

ORTHOGRAPHIC TRANSPARENCY OF ROTE SPEECH VARIETIES: CHALLENGES IN LANGUAGE LEARNING

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Abstract

Effective orthographic systems are essential for language documentation and revitalization. This study examines the orthographic transparency of six Rote speech varieties—Dela, Dengka, Tii, Lole, Termanu, and Rikou—focusing on the consistency of sound–symbol correspondences and their implications for language learning. Data were collected from published materials, field observations, and interviews with native speakers. The findings reveal inconsistencies in the representation of implosive consonants (/b/, /d/), the glottal stop (/ʔ/), and double vowels. These inconsistencies reduce orthographic transparency, hinder learnability, and disrupt grapheme–phoneme correspondences. The study highlights the importance of transparent and consistent orthographic representation for literacy development and language revitalization. It proposes recommendations for improving orthographic transparency across Rote speech varieties.

Keywords: language learning challenges, orthographic transparency, Rote speech varieties

Abstrak

Sistem ortografi yang efektif sangat penting bagi dokumentasi dan revitalisasi bahasa. Ortografi enam ragam tutur bahasa Rote—Dela, Dengka, Tii, Lole, Termanu, dan Rikou—menghadapi tantangan akibat variasi fonologis dan representasi fonem yang tidak konsisten. Penelitian ini mengkaji transparansi ortografi pada enam ragam tersebut dengan menitikberatkan pada konsistensi korespondensi bunyi–simbol serta implikasinya terhadap pembelajaran bahasa. Data diperoleh dari bahan publikasi, observasi lapangan, dan wawancara dengan penutur asli. Hasil penelitian menunjukkan adanya ketidakkonsistenan dalam representasi bunyi implosif (/b/, /d/), bunyi glotal (/ʔ/), serta vokal ganda. Ketidakkonsistenan ini mengurangi transparansi ortografi, menghambat kemudahan pembelajaran, dan mengganggu korespondensi grafem–fonem yang konsisten. Studi ini menekankan pentingnya penggunaan simbol yang transparan dan konsisten untuk mendukung pengembangan literasi dan revitalisasi bahasa bagi generasi muda. Studi ini juga mengusulkan beberapa perbaikan untuk meningkatkan transparansi ortografi pada ragam tutur bahasa Rote.

Kata kunci: tantangan pembelajaran bahasa, transparansi ortografi, ragam tutur bahasa Rote

INTRODUCTION

One of the important goals of language documentation is to develop effective orthographic systems (Austin, 2016; Seifart, 2006). Orthography generally refers to the system used to represent a language in written form. According to Seifart (2006: 277), an orthography consists of both graphic symbols (graphemes) and a set of conventions or rules governing their use, such as spelling conventions and writing practices. An effective orthography design requires careful consideration of the language's phonology, community needs, and practicality (Cahill, 2018; Hemmings et al., 2023). It is, in fact, an essential part of the beginning of a documentation project. Although relatively few publications address the orthography of Rote speech varieties, there has been a growing interest in orthography development, as evidenced by the published materials in Rote speech varieties and neighboring languages. Several factors contribute to this trend, primarily using the mother tongue as a language of instruction and a subject taught in primary schools, alongside an increased awareness of the importance of preserving local languages.

The relationship between orthography and literacy has long been a topic of interest in the field of language education. One key concept that has emerged in recent years is orthographic transparency, which refers to the consistency and predictability of sound-letter correspondences in a writing system (Katz & Frost, 1992; Ziegler & Goswami, 2020). In other words, orthographic transparency measures how easily a written word can be sounded based on its spelling. Orthographic transparency is important in facilitating literacy acquisition, enabling learners to decode and encode words more easily. Research has shown that languages with transparent orthographies, such as Finnish and Spanish, tend to have higher literacy rates and faster literacy acquisition compared to languages with more complex or opaque orthographies, such as English and French (Seymour, 2006; Ziegler & Goswami, 2005). A lack of orthographic transparency can significantly hinder the acquisition of reading and spelling skills. For example, inconsistent representations of the implosive sound /b/ in the word /biʔi/ in Dela as <bib'i> instead of <b'ib'i> may lead learners to assume that symbols and <b'> represent different sounds. Similarly, the inconsistent representation of the glottal stop in words such /ʔetu/ as <'etu> and <etu> may obscure minimal contrasts that are crucial for meaning. These inconsistencies increase the cognitive load for learners and slow the acquisition of reading skills. Research has shown that inconsistent relationships between sounds and letters can lead to difficulties in word recognition and spelling (Kilpatrick, 2015). Furthermore, studies have found that readers of languages with deep orthographies, which are characterized by a lack of transparency, tend to rely more heavily on whole-word recognition strategies rather than phonological decoding (Bowers & Bowers, 2017). This can result in slower reading development and increased difficulty with spelling and word recognition (Moats, 2017; Seymour, 2006). Additionally, recent research has highlighted the importance of orthographic transparency in developing reading skills, particularly in the early stages of reading instruction (Hudson et al., 2019). Overall, the lack of orthographic transparency can pose a significant challenge for learners, highlighting the importance of explicit instruction and practice in orthographic skills.

Cross-linguistic studies of reading development further demonstrate the impact of orthographic transparency on literacy acquisition. Seymour et al. (2003), in a large-scale

European study, found that children learning to read in transparent orthographies achieved accurate decoding much earlier than children learning languages with deeper orthographies. Similarly, Ziegler & Goswami (2005) propose the Psycholinguistic Grain Size Theory, which explains how readers in different orthographic systems rely on different units of phonological processing. In transparent orthographies, readers tend to rely on small grain sizes such as phonemes, whereas in opaque orthographies, larger units such as syllables or whole words are often required. These findings highlight the importance of consistent sound–symbol correspondences for efficient literacy development.

When designing an orthography, several major factors need to be considered. Recent orthographic designs take into account linguistic, sociolinguistic, pedagogical or educational, and practical principles (Cahill & Karan, 2008; Seifart, 2006). From a linguistic standpoint, the ideal principle is “one phoneme, one symbol,” meaning that only phonemic sounds should be represented in the orthography. This principle, advocated by Pike (1947), remains a crucial consideration in modern orthography design (Cahill & Karan, 2008; Jany, 2010). When an orthography employs fewer alphabets than the existing phonemes in the language, it results in underrepresentation, which can hinder the learnability of the orthography. Cahill (2014) points out that the influence of the national language may contribute to this underrepresentation. Alongside the phonemic status, the functional load of a phoneme must also be considered to determine whether it should be represented in the orthography. Phonemes with a low functional load may not need representation in the orthography, especially if they require a unique character or diacritic (Tadmor, 2009).

