

The Types of Phonological Changes from Proto-Austronesian to the Kolo Language Spoken in Bima Regency

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ABSTRACT

This study aimed to determine the existence of genealogical relatedness between Kolo language and Proto-Austronesia, to describe the forms of phonological inheritance from Proto-Austronesia into Kolo language spoken in Bima regency, and to identify the most dominant types of phonological changes found in Kolo reflexes of Proto-Austronesia etymon. The research instruments consisted of analytical tables, audio-recorded interviews, and supporting documents. The obtained data were collected through interviews and audio recordings following four procedures, such as eliciting basic vocabulary, recording pronunciations, verifying lexical meanings and phonetic accuracy, and transcribing data into analytical tables. The data were analyzed using a combination of lexicostatistical and historical-comparative approaches. The findings confirmed that Kolo language has a genealogical relationship with Proto-Austronesian, reflected through both full retentions and inherited forms that have undergone systematic phonological changes. Retention involving a single phonological change was found to be the most dominant pattern, such as assimilation, lenition, fortition, deletion, insertion, diphthongization, monophthongization, dissimilation, metathesis, rhotacism, nasaliation. These results indicate that Kolo preserves traces of its Austronesian origin while also displaying significant phonological innovation.

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INTRODUCTION

The Austronesian language family is one of the largest language families in the world, comprising approximately 1,268 languages spoken by more than 300 million speakers worldwide (Purwanti, 2020). Its geographical distribution extends from Madagascar in the west to Easter Island in the east, and from Taiwan in the north to New Zealand in the south (Noerwidi, 2018). This extensive distribution has made Austronesian languages an important subject of investigation in linguistics, archaeology, anthropology, and history, particularly in understanding language diversification and human migration across the Asia-Pacific region (Noerwidi, 2018). Historical-comparative linguistic studies have shown that systematic phonological correspondences between proto-languages and their descendant languages provide valuable evidence for identifying genetic relationships and reconstructing language development over time (Campbell, 1998; Crowley & Bower, 2010).

Indonesia occupies a strategic position within the Austronesian-speaking world because of

its exceptional linguistic diversity and its role in prehistoric migration routes (Noerwidi, 2018; Purwanti, 2020). One of the local languages spoken in eastern Indonesia is Kolo language, which is used by the community of Kolo Village, Bima Regency, West Nusa Tenggara (Candra, 2022). Previous studies suggest that Kolo language may belong to the Austronesian language family, particularly within the Sumbawan subgroup; however, its classification remains uncertain due to the absence of comprehensive historical-comparative evidence (Budasi et al., 2021). Quantitative evidence indicates that Kolo shares lexical similarities with neighboring languages, including Bima (56%), Sambori (48%), and Sanggar (41.1%), suggesting a historical relationship among these languages despite substantial phonological differences (Budasi et al., 2021). Nevertheless, systematic evidence demonstrating the inheritance of PAN forms in Kolo language remains limited.

This lack of evidence constitutes a significant research problem. Unlike several regional languages of eastern Indonesia, such as Balinese, Flores, Sumba, and Sumbawan languages, whose genealogical relationships with PAN have been established through lexical and phonological correspondences, Kolo language has not yet been thoroughly examined from a historical-comparative perspective (Noerwidi, 2018). Consequently, the linguistic status of Kolo language within the Austronesian family remains unclear. Addressing this issue is important not only for clarifying the genetic affiliation of Kolo language but also for supporting language documentation and preservation efforts. As language shift and language endangerment continue to affect minority languages throughout Indonesia, documenting phonological inheritance patterns becomes increasingly important for safeguarding linguistic and cultural heritage (Budasi et al., 2021).¹

Several previous studies have investigated phonological inheritance and sound changes from PAN to its descendant languages. Ariantini et al. (2017) identified various phonological processes, including aphaeresis, syncope, apocope, assimilation, and dissimilation in Balinese dialects. Dardanila et al. (2022) examined sound changes from PAN to Gayo language and reported systematic patterns of deletion and insertion. Similarly, Siregar et al. (2022) analyzed six Batak languages and identified several phonological innovations that reflect their historical development from PAN. Rizqi and Widayati (2021) also demonstrated regular sound correspondences between PAN and the Sumatran dialect of Javanese. In contrast, research concerning Kolo language remains limited. Candra (2022) focused on describing its phonological inventory, syllable structures, and phoneme distribution, but did not investigate phonological inheritance or historical relationships with PAN. There is no comprehensive historical-comparative study examining Proto-Austronesian phonological inheritance, cognate correspondences, and systematic sound changes in Kolo language. Existing studies only report lexical similarity or describe Kolo's phonological inventory without establishing its genetic relationship with Proto-Austronesian. Therefore, a gap remains in understanding how PAN lexical items and phonological features are reflected in Kolo language.

