of another area. The distance between Gura and other language varieties was not included in this result since Gura is spoken in Chaha district and the exact number of Gura speakers is not known.

**Table 9:** Correlation coefficients of phonetic similarity, geographical distance, and population size.

| | Phonetic similarity | Lexical similarity |
|---|---|---|
| Product of population size | −0.461 | −0.721 |
| Distance in min | −0.651 | −0.610 |
| Square of distance in min | −0.650 | −0.613 |

based on the driving time. The correlation coefficient was computed both for the distance between the sites and the square of the distance between the sites. The table illustrates a negative correlation between the phonetic similarity and the population size, $r = -0.461$. Likewise, there is an inverse relationship between the lexical similarity and population size, $r = -0.721$.

The results presented in Tables 8 and 9 do not replicate the social gravity impact predicted by the Gravity model. The absence of correlation between the population size and the linguistic similarity could be due to the sociolinguistic reality in the Gurage area. The Gurage communities are bilingual since Amharic is a dominant language of communication in the towns in the Gurage area. Therefore, it could be that the diffusion of phonetic and lexical features of Amharic from one town to another has overtaken the diffusion of features of the Gurage varieties. Hence, Pearson's correlation was computed only for the rural population and the linguistic similarities. Nonetheless, the correlation between the two remained negative; the correlation between rural population and phonetic similarity, $r = -0.466$, and the correlation between rural population and lexical similarity, $r = -0.724$. The correlation coefficients between the two geographical distance measures (driving distance and driving time) and the two linguistic distance measures (phonetic and lexical similarities) were also compared to determine whether it is the driving distance or the driving time that is the stronger determinant of linguistic distance. The result of the analysis shows that the correlation between phonetic similarity and driving distance and that of the phonetic similarity and driving time are not significantly different; Hotelling's $t$-test, $t = 0.810$, $p = 0.424$. Likewise, the correlation between the lexical similarity and the driving distance, and that of the lexical similarity and driving time is not statistically significant; Hotelling's $t$-test, $t = -0.424$, $p = 0.674$. This result shows that the time required to travel from one language area to another and the distance between each of the language areas have similar impacts on the frequency of contact among the speakers of Gurage varieties.

The attitude of the speakers was measured using Linkert scales, based on the recordings of the fable "The North Wind and the Sun". Table 10 shows a strong negative correlation between the speakers' attitude and the two linguistic distance measures: between the speakers' attitude and phonetic distance ($r = 0.751$) and between the

**Table 10:** Correlation between speakers' attitude, linguistic similarity, and intelligibility.

| | | Attitude |
|---|---|---|
| Linguistic | Phonetic | −0.751 |
| | Lexical | −0.705 |
| Degree of intelligibility | | 0.682 |
| Perceptual similarity | | 0.959 |

speakers' attitude and lexical distance ($r$ = −0.705). This means that the smaller the linguistic distance between the languages, the more positive the attitude of the speakers toward the varieties. Besides, the table shows that the speakers have positive attitudes towards the varieties they understand better (a strong correlation between the speakers' attitude and degree of intelligibility, $r$ = 0.682). There is also a strong positive correlation between the speakers' attitude and perceptual similarity, $r$ = 0.959; the respondents are positive about the varieties that are similar to their native language.

Table 11 compares the correlation coefficients shown in Table 10. It shows that there is no statistically significant difference between the correlation coefficient of the lexical distance and the speakers' attitude, and the phonetic distance and speakers' attitude. Likewise, there is no statistically significant difference between the correlation coefficient of phonetic distance and speakers' attitude and that of the degree of intelligibility and speakers' attitude. Furthermore, there is no significant difference between the correlation coefficient of the lexical distance and speakers' attitude and that of the degree of intelligibility and speakers' attitude. Nonetheless, the perceptual similarity is strongly associated with language attitude, as compared to the phonetic distance; 0.959 > −0.751, $r$ = −4.390, $p$< .001, Fisher's z-transformation. Likewise, the correlation coefficient of the perceptual similarityand

**Table 11:** Correlation among the dimensions of distance and language attitude.

| Compared coefficients | *t*/*z* values | *p* value | Test |
|---|---|---|---|
| $r_{PD}r_{AT}$ versus $r_{LD}r_{AT}$ | −0.450 | 0.653 | Fisher's *z*-transformation |
| $r_{PD}r_{AT}$ versus $r_{DI}r_{AT}$ | −0.653 | 0.514 | Fisher's *z*-transformation |
| $r_{PD}r_{AT}$ versus $r_{PcpS}r_{AT}$ | −4.390 | 0.001 | Fisher's *z*-transformation |
| $r_{LD}r_{AT}$ versus $r_{DI}r_{AT}$ | −0.231 | 0.839 | Fisher's *z*-transformation |
| $r_{LD}r_{AT}$ versus $r_{PcpS}r_{AT}$ | −4.840 | 0.001 | Fisher's *z*-transformation |
| $r_{DI}r_{AT}$ versus $r_{PcpS}r_{AT}$ | 8.758 | 0.001 | Hotelling's *t*-test |