As the development of a language’s orthography often references the national language, discrepancies in the sound systems can lead to complications. Two phonemes that frequently cause difficulties in many Eastern Indonesian languages are glottal stops and long vowels. According to Grimes (1998), regional languages featuring long vowels and the glottal stop /ʔ/ as phonemes often present challenges in developing orthography for Indonesian-centric people. This is mainly because, in Indonesian, the glottal stop sounds between vowels, such as *maaf* [maʔaf] ‘sorry’ and *keadaan* [keʔadaʔan] ‘condition,’ are not represented, as they are not considered phonemic and do not significantly impact the learnability of the orthography.

Like other Eastern Indonesian languages, those in Rote possess different phonemes and a high frequency of glottal stop phonemes. The Dela variety, for instance, has a glottal stop frequency above 45% (Tamelan, 2021). The significant functional load, the various roles of glottal stops in the Rote speech varieties, and the presence of double vowels create challenges for orthography development.¹ Additionally, some Rote speech varieties feature implosive sounds, which are rarely found in the world’s languages. As not all Rote speech varieties have implosive sounds, careful selection of sound-symbol representation is essential for language maintenance in Rote. Consistency in the representation of implosive phonemes across Rote varieties is crucial for the acceptance of the orthographies and for facilitating the learning of the sound systems of these speech varieties.

Although the orthography systems of Rote speech varieties are claimed to be developed through a participatory approach and have been utilized within their respective communities, challenges remain in reading and writing certain letters and morphologically complex words. For example, some speakers struggle with glottal stop and implosive sounds due to their unfamiliarity with alphabetic characters such as ⟨b'⟩, ⟨d'⟩ and ⟨'⟩. This issue arises from differing representations or the absence of certain sounds in Indonesian orthography; glottal sounds are

not represented in non-final positions, and final glottal stops are represented as ⟨k⟩. This challenge raises questions about the orthographic transparency (depth, regularity, and consistency) of the existing orthographies of Rote speech varieties. To date, no studies have examined the orthographic transparency of Rote speech varieties or neighboring languages, making this the first effort to highlight this issue.

Examining orthographic transparency in the Rote speech varieties is therefore essential for understanding how existing orthographies support or hinder literacy development within these communities. This paper examines the grapheme-phoneme representations in the existing orthographies of six Rote speech varieties. It presents the choices of sound-symbol representations, discusses three challenges encountered in the existing orthographies, and examines how these inconsistencies affect their learnability. It specifically details how the inconsistent representation of implosive /ɓ/ and /ɗ/, glottal /ʔ/, and double vowels pose challenges for orthography learning and proposes suggestions for transparent orthographies.ⁱⁱ The study contributes to the discussion of orthography development in minority languages by evaluating the transparency of existing orthographies across several closely related speech varieties in Rote.

METHOD

This research was conducted in Rote Ndao Regency, East Nusa Tenggara, Indonesia, an area characterized by considerable linguistic diversity. The study focuses on six Rote speech varieties: Dela, Dengka, Tii, Lole, Termanu, and Rikou. The objective of this study was to examine the orthographic systems used in these speech varieties and to evaluate their transparency and consistency in representing sound-symbol correspondences. This study employed a descriptive qualitative approach, integrating both primary and secondary data sources. The secondary data were obtained through a comprehensive review of published materials in Rote speech varieties. These included religious texts, educational materials, dictionaries, and previous linguistic studies. Among the sources examined were the New Testaments translated into several Rote speech varieties, health leaflets produced by the Language and Culture Unit (UBB GMIT), a Termanu Bible translation published by the Indonesian Bible Society (LAI, 2018), a primary school textbook by Balukh (2007), and the Rote-Indonesian dictionary by Ingguae (2021).

To gather primary data, the researchers conducted systematic observations and unstructured group interviews with 18 native speakers (three from each speech variety) representing Dela, Dengka, Tii, Lole, Termanu, and Rikou. The data collection was carried out between February and June 2024 in several communities across Rote-Ndao Regency. All informants, aged 20 and above, received a thorough explanation of the research objectives and how the data would be used. The informants provided oral informed consent, which was preferred by the informants. The involvement of native speakers was essential for obtaining community perspectives on the existing orthographies. During interviews, the informants were asked to: (1) read selected texts aloud written in their speech variety; (2) discuss the sound-symbol representations used in the orthographies; and (3) share their perspectives and experiences regarding reading and writing in their language.

These activities allowed the researchers to gather insights into (a) speakers' experiences with the existing orthographies, (b) perceived challenges in sound-symbol representation within

the orthographies, and (c) community attitudes towards orthographic practices. The primary data gathered offered a rich contextual understanding of orthographic practices, enabling analysis and improvement of the orthographies.

Following the data collection phase, the orthographic representations were analyzed using phonemic principles proposed by Cahill & Karan (2008) and Seifart (2006). The analysis focused on evaluating the transparency, consistency, and adequacy of sound–symbol correspondences across the six speech varieties. The researchers compared the orthographic conventions found in published materials with the phonological characteristics of the languages and with the feedback obtained from informants. The analysis also involved coding informants' responses and conducting thematic analysis to identify recurring patterns of inconsistency and their implications for orthography learnability.

FINDINGS AND DISCUSSION

The current orthographies of Rote speech varieties use Roman letters for transferability with the Indonesian orthography. These orthographies closely resemble Indonesian, except for the glottal stop phoneme. However, data indicate inconsistencies in the choice of sound-symbol representations for the implosives and glottal stop phonemes, and the treatment of double vowels. These issues present significant challenges for developing a transparent and consistent orthography for Rote speech varieties. This section covers: the sound-symbol representations in the Rote orthographies and the inconsistencies found therein, the challenges faced and recommendations for improvement, and lastly the implications of the learnability of the orthographies.

The Sound-symbol Representations in the Orthographies of Rote Speech Varieties

Before discussing the sound-symbol representations used in the Rote orthographies, it is important to consider some key aspects of the Rote speech varieties and their synchronic phonology.