To address this gap, this study aims to investigate the phonological inheritance of PAN in Kolo language. Specifically, the study seeks to determine the percentage of lexical relatedness between PAN and Kolo language, identify the forms of phonological inheritance reflected in Kolo cognates, and determine the most prominent forms of phonological change. To achieve these objectives, this study employs a descriptive qualitative design within the framework of historical-comparative linguistics. The data consist of a 200-word Swadesh list collected from native speakers of Kolo language and PAN etymons obtained from published reconstruction sources. Through comparative analysis, the study identifies cognate forms and examines systematic sound correspondences between PAN and Kolo language. So, the novelty of this study is that this study is the first to systematically investigate Kolo language using a historical-comparative linguistic framework by combining lexical relatedness, cognate analysis, and regular sound correspondence analysis to clarify its genetic relationship with Proto-Austronesian while contributing to Austronesian classification and language documentation. Furthermore, the research questions are:

1. What is the percentage of lexical relatedness between PAn and Kolo language?
2. What forms of phonological inheritance are reflected in Kolo cognates?
3. What are the dominant phonological changes from PAn to Kolo language?

METHOD

This study was designed as qualitative research involving speakers of the Kolo language as its subjects. Three native speakers were selected as informants based on a set of criteria suggested by Budasi (2018). The objects of the study were Kolo language lexical items and the types of sound changes from PAn etymons to their corresponding forms in the Kolo language. The primary data consisted of a list of 200 basic vocabulary collected through interview and recording techniques. The secondary data were obtained from the Finderlist Dictionary compiled by Wurm and Wilson (1975).

The procedure of data collections and data analysis passed the following steps: (1) comparing the Kolo language word list to the Swadesh word list to the PAn etymons in the Finder List Dictionary by Wurm and Wilson (1975). The etymons selected were the ones that show cognate; (2) If the Kolo language etymons showed the same forms with the PAn etymons, they were directly determined as the definitive inheritance from PAn etymons, or called full phonological retention; (3) If Kolo language words showed similarity to one of the PAn etymons reconstructed based on a bottom-up approach (Fernandez, 1996), the more similar forms were determined as the definitive and reconstructed with the types of sound changes; 3a. the types of sound changes from PAn etymons to Kolo language ones were finally categorized based on Antilla (1972), Campbell (1998), Crowley and Bower (2010), Katamba (1989), Millar and Trask (2015), and Roach (2000) sound change theories.

In addition, this study also employed a lexicostatistical approach to determine the degree of lexical relatedness between the word list of Kolo language and the etymons of PAn. Lexicostatistics is a method in historical linguistics used to measure the percentage of cognate vocabulary shared between languages based on basic vocabulary lists (Mbangi & Marafad, 2018). The percentage of lexical similarity was calculated using the following formula:

$$C = \frac{k}{n} \times 100\%$$

Explanation:

- a. C = percentage of cognates
- b. K = number of cognate words
- c. N = total number of vocabulary items compared

FINDINGS AND DISCUSSION

Findings

The analysis of 200 PAn etymons and their corresponding forms in Kolo language revealed two major themes representing the historical relationship between PAn and Kolo language, namely (1) lexical relatedness and phonological inheritance, (2) types of phonological inheritance, (3) phonological change patterns in inherited forms.

Lexical Relatedness and Phonological Inheritance

The analysis identified 42 cognate forms inherited from PAn into Kolo language. Based on the percentage of cognate forms, the level of lexical relatedness between PAn and Kolo language reached 21%. This finding indicates that Kolo language retains a number of inherited lexical items that can still be traced back to PAn etymons despite undergoing various phonological developments.