(1) *r*, correlation coefficient; PD, phonetic distance; AT, language attitude; LD, lexical distance; DI, degree of intelligibility; PcpS, perceptual similarity. (2) Hotelling's test was used for comparison of the correlation coefficient between degree of intelligibility and attitude and perceptual distance and attitude since the data are multivariate; obtained from the same group after repetitive measures.

the speakers' attitude (0.959) is greater than the correlation coefficient of the lexical distance and the speakers' attitude (–0.705), $z = -4.840$, $p < .001$, Fisher's z-transformation. Moreover, the correlation coefficient of the perceptual similarity and the speakers' attitude (0.959) is greater than the correlation coefficient of the degree of intelligibility and speakers' attitude (0.682); $t = 8.758$ $p < .001$, Hotelling's *t*-test.

In general, Table 11 depicts three crucial points. First, all the distance measures strongly correlate with the attitude of the speakers, implying a general tendency of the positive relationship between language similarity and the attitude of the speakers. As the linguistic similarity between the languages increases, the speakers' positive perception toward the languages also increases. There is also a weak connection between the speakers' attitude and degree of intelligibility; it is not always the case that the speakers' actual understanding of a language is dependent on the attitude of the speakers towards a particular language. Moreover, perceptual similarity is sensitive to the attitude of the speakers; among all distance measures, it is the perceptual similarity that is most likely affected by the speakers' attitude.

# 5 Discussion and conclusion

The aim of the present study is to identify the linguistic and non-linguistic factors that determine language variation in the Gurage area. Three types of linguistic determinants were examined, i.e. degree of understanding among the speakers, diffusion of features due to contact and the influences of Amharic and Oromo. The analyses performed on these factors show that the degree of understanding strongly correlates with linguistic distance measures. This implies that mutually intelligible varieties tend to be structurally similar. It also implies that the speakers' degree of understanding can be constrained by the properties of the structure of a language. The absence of significant difference between the correlation coefficient of the phonetic distance and intelligibility scores and that of the lexical distance and intelligibility scores means that the participants' understanding of a language can be enhanced both by the lexical and phonetic similarity among the languages. In other words, both phonetic and lexical similarities among the languages equally contribute to the speakers' understanding. The strong correlation between the perceptual similarity and linguistic distance also shows that native speakers may understand varieties that are similar to their own languages than varieties that are not. However, the result also shows that the perceptual dimension is sensitive to the speakers' attitude as noticed by Abu-Rabia (1996, 1998), Golubović and Sokolić (2013), and Pavlenko (2006).

The diagnosis based on the Neighbor-net algorithm shows the influence of lexical diffusion on the similarity among the varieties. The affinity between, for example, Silt'e and Kistane that are otherwise historically remotely related can be

taken as evidence of the contribution of contact to the similarity among the Gurage varieties. Similarly, the estimation of borrowed phonetic and lexical features based on lexicostatistical skewing shows that there is a large percentage of borrowed phonetic and lexical features particularly between Inor and Central West Gurage languages (Chaha, Gura, Gurner, and Ezha), and between Inor and Mesqan–Muher. This borrowing is partly the consequences of geographical adjacency among the languages.

The contact among the languages is also a part of social and historical events. For example, the large percentage of borrowed phonetic and lexical features between Inor and Central West Gurage languages could be due to east to west historical movement of the Gurage people (see Menuta 2015). There is also the involvement of the influence of non-Semitic neighboring languages. The negative phonetic and lexical skewing between Endegagn and the Central West Gurage could be due to the influence of the non-Semitic languages on Endegagn since the Endegagn speakers have contact with languages such as Hadiyya. There is also borrowing between Amharic and Oromo, and the Gurage varieties. Mesqan, Kistane, and Muher are among the varieties that are significantly influenced by Amharic. There is a strong influence of Oromo on Silt'e.

The similarity among the Gurage languages is partly related to the geographical proximity among the Gurage languages. Adjacent languages are more similar than languages that are far apart in line with the Gravity model (see Trudgill 1974; Nerbonne et al. 2005). Nevertheless, population size does not have a direct impact on the linguistic distance among the languages. In the Gravity model, population size is supposed to be a driving force behind the spread of linguistic innovations (Nerbonne et al. 2005). The big center always affects the smaller ones. The present study does not confirm this hypothesis (also see Boberg 2000; Horvath and Horvath 2001; Nerbonne et al. 2005).