Some researchers classify the speech of Rote as a single language (Grimes, et al, 1997; Kementrian Pendidikan dan Kebudayaan, 2009); however, it is a complex language/dialect chain. This complexity is evident in its lexicon, phonology, and morphosyntax (Edwards, 2018; Tamelan, 2007; 2014). The term "speech varieties" is used in this article to emphasize that further research is necessary to ascertain whether these varieties represent distinct related languages or constitute a dialect chain of a single language. The *Ethnologue* classifies Rote speech varieties into seven closely related languages (Eberhard et al., 2020). A map illustrating these languages is given in Figure 1.



Figure 1. Languages of Rote Ndao (Edwards & UBB GMIT, 2018)

Each Rote speech variety exhibits a distinct consonant inventory, although they share the same five vowels /i u e o a/. The phoneme inventory of Rote speech varieties and their variation is provided in Table 1 and Table 2.

Table 1. Phoneme inventories of Rote speech varieties

	Labial	Apical	Velar	Glottal		Front	Central	Back
Voiceless plosives	p	t	k	ʔ	High	i		u
Voiced plosives	b	d			Mid	e		o
Implosives	ɓ	ɗ			Low		a	
Prenasalised plosives	^m p; ^m b	ⁿ d	^ŋ g					
Nasals	m	n	ŋ					
Fricatives	f	s		h				
Lateral		l						
Flap/trill		r						

All Rote varieties have four voiceless stops /p t k ʔ/, two voiced stops /b d/, and three fricatives /f s h/. The voice stops exhibit variations in their phonetic qualities. In the southwestern varieties, including Dela, Tii, and Lole, both voiced stops are imploded in all word positions and treated as phonemes (Edwards, 2021; Tamelan, 2021).ⁱⁱⁱ Data from Dengka indicates that the apical voice plosive [d] is sometimes imploded, whereas the /b/ is typically unimploded [b].^{iv} In the Termanu variety, voiced plosives are only imploded in the word medial positions. During his field trip in Bilba, Landu, and Oepao, Edward (2021) reported that there was no record of implosion for /b/, but there was light implosion recorded intervocally for /d/; thus, the implosion is considered phonetic. The phonetics of the two-voiced plosives in other Rote varieties are currently unknown. Some varieties have two liquids /l r/, while others have only one liquid /l/. Some varieties have all the nasals, while others have only two nasals /m, n/. Similarly, some varieties have a full series of prenasalized stops /mb, nd, ŋg/, while others have only some or no nasals. In Ba'a, the bilabial prenasalized stop is voiceless /mp/, while in other varieties, it is voiced /mb/. The phonological variation among Rote speech

varieties presents challenges for designing an orthography that consistently represents the sounds that vary across these varieties.

Table 2. Phoneme inventories of Rote speech varieties

Rote speech varieties	Consonant inventories															
Dela	<i>p</i>	<i>t</i>	<i>k</i>	<i>ʔ</i>	<i>mb</i>	<i>nd</i>	<i>ŋg</i>	<i>ɓ</i>	<i>d'</i>	<i>f</i>	<i>s</i>	<i>h</i>	<i>m</i>	<i>n</i>	(<i>ŋ</i>)	<i>r</i> <i>l</i>
Dengka	<i>p</i>	<i>t</i>	<i>k</i>	<i>ʔ</i>	<i>mb</i>	<i>nd</i>	<i>ŋg</i>	<i>b</i>	<i>d</i>	<i>f</i>	<i>s</i>	<i>h</i>	<i>m</i>	<i>n</i>		<i>l</i>
Tii	<i>p</i>	<i>t</i>	<i>k</i>	<i>ʔ</i>	<i>mb</i>	<i>nd</i>	<i>ŋg</i>	<i>ɓ</i>	<i>d'</i>	<i>f</i>	<i>s</i>	<i>h</i>	<i>m</i>	<i>n</i>	(<i>ŋ</i>)	<i>r</i> <i>l</i>
Lole	<i>p</i>	<i>t</i>	<i>k</i>	<i>ʔ</i>	<i>mb</i>	<i>nd</i>	<i>ŋg</i>	<i>ɓ</i>	<i>d'</i>	<i>f</i>	<i>s</i>	<i>h</i>	<i>m</i>	<i>n</i>		<i>l</i>
Ba'a	<i>p</i>	<i>t</i>	<i>k</i>	<i>ʔ</i>	<i>mp</i>	<i>nd</i>	<i>ŋg</i>	<i>b</i>	<i>d</i>	<i>f</i>	<i>s</i>	<i>h</i>	<i>m</i>	<i>n</i>		<i>l</i>
Termanu	<i>p</i>	<i>t</i>	<i>k</i>	<i>ʔ</i>		<i>nd</i>	<i>ŋg</i>	<i>b</i>	<i>d, d'</i>	<i>f</i>	<i>s</i>	<i>h</i>	<i>m</i>	<i>n</i>	<i>ŋ</i>	<i>l</i>
Bokai, Bilba	<i>p</i>	<i>t</i>	<i>k</i>	<i>ʔ</i>				<i>b</i>	<i>d</i>	<i>f</i>	<i>s</i>	<i>h</i>	<i>m</i>	<i>n</i>	<i>ŋ</i>	<i>l</i>
Rikou	<i>p</i>	<i>t</i>	<i>k</i>	<i>ʔ</i>		<i>nd</i>		<i>b</i>	<i>d</i>	<i>f</i>	<i>s</i>	<i>h</i>	<i>m</i>	<i>n</i>		<i>r</i> <i>l</i>
Oepao	<i>p</i>	<i>t</i>	<i>k</i>	<i>ʔ</i>		(<i>nd</i>)		<i>b</i>	<i>d</i>	<i>f</i>	<i>s</i>	<i>h</i>	<i>m</i>	<i>n</i>		<i>r</i> <i>l</i>

* The phonemes in brackets are borrowings or are quite rare. E.g. In Dela, the velar nasal /ŋ/ only occurs in onomatopoeic words.

The Inconsistencies in the Sound-symbol Representations

Most consonants and all five vowels in Rote speech varieties are represented similarly to those in the Indonesian orthography, as presented in Table 3.