Table 1 The Percentage of Lexical Relatedness of the Kolo language				
Language	Total Analyzed Words (Swadesh)	Full Retention (Cognate)	Retention With Phonological Changes (Cognate)	Lexical Innovation (Non-Cognate)
Kolo	200	4	42	154

The data presented in Table 1 indicate that lexical inheritance from PAn remains evident in Kolo language. However, most inherited forms have undergone phonological modifications that differentiate them from their original PAn etymons. These modifications include sound substitution, vowel changes, deletion, and sound insertion processes.

Types of Phonological Inheritance

In this study, Kolo demonstrates two primary types of inheritance from PAn:

A. Full Retention

Full retention refers to lexical items that have not undergone any phonological change from their PAn forms. Out of the 46 inherited retention data that were analyzed, 4 words (2%) are classified under this category of full retention.

Table 2. Full Retention				
No	PAn	Kolo	English	
1.	*asu (PANS) STRESEMANN 1927	asu	dog	
2.	*mata (PANBIROLI) BIGGS 1965	mata	eye	
3.	*ina (PANDYTV) DYEN 1949	ina	mother	
4.	*ama (PANDYPMPL) DYEN 1953	ama	father	

Table 2 shows examples of full retention in the Kolo language, where the words have not undergone any phonological change from their PAn forms. All the words in the table have identical forms in both PAn and Kolo, indicating a very clear genetic relationship. This shows that some core vocabulary in the Kolo language has been fully preserved from its ancestral language without any change.

B. Retention with Phonological Changes

This category represents the most dominant pattern of inheritance in Kolo etymons, comprising 42 words (21%) of the total data. These words have undergone various phonological changes; however, they still retain sufficient similarity to be traced back to their PAn forms. Furthermore, these phonological changes are classified into several types:

a) One Sound Change (16 items)

Table 3. Examples of etymon retention with 1 type of phonological change

No	PAn	Kolo	English
1.	*anak (PANDYPMPL) DYEN 1953	ana	child
2.	*iya(PANC) CAPELL 1943	ia	she/he
3.	*taliŋa (PANDYTV) DYEN 1949	kaliŋa	ear
4.	*telu (PANDYMT) DYEN 1946	tolu	three
5.	*sapa (PANBLWO) BLUST1971	apa	what

Table 3 shows examples of Kolo words that are derived from Pan but have undergone one phonological change. Although sound changes have occurred, the

forms remain similar to their original PAn forms to be recognized. This indicates that the Kolo language retains elements of its ancestral language while undergoing change.

b) Two Sound Changes (14 items)

Table 4. Examples of etymon retention with 2 type of phonological change

No	PAn	Kolo	English
1.	*laki' (PAND) DEMPWOLFF 1938	lahi	husband
2.	*yamut (PANC) CAPELL 1943	amu	root
3.	*batu' (PAND) DEMPWOLFF 1938	watu	stone
4.	*matay(PANDLO) LOPEZ n.d	mate	die
5.	*hinih(PAND) DEMPWOLFF 1938	ini	this

Table 4 shows a more complex pattern of inheritance, in which Kolo etymons have undergone two phonological changes. Despite these changes, the forms still retain noticeable similarities to their PAn structures, allowing their historical relationship to be identified.

c) Three or More Changes (12 items)

Table 5. Examples of etymon retention with 3 or more type of phonological change

No	PAn	Kolo	English
1.	*baya' (PAND) DEMPWOLFF 1938	bela	shoulder
2.	*manay (PANC) CAPELL 1943	mone	male
3.	*rumput(PANDLO) LOPEZ n.d	ruhu	grass
4.	*buwah(PANC) CAPELL 1943	wua	fruit
5.	*'ataj(PAND) DEMPWOLFF 1938	ate	liver

Table 5 shows examples of Kolo words derived from Pan that have undergone three or more phonological changes. These changes are more complex, but the forms still retain enough similarity for their PAn origin to be recognized. These forms show deeper structural transformations while still being traceable to PAn.

Dominant Pattern of Change

Among the 42 words that underwent phonological modification, those with one phonological change form the largest group. This suggests that Kolo tends to modify inherited PAn forms in limited and predictable ways rather than undergoing radical restructuring. The dominance of single-change retention indicates that many PAn forms still remain recognizable in Kolo, supporting a clear genealogical link. At the same time, the presence of forms with two or three changes shows that Kolo phonology has developed through cumulative shifts across generations, typical of natural language evolution.