It seems that population size by itself is not the main determining factor, but other factors associated with it. For example, the impact of population size becomes more prominent when the speakers of the languages are economically and politically dominant. In the Gurage area, there is no economically superior social group. None of the languages is politically dominant either. Boberg (2000) reported a negative influence of political borders on the diffusion of linguistic features. This cannot be the case in the context of Gurage area since the languages are spoken in the same country and even in a small geographical area. Another factor could be a negative attitude deriving from the association of a language with foreign rule as reported in Pavlenko (2006). Since the Gurage people are positive about the Gurage languages that they are familiar with, language imposition cannot be an influential factor (see Emebet 2019; Menuta 2015). Rather, social heterogeneity among the Gurage community can be another factor influencing the diffusion of linguistic features.

The influence of Amharic is another factor. Since all Gurage languages are under the influence of Amharic, probably the potential influence of Gurage languages with a large population size has been suppressed by the dominance of Amharic. For decades, Amharic has remained an influential language in the Gurage area. Speakers of every Gurage language have exposure to Amharic. Though Amharic was initially exported to the Gurage land through national enforcement, forced settlement, and the mobile nature of the Gurage community, it gradually became the most preferred language in the area. It is currently recognized as the language of business and politics. According to Menuta (2015), most Gurage people have positive attitude towards Amharic. Indeed, many of them prefer Amharic to the local language for schooling and administration.

There is also a strong correlation between the similarity among the languages and the attitude of the speakers. The Gurage speakers are more positive about the languages they are familiar with. The negative attitude towards the unfamiliar languages may reflect a conservative position of the Gurage community towards new languages. This may emerge from a conservative tribe-based tradition indicated in Hetzron (1972). The conservative culture may also be associated with the effort to preserve the local identity. There is a strong correlation between the speakers' attitudes and perceptual similarity. This has an important methodological implication. It shows that the use of perceptual similarity as a measure of the linguistic distance can sometimes be problematic as it can be influenced by the attitude of the speakers. Similar observation was previously reported by Abu-Rabia (1996, 1998) and Golubović and Sokolić (2013). In sum, the present study shows that geographical distance, contact among the Gurage speakers, intelligibility among the languages and diffusion of phonetic and lexical features are the main factors that influence language variation in the Gurage area.

# Appendices

## Appendix A: Background questionnaire

**Purpose:** It was employed lo determine the participants' language background.

**Directions:** 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 B. Grade ten C. Grade eleven D. 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? (Your father? Your mother?)
4. Which language is frequently spoken by your friends?
5. Have your parents changed their place of residence? Please indicate the places they lived, and the language spoken in each place.
6. How often do you use your mother tongue?
   A. Very often B. Often C. Sometimes 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?

## Appendix B: Test materials

### B1: Response sheet for words categorization test

**Directions:** Dear student, you are going to listen to some list of words. Listen carefully and determine to 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

### B2: List of words for word categorization test

The following list of words were used in the word categorization test to measure intelligibility among the selected language varieties.

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

# Appendix C: Additional results

## C1: Intelligibility scores

Mean of the participants' scores on the Word Categorization test

| Language | CH | EN | EZ | GM | GU | IN | KS | MS | MU | SI |
|---|---|---|---|---|---|---|---|---|---|---|
| Chaha | 81 | 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 |
| Gurner | 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 |

(1) CH, Chaha; EN, Endegagn; EZ, Ezha; GM, Gurmer; GU, Gura; IN, Inor; MS, Mesqan; MU, Muher; SI, Silt'e; KS, Kistane.
(2) The intelligibility results are converted to percentage.

## C2: Phonetic similarity index

| Language | CH | EN | EZ | GM | GU | IN | KS | MS | MU | SI |
|---|---|---|---|---|---|---|---|---|---|---|
| Chaha | 100 | | | | | | | | | |
| Endegagn | 82 | 100 | | | | | | | | |
| Ezha | 92 | 81 | 100 | | | | | | | |
| 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 |

### C3: Lexical similarity index

| Language | CH | EN | EZ | GM | GU | IN | KS | MS | MU | SI |
|---|---|---|---|---|---|---|---|---|---|---|
| Chaha | 100 | | | | | | | | | |
| Endegagn | 74 | 100 | | | | | | | | |
| Ezha | 87 | 75 | 100 | | | | | | | |
| Gurner | 88 | 73 | 87 | 100 | | | | | | |
| Gura | 89 | 73 | 85 | 88 | 100 | | | | | |
| Lnor | 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 |

### C4: 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 |
| Gurner | 78 | 19 | 70 | 95 | 92 | 40 | 20 | 54 | 43 | 10 |
| Gura | 84 | 35 | 72 | 85 | 89 | 57 | 18 | 47 | 37 | 10 |
| Lnor | 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 |

### C5: Attitude test results

| Language | EN | IN | EZ | GM | GU | MS | MU | SI | KS | CH |
|---|---|---|---|---|---|---|---|---|---|---|
| Endegagn | 99 | 93 | 47 | 61 | 60 | 53 | 61 | 42 | 58 | 48 |
| Lnor | 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 | 7 | 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 | 3 | 10 | 81 |

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