Table 3. Rote existing orthography

<u>Consonant</u>														
Phoneme	b	ɓ	^m b	d	d'	ⁿ d	f	^ŋ g	h	k	l	ʔ	m	
Letter	b	b, b', 'b	mb	d	d, d', 'd	nd	f	ngg	h	k	l	', ∅	m	
Phoneme	n	ŋ	p	^m p	r	s	t							
Letter	n	ng	p	mp	r	s	t							
<u>Vowels</u>														
Phoneme	i	u	e	o	a									
Letter	i	u	e	o	a									

The representation of implosives and glottal stop phonemes in Rote speech varieties is inconsistent. The labial implosive /ɓ/ is represented by either the symbol ⟨b⟩ or ⟨b'⟩ and the apical implosive /d'/ is represented by the symbol ⟨d⟩, ⟨d'⟩ or ⟨'d⟩. This shows a non-phonemic representation of the implosives, as some orthographies of Rote speech varieties represent the implosives /ɓ/ and /d'/ simply as plosives ⟨b⟩ and ⟨d⟩ following the standard Indonesian orthography. Regarding the glottal stop, its representation diverges from standard Indonesian orthography, as it is phonemic and carries significant functional load. In Indonesian, final glottal stops are represented with the symbol ⟨k⟩, while non-final glottal stops are typically not written. Conversely, in Rote speech varieties, the glottal stop /ʔ/ is consistently represented by the symbol ⟨'⟩, as in <o'e> [ʔoʔe], meaning '1SG.call'. However, the representation of initial glottal

stops is inconsistent; some publications do not denote the initial glottal stop. For further discussion on word-initial glottal stops in Rote, see Tamelan (2021, 2024). The inconsistencies in the representation of the implosives and glottal stops in Rote speech varieties are presented in Table 4.

Table 4. Inconsistencies in the orthographies of Rote speech varieties

Rote speech varieties	Sound-symbol representations						
	#C	V_V	#C	V_V	#C	V_V	C#
<u><i>Dela (UBB):</i></u>							
Phoneme	ʙ	ʙ	ɗ	ɗ	ʔ	ʔ	ʔ
Letter	b	b'	d	d'	'	'	'
<u><i>Dengka (UBB):</i></u>							
Phoneme	b	b	d	d	ʔ	ʔ	ʔ
Letter	b	b	d	d	'	'	'
<u><i>Tii and Lole(UBB):</i></u>							
Phoneme	ʙ	ʙ	ɗ	ɗ	ʔ	ʔ	ʔ
Letter	b	b	d	d	'	'	'
<u><i>Termanu (UBB)</i></u>							
Phoneme	b	b	d	ɗ	ʔ	ʔ	ʔ
Letter	b	b	d	d'	'	'	'
<u><i>Termanu, Rote (LAI):</i></u>							
Phoneme	b	b	d	ɗ	ʔ	ʔ	ʔ
Letter	b	b	d	'd	∅	'	'
<u><i>Rikou (UBB):</i></u>							
Phoneme	b	b	d	d	ʔ	ʔ	ʔ
Letter	b	b	d	d	'	'	'
<u><i>Rote (Ingguoe, 2021)</i></u>							
Phoneme	b	b	d	d	ʔ	ʔ	ʔ
Letter	b	b	d	d	∅	'	'

Implosives are found in Dela, Tii, Lole, and Termanu. As shown in Table 4, the implosives /ʙ/ and /ɗ/ in Rote speech varieties are represented differently using the symbols ⟨b⟩ or ⟨b'⟩ for /ʙ/ and ⟨d⟩, ⟨d'⟩ or ⟨'d⟩ for /ɗ/. These implosives are represented inconsistently in the publications from UBB for Dela, Tii, Lole, and Termanu. In Dela, implosives /ʙ/ and /ɗ/ are written as ⟨b⟩ and ⟨d⟩ word-initially and as ⟨b'⟩ and ⟨d'⟩ word-medially. This varying representation is inconsistent and lacks transparency. In Tii and Lole, implosives /ʙ/ and /ɗ/ are represented as plosives ⟨b⟩ and ⟨d⟩ in all word positions, which reflects non-phonemic representations of these phonemes. In Termanu, the implosives /ʙ/ and /ɗ/ are only found word-medially and are written as ⟨b'⟩ and ⟨d'⟩. Therefore, the representation of implosives in UBB's publications shows a lack of transparency in both Dela and Tii. Similarly, in the LAI's publication of Termanu, the implosives /ʙ/ and /ɗ/ are only found word-medially. However, LAI represents them as ⟨'b⟩ and ⟨'d⟩, where the symbol indicating glottalization follows the phoneme. Balukh (2007) and Ingguoe (2021) did not mention implosive phonemes in their Rote publications.

All publications in Rote speech varieties choose to represent the glottal stop /ʔ/ with the symbol ⟨ʔ⟩. However, the representation of initial glottal stops is inconsistent: some publications do not mark initial glottal stops. While vowels are consistently represented in all Rote varieties, double vowels are written inconsistently in the publications. For example, the double vowels in the word *tehuu* ‘but’ is written as a single vowel in Termanu and as double vowel in the other speech varieties. (See Table 8 and 9 for more examples).

Challenges and Recommendations

This section details how implosives /b/ and /d/, the glottal stop /ʔ/ phonemes, and double vowels challenge the learning of the existing orthographies of Rote speech varieties. Recommendations are also given for the solution to the challenges.

The first challenge is transparently representing the bilabial and apical implosives /b/ and /d/ as there are variations among the Rote speech varieties. These implosives are phonemic in all positions in the Dela, Tii, and Lole varieties. However, Termanu only has the implosives in intervocalic positions. The phonetics of the two-voiced plosives in other Rote varieties are currently unknown. Since Indonesian does not have implosives, existing Rote orthographies represent them with three symbols, as shown in Table 5.