Furthermore, the appearance of processes such as syncope, lenition, and vowel change corresponds to common phonological trajectories found in many Austronesian languages (Ariantini et al., 2017; Dardanila et al., 2022; Siregar et al., 2022).

Tabel 6. Distribution of Phonological Change Types

Number of Changes	Items	Percentage
One change	16	38.10%
Two changes	14	33.33%
Three or more	12	28.57%

Table 6 shows the distribution of phonological change types in the analyzed data. Most of the data undergo one phonological change, accounting for 16 items (38.10%). This is followed by 14 items (33.33%) with two changes, and 12 items (28.57%) with three or more changes. This indicates that phonological changes in the Kolo language vary, but simpler changes (one change) are the most prominent.

Several phonological processes were identified during the analysis. These processes are summarized in Table 7.

Table 7. Phonological Processes

Category	Types of Change
Sound substitution	Lenition, Fortition, Nasalization, Dissimilation
Vowel changes	Vowel Raising, Vowel Backing
Structural changes	Monophthongization, Diphthongization
Sound deletion	Apheresis, Syncope, Apocope
Sound deletion	Epenthesis

Discussion

Lexical Relatedness between PAn and Kolo language

The identification of 42 cognate forms out of 200 PAn lexical items demonstrates that Kolo language preserves a number of inherited lexical forms from PAn. The resulting lexical relatedness percentage of 21% indicates that although Kolo language has undergone substantial linguistic development, traces of its Austronesian ancestry remain observable through systematic lexical correspondences.

The existence of cognate forms supports the historical-comparative principle that languages descended from a common ancestor retain inherited vocabulary despite experiencing phonological innovations over time (Campbell, 1998). For instance, PAn *manay ‘male’ corresponds to Kolo mone. Although the lexical item remains semantically identical, the form exhibits phonological modifications involving vowel backing (/a/ > /o/) and monophthongization (*ay > e). The preservation of the lexical meaning alongside systematic phonological change suggests inheritance rather than borrowing.

Similarly, PAn *'ataj ‘liver’ developed into Kolo ate. In this case, the initial glottal stop was deleted through apheresis, while the final semivowel was lost through apocope. Despite these changes, the lexical structure remains sufficiently similar to establish a historical relationship. Such correspondences provide evidence that Kolo vocabulary contains inherited PAn elements that have undergone regular phonological developments.

The relatively low percentage of cognates may be attributed to lexical replacement, semantic change, and prolonged language evolution. Crowley and Bower (2010) argue that inherited vocabulary may gradually be replaced by innovative forms or borrowings, reducing the overall percentage of recognizable cognates while maintaining evidence of common ancestry through systematic sound correspondences.

Types of Phonological Inheritance

The analysis revealed two types of phonological inheritance in Kolo language, namely full retention and retention with phonological changes. However, retention with phonological changes was found to be more common than full retention. This finding indicates that although many lexical items in Kolo language originate from PAn, most of them have undergone phonological developments during their transmission from one generation to another.

Retention with phonological changes can be observed in forms such as PAN *manay > Kolo mone and PAN *buwah > Kolo wua. Although these forms have experienced modifications in their phonological structure, their similarities in both form and meaning still demonstrate a historical relationship with the PAN etymons. According to Campbell (1998), inherited forms rarely remain completely unchanged because languages naturally undergo regular sound changes over time. As a result, descendant languages often preserve ancestral vocabulary in modified forms rather than in their original phonological shapes.

In contrast, several lexical items exhibit full retention, meaning that they preserve the phonological structure of the PAN etymons without significant modification. Examples such as PAN *ama > Kolo ama and PAN *ina > Kolo ina show that some inherited forms have remained stable throughout the historical development of the language. These forms suggest that certain basic vocabulary items are more resistant to change than others.

The occurrence of full retention may be related to the frequency and importance of particular lexical items in daily communication. Crowley and Bower (2010) explain that frequently used words, especially those referring to kinship relations and basic human experiences, tend to be preserved because they are continuously transmitted and reinforced within the speech community. Consequently, these words often experience fewer phonological changes than less frequently used vocabulary.