Table 5. Examples of inconsistent representation of /b/ and /d/ in Rote speech varieties

Rote speech varieties		Phoneme /b/							
Dela (UBB)	<i>bib'i</i>	‘lamb’	<i>bub'ulu'</i>	‘know’	<i>bob'oa'</i>	‘side’	<i>teb'e</i>	‘true’	
Tii (UBB)	<i>bibi</i>	‘lamb’	<i>bubuluk</i>	‘know’	<i>boboan</i>	‘side’	<i>tebe</i>	‘true’	
Lole (UBB)	<i>bibi'i</i>	‘divide’	<i>bubuluk</i>	‘know’	<i>boboa</i>	‘side’	<i>tebe</i>	‘true’	
Termanu (UBB)	<i>sob'a</i>	‘try’	<i>bubuluk</i>	‘know’	<i>boboa</i>	‘side’	<i>tab'u</i>	‘step’	
Termanu (LAI)	<i>laboa</i>	‘fruit’	<i>so'ba</i>	‘try’	<i>boboan</i>	‘side’	<i>ta'bu</i>	‘step’	
Rote speech varieties		Phoneme /d/							
Dela (UBB)	<i>dad'i</i>	‘happen’	<i>tud'a</i>	‘fall’	<i>dud'u'a</i>	‘think’	<i>ded'e</i>	‘light’	
Tii (UBB)	<i>dadi</i>	‘happen’	<i>Ledo</i>	‘sun’	<i>dudu'a</i>	‘think’	<i>nade</i>	‘name’	
Lole (UBB)	<i>dadi</i>	‘happen’	<i>Ledo</i>	‘sun’	<i>dudu'a</i>	‘think’	<i>nade</i>	‘name’	
Termanu (UBB)	<i>dad'i</i>	‘happen’	<i>led'o</i>	‘sun’	<i>dodoo</i>	‘think’	<i>dede'a</i>	‘word’	
Termanu (LAI)	<i>da'di</i>	‘happen’	<i>le'odaek</i>	‘night’	<i>doidoso</i>	‘suffer’	<i>na'de</i>	‘name’	

There is a non-phonemic representation of implosives, as the word-initial implosives in Dela and all implosives in Tii and Lole are not represented phonemically. The inconsistent sound-symbol representations contribute to the challenges of learning the orthographies. In Dela, word-initial implosives are not represented phonemically, and both the word-initial and intervocalic representations of the phonemes /b/ and /d/ can cause issues. For instance, words like *bib'i* ‘goat, lamb’ and *dad'i* ‘so’ illustrate this inconsistency, leading language informants to believe that different symbols indicate different sounds. In Tii and Lole, the use of the symbols ⟨b⟩ and ⟨d⟩ to represent implosives has caused language informants to incorrectly assume these symbols denote voiced plosives instead. Moreover, two different publications in Termanu have used varying symbols for implosives, resulting in further inconsistency. For example, the UBB publication represents the implosive /d/ as ⟨d'⟩, while the LAI publication uses ⟨d'⟩.

Additionally, the representation of intervocalic implosives is inconsistent in both publications for Termanu. While the intervocalic /d/ is phonemically represented in forms such as *dad'i/da'di* ‘happen’, *led'o* ‘sun’, and *na'de* ‘name’, it is not represented phonemically in words such as *dodoo* ‘think’, *dede'a* ‘word’, *le'odaek* ‘night’, and *doidoso* ‘suffer’. In the analysis presented here, all intervocalic ⟨d⟩ are treated as implosives (see Table 4). This inconsistency occurs not only across Rote speech varieties but also within a single variety. Furthermore, the use of two different symbols for the implosive /d/, namely ⟨d⟩ in the UBB publication and ⟨'d⟩ in the LAI publication, does not facilitate orthographic transfer across the Rote varieties. However, it is important to note that some trisyllabic forms, such as *doidoso*, may reflect different phonetic realizations, which require further phonetic investigation.

In conclusion, the inconsistent representation of implosives across the speech varieties of Dela, Tii, Lole, and Termanu highlights an issue in the phonetic documentation within UBB’s publications. The variations in symbol usage—such as , <b'>, <d>, and <d'> by UBB, contrasted with LAI’s <'b> and <'d>—further complicate the understanding of these phonemes and their phonemic status. Such discrepancies not only obscure the phonemic distinctions but also reflect a lack of consensus within the scholarly community. This inconsistency, coupled with the omission of implosive phonemes in works by Balukh (2007) and Inguoe (2021), calls for a more unified and transparent framework for documenting these linguistic features.

To facilitate language learning and promote consistency across Rote speech varieties, the following suggestions are proposed: 1) All phonemic voiced stop implosives should be phonemically represented in all positions, and 2) Phonemic implosives should be represented with symbols ⟨b'⟩ and ⟨d'⟩ instead of ⟨'b⟩ and ⟨'d⟩. That is the base consonant plus apostrophe. This representation shows the base consonant first, followed by the implosion.

The rationale for representing implosive sounds with a base consonant followed by an apostrophe is outlined below, along with relevant examples:

1. Clarity in representation

Using the notation ⟨b'⟩ and ⟨d'⟩ immediately indicates that these sounds differ from their non-implosive counterparts. In neighboring languages such as Dhao and Hawu, distinguishing between [b] and [b'] is essential for understanding meaning. This highlights the need for clarity in transcription.

2. Phonetic consistency

This representation adheres to a consistent structure similar to other modified sounds, like aspirated consonants. For instance, in Hindi, aspirated plosives are written as ⟨bh⟩ and ⟨dh⟩. Likewise, using ⟨b'⟩ and ⟨d'⟩ maintains a systematic approach without causing confusion.

3. Ease of understanding

Readers familiar with phonetic transcription will identify the apostrophe as a marker of distinction. Representing implosives with ⟨b'⟩ and ⟨d'⟩ helps speakers and learners avoid mispronunciations rooted in misunderstanding. This consistent notation enhances comprehension across various linguistic backgrounds.

4. Linguistic precision

The unique airflow mechanism of implosives, as seen in languages like Dela, where /d/ is frequently used, necessitates precise representation. The clarity provided by the apostrophe helps articulate the sound's formation, which differs significantly from a standard [d]. This precision is essential for accurate phonetic analysis and teaching.

5. Facilitating comparative analysis

Understanding how implosives function in different languages can provide insights into phonological systems. In Dhao, for example, /b/ and /d/ are key phonemes that contrast with their non-implosive forms. Analyzing the sound patterns of Dhao alongside those of other languages, such as Hawu—which also employs similar implosive sounds—can reveal fascinating patterns and variations in sound production within the languages of East Nusa Tenggara.

The second challenge in learning the existing orthographies of Rote speech varieties arises from inconsistencies in the phoneme representation, particularly in word-initial positions. In Rote, the glottal stop phoneme is productive and occurs frequently in both word-final and non-final positions (Tamelan, 2021: 63). It can function as part of a root or an affix with various functions. Consequently, the glottal stop should be represented in all positions, while in Indonesian, it is less common and is typically not written in non-final positions between vowels, as seen in *maaf* /maʔaf/ ‘sorry’ and *kebudayaan* /kebudajaʔan/ ‘culture’. Moreover, word-final glottal stops in Indonesian are represented as /k/ as in *tidak* /tidaʔ/ ‘no, not’.

While glottal stops are represented differently from the standard Indonesian orthography due to their phonemic status and their frequency of use, the current orthographies of Rote speech varieties still exhibit inconsistencies, especially with word-initial glottal stops, as illustrated in Table 6. The glottal stops are represented with the symbol <'>; however, some languages do not write word-initial glottal stops. The symbol ∅ in the examples indicates that a glottal stop is expected, but it is not written.

Table 6. Inconsistent representation of /ʔ/ in the orthographies of Rote speech varieties

Rote speech variety	Phoneme /ʔ/					
	'elder sibling'	'1sg-see'	'root (N)'	'3sg-root (v)'	'1sg-go'	'1sg-decide'
Dela-Dengka (UBB)	<'a'a>	<'ita>	<'oka>	<na-'oka>	<'uu>	<'u-'etu>
Tii (UBB)	<ka'a>	<∅ita>	<∅oka>	<na-∅oka>	<∅uu>	<∅a-ketu>
Lole (UBB)	<ka'a>	<∅ita>	<∅oka>	<na-∅oka>	<∅uu>	<∅a-ketu>
Termanu (UBB)	<ka'a>	<∅ita>	<∅oka>	<na-∅oka>	<∅u>	<∅a-ketu>
Termanu (LAI)	<ka'a>	<∅ita>	<∅oka>	<na-∅oka>	<∅u>	<∅a-ketu>
Rikou (UBB)	<∅a'a>	<∅ita>	<∅oka>	<na-∅oka>	<∅uu>	<∅a-ketu>
Rote (LAI)	<ka'a>	<∅ita>	<∅oka>	<na-∅oka>	<∅u>	<∅a-ketu>

The data in Table 6 indicates that medial and final glottal stops are represented in all the speech varieties, while initial glottal stops are only represented in Dela and Dengka in UBB's publication. In other speech varieties published by LAI and UBB, the initial glottal stops are not written down. Ingguae (2015) and Balukh (2007) also did not represent word-initial glottal stops in their publications. Further research is necessary to understand the status of the initial glottal stops in languages where they are not represented. This inconsistency suggests that some authors or publishers might treat all the word-initial glottal stops as epenthetic, which leads to their omission. However, some word-initial glottal stops are epenthetic in Rote speech varieties, while others are contrastive. For a comprehensive analysis of word-initial glottal stops in Rote, see Tamelan (2024).

This inconsistent representation of word-initial glottal stops challenges readers learning to read in Rote speech varieties. To establish unified symbols that can facilitate learning and transfer across Rote varieties, it is recommended that 1) all phonemic glottal stops, regardless of their position within words, be represented in all Rote speech varieties, and 2) phonetic glottal stops do not need to be represented. In many cases, phonetic glottal stops may be considered optional or redundant in the writing system because their absence does not lead to ambiguity. This can simplify the writing system and make it easier for learners to read and write the language without overwhelming them with additional symbols that do not contribute to distinguishing meaning. Representing the phonemic glottal stops will help disambiguate words that include glottal stops from those that do not, as illustrated by the minimal pairs in Table 7.

Table 7. Minimal pairs of glottal stop /ʔ/ and no glottal stop /Ø/ in Dela

<i>Word-initial position with and without /ʔ/</i>		
'etu	/ʔetu/	'break (rope)'
etu	/etu/	'catfish'
'ai	/ʔai/	'forbid'
ai	/ai/	'fire'
'ena	/ʔena/	'close (door)'
ena	/ena/	'PFV'
<i>Word-medial position with and without /ʔ/</i>		
ⁿ daʔe	/ ⁿ daʔe/	'betel nut'
ⁿ dae	/ ⁿ dae/	'put'
toʔo	/toʔo/	'uncle'
too	/too/	'year'
ʔeʔo	/ʔeʔo/	'move over (sit)'
ʔeo	/ʔeo/	'stir (drink)'
<i>Word-final with and without /ʔ/</i>		
b'au'	/ʔauʔ/	'bat'
b'au	/ʔau/	'increasingly'
tute'	/tuteʔ/	'immediately'
tute	/tute/	'continue, connect'
una'	/unaʔ/	'fish scale (n)'
una	/una/	'scale (fish) (v)'

The third challenge in using the existing orthographies of Rote speech varieties arises from inconsistencies in the representation of double vowels. While the existing orthographies treat the double vowels as two different vowels and are represented with two sequences of vowels, there are inconsistencies in how these double vowels are written. This may be due to a lack of understanding regarding which words have double vowels.

Phonetically long vowels in Rote are analyzed as sequences of two vowels, with each vowel being the head of a syllable nucleus (Tamelan, 2021). The contrast between double and single vowels is most clearly exemplified in two contexts, as illustrated in Table 8. First, a comparison of monosyllabic and disyllabic words demonstrates the difference. Monosyllabic words act as functors and do not carry stress, whereas disyllabic words are lexical and carry

penultimate stress. Second, the contrast between disyllabic and trisyllabic words shows that the stress is placed on the penultimate vowel. This is the first vowel for disyllabic words, while for trisyllabic words, it is the second vowel. For a comprehensive analysis of double vowels, consult Tamelan (2021).

Table 8. Minimal pairs of single and double vowels in Dela

Monosyllabic functors (no stress)		Disyllabic lexical words (penultimate stress)		
<i>se</i> [sɛ]	‘3PL.ACC’	<i>see</i>	[ˈsɛ:]	‘who’
<i>sa</i> [sɐ]	‘NEG2’	<i>saa</i>	[ˈsa:]	‘what’
<i>dɔ</i> [dɔ]	‘or’	<i>doo</i>	[ˈdɔ:]	‘long’
Disyllabic lexical words		Trisyllabic lexical words		
<i>lilɪ?</i>	[ˈlɪlɪ?]	‘under arm’	<i>lilii?</i>	[liˈli:ʔ] ‘forget’
<i>lele?</i>	[ˈlɛlɛʔ]	‘time, era’	<i>lelee?</i>	[lɛˈlɛ:ʔ] ‘cloud’
<i>filo</i>	[ˈfilɔ]	‘whip’	<i>filoo</i>	[fiˈlɔ:] ‘ <i>sterculia</i> genus’

Since phonetically long vowels in Rote contrast with single vowels in terms of their stress, they must be consistently represented. However, inconsistencies in the representation of double vowels are still found in most of the existing orthographies, as shown in Table 9.