Dominant Pattern of Change

The analysis revealed that inherited forms with one phonological change account for 38.10% of all cognates, making this the most productive inheritance pattern. Forms with two phonological changes account for 33.33%, while the remaining cognates exhibit three or more phonological changes. These findings indicate that phonological inheritance in Kolo language is characterized by both retention and innovation.

Sound deletion was one of the most common phonological developments identified in the data, including apheresis, syncope, and apocope. Among these, apocope occurred most frequently. For example, PAN *buwah ‘fruit’ became Kolo *wua through the loss of final /h/, while PAN *baya ‘woman’ became *bela through the deletion of the final glottal stop. Similarly, PAN *rumput ‘grass’ developed into *ruhu through the loss of final consonants. Apheresis was also observed in forms such as PAN *'ataj > *ate and PAN *waiR > *oir. These findings suggest that Kolo language tends to simplify word structures by reducing sounds, particularly in word-final positions, a process commonly found in language change (Campbell, 1998).

Sound substitution was another productive phonological process in the inherited forms. For example, PAN *buwah > Kolo *wua shows the change of /b/ to /w/, representing lenition, while PAN *baya > *bela reflects the substitution of /y/ with /l/. Similar changes are found in PAN *rumput > *ruhu. These examples indicate that consonant replacement contributed significantly to the development of the modern phonological system of Kolo language.

The data also revealed several vowel changes, particularly vowel raising and vowel backing. For instance, PAN *manay became Kolo *mone through vowel backing and monophthongization, while PAN *'ataj > *ate demonstrates vowel raising. These developments show that vowel restructuring played an important role in the phonological evolution of Kolo language and reflects patterns commonly observed in Austronesian languages (Crowley & Bower, 2010).

In addition to deletion and substitution, epenthesis was found in several inherited forms. For example, PAN *hit'(aə)p became Kolo *hinti through the insertion of /n/, while PAN *qudan ‘rain’ developed into *hudan. The occurrence of epenthesis suggests that phonological change in Kolo language also involved the addition of sounds to create more acceptable syllable structures.

Overall, the phonological changes identified in Kolo language demonstrate a combination of sound deletion, substitution, vowel modification, and insertion. These processes show that

while many lexical items were inherited from PAn, they underwent systematic phonological innovations that contributed to the distinctive characteristics of Kolo language.

CONCLUSIONS

This study showed that the Kolo language still preserves part of its vocabulary inherited from PAn. Out of the 200 basic words analyzed, 46 words (23%) were identified as cognates. Four of these words are fully retained and remain almost identical to their PAn forms, while the remaining 42 words show inheritance with phonological changes. These changes include processes such as sound loss, sound addition, vowel modification, lenition, fortition, and cluster simplification. The most dominant pattern is retention with only one phonological change, indicating that many PAn forms remain relatively close to their original structure in the Kolo language.

These findings confirm that Kolo has a clear genealogical relationship with PAn and has developed through natural and systematic sound changes over time. The results also support the classification of Kolo within the Sumbawan subgroup of the Austronesian language family. Although many words have undergone modification, their basic structure still reflects historical inheritance. This contributes valuable information to the study of underdocumented local languages in Bima Regency and helps strengthen our understanding of Kolo's linguistic history and identity. Furthermore, the implications of this study are confirming the genealogical relationship between Proto-Austronesian and Kolo language, enriches historical-comparative linguistic studies. It also contributes to Austronesian classification, language documentation, and preservation of Kolo language. In addition, the limitation of this study are uses only a 200-word Swadesh list, involves three informants, focuses solely on phonological inheritance, compares only PAn and Kolo, and relies on lexicostatistical evidence without broader linguistic reconstruction.

Based on these findings, several suggestions can be offered for future research. First, it is recommended to use a larger and more detailed wordlist—such as Hole or Nothofer—in order to identify additional inherited vocabulary and more complex patterns of sound change. A broader dataset may also provide stronger evidence for the reconstruction of proto-languages in the region. Second, comparative studies with Bima, Sambori, and Sanggar languages are encouraged to better understand their shared origins and differences. Finally, because Kolo remains underdocumented, further research and documentation efforts are important to support its preservation and to help maintain the linguistic diversity of the Bima region. Through these steps, future research can deepen our understanding of Kolo and contribute to the documentation of Austronesian languages in Indonesia.

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