Table 9. Inconsistent representation of double vowels in the orthographies of Rote

Rote speech variety	Double vowels					
	‘1pi-with’	‘3pl-with’	‘but, because’	‘friend, sibling’	‘diligent’	‘strong’
Dela (UBB)	⟨too⟩	⟨roo⟩	⟨te huu⟩	⟨toronoo⟩	⟨manggate⟩	⟨manggatee⟩
Dengka (UBB)	⟨too/to⟩	⟨lo/loo⟩	⟨te huu, tehuu⟩	⟨tolano/tolanoo⟩	⟨manggate⟩	⟨manggatee/manggatee’⟩
Tii (UBB)	⟨to⟩	⟨roo⟩	⟨tehuu⟩	⟨toranoo⟩	⟨manggatek⟩	⟨manggateek⟩
Lole (UBB)	⟨to⟩	⟨lo⟩	⟨tehuu⟩	⟨tolanoo⟩	⟨manggatek⟩	⟨matea⟩
Termanu (UBB)	⟨to⟩	⟨lo⟩	⟨tehuu⟩	⟨tolanoo⟩	⟨-⟩	⟨matea⟩
Termanu (LAI)	⟨too⟩	⟨lo⟩	⟨tehu⟩	⟨tolano/tolanoo⟩	⟨-⟩	⟨matea⟩
Rikou (UBB)	⟨to⟩	⟨ro⟩	⟨tehuu⟩	⟨toranoo⟩	⟨makate⟩	⟨matea⟩
Rote (LAI)	⟨too⟩	⟨lo⟩	⟨tehu⟩	⟨tolanoo⟩	⟨-⟩	⟨matea⟩

The data in Table 9 show inconsistencies in representing double vowels among the Rote speech varieties and within a single variety, as shown in the example from Dengka and Termanu (LAI). A more detailed morphosyntactic analysis of monosyllabic and disyllabic words in Rote would be required to determine whether some vowel sequences should be analyzed as double vowels or single vowels. For a comprehensive analysis of the structure and stress patterns of monosyllabic and disyllabic words in Rote, see Tamelan (2021: 23–24). The representation of double vowels can lead to confusion and misunderstandings in both writing and pronunciation. When double vowels are written as a single vowel instead of as two separate vowels, it can shift

the word stress and result in inaccuracies in how words are understood and used, as illustrated in (1) and (2).

(1) Stress pattern for disyllabic roots

	x			
(x)	x	x	(x)	(x)
(C)(V-)(C)	V	(C)V(C)(-C)(V)(-C)(V)		
m	a	t a		‘eye’
m	a	t a =n a		‘eye=3SG.GEN’
t e-	h	u u		‘but, because’
*t	e	h u		*‘but, because’
t	o	o		‘year’

(2) Stress for trisyllabic and quadrisyllabic affixed words

			x			
(x)		(x)	x	x	(x)	(x)
(C)(V-)	(C)	(V-)(C)	V	(C)V(C)(-C)(V)(-C)(V)		
m	a-	ng	a	t e ?		‘diligent’
m	a-	ng	a	t e =n a =r a		‘diligent=3SG.GEN=PL’
m a-	ngg	a-	t	e e ?		‘strong’
*m	a-	ng	a	t e ?		*‘strong’
t o	l	a-	n	o o		‘friend, sibling’
*t	o	l	a	n o		*‘friend, sibling’
n a-	k	a-	nd	o o		‘continue’

The examples in (1) and (2) illustrate how the word stress in *te huu* ‘but, because’, *manggatee* ‘strong’, *tolanoo* ‘friend, sibling’ shifted when double vowels are written as single vowels. For both speakers and learners of the language, this may create difficulties in identifying which words contain double vowels, potentially impacting literacy and communication. Furthermore, these inconsistencies can impede the development of standardized orthographies, making it more difficult for linguists and educators to effectively teach and promote the language. Thus, it is recommended that double vowels are consistently represented. Overall, clarity and consistency in the representation of double vowels are essential for accurate communication and effective language learning.

Implications to the Learnability of the Orthographies

Two of the criteria for an adequate orthography are related to education: learnability and ease of transfer to other languages (Malone, 2004; Smalley, 1964). Learnability refers to the extent to which an orthography can be easily learned and used by speakers and learners of the language. Several factors contribute to the challenge of teaching and learning orthography, namely: (1) the complexity of teaching and learning reading and writing increases when there is a mismatch between spoken and written language; (2) the symbols and conventions used in the orthography do not facilitate the transfer to other languages, including closely related languages and the national language; and (3) the visual appearance of the orthography affects the reading process.

The findings of this study have revealed a lack of transparency and inconsistent representation of implosives /ɓ/ and /ɗ/, the glottal stop /ʔ/, and double vowels in the

orthographies of Rote speech varieties. In addition, different symbols are used for the implosives, and this inconsistency hinders the transfer among Rote speech varieties and to neighboring languages with similar features, such as Dhao and Hawu.

Orthographic transparency is crucial in how easily learners can acquire reading and writing skills. A transparent orthography allows learners to predict how words should sound based on their spellings, facilitating quicker and more efficient word recognition (Ziegler & Goswami, 2020). In contrast, the observed inconsistencies in Rote speech varieties hinder this predictive mechanism, making it more challenging for learners, especially young children starting their literacy journey. Research indicates that languages with higher levels of orthographic transparency tend to produce more proficient readers in shorter periods (Seymour, 2006). The lack of transparency in these Rote varieties may lead to slower literacy acquisition rates and require more instructional time for mastering reading and writing skills.

Choosing different symbols to represent the same phonemes in closely related languages or speech varieties can lead to: (1) Reduced mutual intelligibility: Speakers of one language may find it more challenging to read and understand texts in another related language (Hickey, 2013); (2) Increased complexity in language learning: Learners may need to learn multiple orthographic systems, which can be confusing and time-consuming (Cook, 2008); (3) Challenges in comparative linguistics: Researchers may face difficulties in comparing languages and identifying cognates due to inconsistent orthography (Campbell, 2013); and (4) Practical challenges: Developing language learning materials, dictionaries, and other resources may become more complicated (Seifart, 2011).

The challenges associated with the lack of transparency and inconsistencies in the existing orthographies of Rote speech varieties are less complex than those found in languages such as English. These challenges can be addressed through pedagogical strategies, such as providing explicit instruction on inconsistencies. However, the benefits and opportunities that come with learning English often outweigh these challenges, whereas minority languages, such as Rote, face more significant obstacles in attracting and retaining learners.

Several factors contribute to the students' high motivation to learn English, namely: (1) Global relevance: English is widely used in international communication, making it a valuable skill for students to acquire (Jenkins, 2014); (2) Career opportunities: Proficiency in English can open doors to better job prospects, higher education, and global mobility (Daqiq et al., 2024); (3) Cultural influence: English-language media are widely popular and influential, fostering interest and motivation to learn the language (Baker & Ishikawa, 2021); and (4) Access to resources: English language learning materials, online courses, and language learning apps are abundant, making it easier for students to access resources and support (Mohammadkarimi, 2024; Pennington et al., 2024).

In contrast, minority languages face more significant challenges in attracting and retaining learners for several reasons:

- (1) Limited resources: Minority languages often have limited learning materials, qualified teachers, and online resources, making it harder for students to access support (Austin & Sallabank, 2013);
- (2) Niche relevance: Minority languages may be less relevant to students' daily lives, careers, or global communication, reducing motivation to learn (Berez-Kroeker et al., 2020);
- (3) Cultural identity: While cultural identity can be a strong motivator, it may not be enough to overcome the challenges of learning a minority language (May, 2012); and

- (4) Lack of opportunities: Limited opportunities to practice and use minority languages in real-life situations can hinder motivation and progress (Cenoz & Gorter, 2020).

Therefore, transparent orthography can facilitate language learning and literacy for minority languages. Transparency in orthography helps learners navigate the complexities of language and supports their overall literacy development. Such orthographies feature a close relationship between sounds and symbols, making it easier for learners to decode and spell words accurately. This is especially important for minority languages, where resources and support may be limited. By adopting a transparent orthography, these languages can improve accessibility and promote revitalization efforts.

In Rote, the choice of sound representation is vital for language maintenance. Consistent representation of phonemes across various Rote dialects would encourage the acceptance of orthography and simplify the learning of sound systems. Research indicates that transparent orthographies with consistent grapheme-phoneme correspondences are learned more easily than complex orthographies with inconsistent and irregular spellings (Caravolas et al., 2013). An effective orthography is not only easy to learn but can also facilitate transfer to other related languages, supporting the government's language revitalization initiatives.

CONCLUSION

This research has identified three major challenges in the orthographies of six Rote speech varieties due to the lack of orthographic transparency and inconsistencies in sound-symbol representations. First, the inconsistent and non-phonemic representation of implosives across the speech varieties of Dela, Tii, Lole, and Termanu, as seen in the varying symbol usage by UBB and LAI, complicates the understanding of these phonemes and their phonemic status. Such discrepancies not only obscure the phonemic distinctions but also reflect a lack of consensus within the scholarly community. The non-phonemic representation of implosive sounds poses a risk of their eventual loss, as inconsistencies can lead to a decline in their recognition and use among speakers, especially the younger generation. Without proper documentation and representation, the unique identity of these implosive sounds may fade from the linguistic landscape, potentially leading to their disappearance over time. Second, the treatment of glottal stops, especially word-initial glottal stops, varies across sources, with some omitting them and others including them, leading to confusion for learners and obscuring their phonemic role. This inconsistency suggests differing views on whether initial glottal stops are epenthetic or contrastive, highlighting the need for a standardized approach and further research of the phoneme within the speech varieties. Lastly, the representation of double vowels varies widely, with some sources treating them as single units while others split them into distinct vowels. This inconsistency is not limited to different publications but also within a single publication.

The inconsistencies in the orthographies of Rote speech varieties highlight the need for a more transparent and consistent framework to document these linguistic features. A transparent and consistent approach not only enhances the clarity of the phonological systems within the Rote speech varieties but also plays a crucial role in preserving the speech varieties. To achieve this, it is suggested that:

- (1) All the phonemic voiced stop implosives and glottal stops should be represented with the same symbol across all Rote speech varieties;
- (2) Double vowels must be written as two consecutive vowels;

- (3) Further research on the variation of implosives and glottal stops in Rote speech varieties is necessary; and
- (4) Scholars should reevaluate their orthography design, addressing the outline challenges and viewing Rote as a language/dialect chain while seeking community feedback for revisions.

Repeating the cycle of revising and retesting orthography designs is essential to ensure ongoing effectiveness. An effective orthography is easy to learn and facilitates transfer to other related languages, supporting the government's language revitalization initiatives. Language development programs should also encompass orthography, pedagogical and post-literacy materials, proper training, and effective literacy instruction. These findings contribute to ongoing discussions on orthography development in minority languages, particularly in contexts where linguistic variation and community literacy needs intersect.

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ⁱ The term double vowels refers to sequences of two identical vowels that function as separate syllabic nuclei, similar to what is often called vowel sequences in the linguistic literature (Tamelan, 2021). These sequences differ from phonemic long vowels because each vowel occupies its own syllable position and contributes to the stress pattern of the word. The term is used following the orthographic conventions used in the Rote publications examined in this study.

ⁱⁱ While orthography therefore includes a wide range of elements, the present study focuses specifically on sound–symbol correspondences, namely how phonemes are represented by letters or diacritics in the existing orthographies of Rote speech varieties. This aspect is particularly relevant for evaluating orthographic transparency, which concerns the consistency of grapheme–phoneme relationships in a writing system.

ⁱⁱⁱ Balukh (2021) analyzed the implosion of the two voice stops in Lole as phonetic; therefore, they are not treated as phonemes.

^{iv} The phonetic quality of the two voiced stops in Dengka needs verification with speakers from different parts of Dengka. It appears that the implosion is recorded by the speakers who live near Dela-Oenale.