

## Orthographic Variation in the Representation of Ingressive Plosives in Bimanese: Evidence from Digital Communication

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### Abstract

*This study investigates the orthographic representation of the ingressive bilabial plosive /b/ and the ingressive dental–epikopos plosive /d/ in contemporary Bimanese (Bahasa Mbojo). Although these phonemes have been formally standardized in Kamus Mbojo–Indonesia Edisi Ketiga (2023), preliminary observations indicate significant variation in actual written usage. Drawing on naturally occurring data from WhatsApp group interactions among Bimanese speakers, this study identifies two dominant orthographic strategies: cluster substitution ( $\bar{b} \rightarrow pb$ ,  $\bar{d} \rightarrow td$ ) and phonological simplification ( $\bar{b} \rightarrow b$ ,  $\bar{d} \rightarrow t$ ). Using a qualitative-dominant mixed-method approach supported by phonological theory, acoustic phonetics, orthographic studies, and sociolinguistics, the study demonstrates that these forms are systematic and socially shared rather than random errors. The findings reveal a substantial gap between orthographic standardization and real-world language practice, shaped by phonological markedness, Indonesian language influence, and technological constraints in digital communication. This study contributes to broader discussions on orthography, language planning, phonological representation, and digital sociolinguistics in minority languages.*

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## 1. INTRODUCTION

Bimanese (Bahasa Mbojo), spoken in West Nusa Tenggara, constitutes a linguistically distinctive system whose phonological structure differs significantly from Indonesian despite both languages employing a Latin-based writing system. In addition to excluding q, v, x, and z, the Bimanese alphabet incorporates phonological elements that are not represented in Indonesian, including the nasal clusters /ng/ and /ngg/ and two typologically marked consonants: the ingressive bilabial plosive /b/ and the ingressive dental–epikopos plosive /d/. These consonants function phonemically in the language and therefore require accurate orthographic representation to preserve lexical distinctions.

The formal codification of these sounds in *Kamus Mbojo–Indonesia Edisi Ketiga* (2023), which prescribes the graphemes *b* and *ḍ*, reflects a deliberate effort in language planning to align orthographic practice with phonological structure. Orthographic standardization is generally based on the principle that writing systems should maintain a relatively transparent correspondence between phonemes and graphemes to facilitate literacy and preserve linguistic distinctions (Coulmas, 2013; Sebba, 2007). Within this framework, the introduction of *b* and *ḍ* represents an attempt to maintain the phonological integrity of Bimanese in a multilingual environment where Indonesian functions as the dominant language.

Despite these standardization efforts, sociolinguistic research has demonstrated that official orthographic norms do not necessarily determine actual language practices. Standardized forms frequently coexist with community-based alternatives, particularly in multilingual settings where dominant languages influence local linguistic systems (Milroy & Milroy, 2012; Clyne, 2003). Such divergence between prescribed norms and everyday usage becomes especially visible in digital communication, where accessibility, efficiency, and technological constraints influence orthographic choices.

Preliminary observations of contemporary Bimanese writing in digital platforms such as WhatsApp and Facebook indicate that many speakers, including educated users and local scholars, do not consistently employ the standardized graphemes *b* and *ḍ*. Instead, alternative representations such as *pb*, *td*, *b*, and *t* occur frequently across various communicative contexts. The recurrence of these forms across multiple users suggests that they represent systematic orthographic practices rather than isolated spelling mistakes.

The emergence of these variants may be explained partly through phonological markedness. According to markedness theory, certain linguistic structures are considered marked because they are typologically less frequent, structurally more complex, and more susceptible to variation and reduction (Trubetzkoy, 1969; Jakobson, 1968). Ingressive or implosive-like consonants belong to this category because their production involves articulatory mechanisms distinct from ordinary pulmonic egressive consonants. Specifically, their articulation requires laryngeal lowering and reduced oral air pressure, making them acoustically and articulatorily more complex than ordinary stops (Ladefoged & Maddieson, 1996; Clements & Osu, 2002).

Recent acoustic studies further support the distinctiveness of implosive consonants. Roux et al. (2023) demonstrate that implosives exhibit characteristic phonetic properties such as short or near-zero Voice Onset Time (VOT), elevated fundamental frequency (*f*<sub>0</sub>), and distinctive amplitude patterns. These features differentiate implosives from ordinary voiced plosives and reinforce their status as independent phonological categories. Because of their marked nature, such sounds often become targets for orthographic adaptation when speakers attempt to represent them in writing.

The orthographic variation observed in Bimanese can be interpreted through two major adaptation strategies: approximation and simplification. Orthographic variation is often systematic rather than random and frequently reflects speakers' attempts to reconcile phonological complexity with practical writing conventions (Sebba, 2007). One common strategy is phonological approximation, whereby a complex phoneme is represented using combinations of familiar graphemes (Hock & Joseph, 2009). In the Bimanese context, the forms *pb* and *td* appear to approximate the articulatory or perceptual properties of the ingressive consonants. Another strategy is phonological simplification, whereby marked sounds are reduced to less complex and more typologically common forms (Hyman, 2008). The representations *b* and *t* exemplify this process because they eliminate the distinctive ingressive feature entirely.

These orthographic choices also have phonological implications. Phonological contrasts are maintained through multiple acoustic cues, including Voice Onset Time, fundamental frequency, intensity, and spectral characteristics (Lisker & Abramson, 1964; Kingston & Diehl, 1994). Consequently, orthographic substitutions may affect how phonological distinctions are conceptualized and represented. Approximation strategies such as *pb* and *td* introduce additional segments that are absent from the original phonemes, potentially altering syllable structure and

phonological interpretation (Kenstowicz, 1994). Simplification strategies such as b and t remove distinctive phonological features altogether, resulting in phonemic neutralization (Hyman, 2008).

In addition to phonological factors, sociolinguistic and technological influences play a crucial role in shaping orthographic practices. Language contact frequently generates orthographic interference from dominant languages (Clyne, 2003), and Indonesian orthographic conventions inevitably influence the writing practices of Bimanese speakers. Furthermore, digital communication environments prioritize speed, convenience, and ease of typing. Computer-mediated communication has repeatedly been shown to encourage orthographic innovation and variation, particularly when specialized characters are unavailable on standard keyboards (Crystal, 2006; Androutsopoulos, 2011). Because graphemes such as b̥ and d̥ are not readily accessible in most typing interfaces, speakers often adopt alternative spellings that are easier to produce. Through repeated use, these alternatives may become normalized and eventually function as informal orthographic conventions within online communities.

Although research on implosives has expanded considerably in acoustic phonetics (Roux et al., 2023), relatively little attention has been paid to their orthographic representation, particularly in minority and regional languages. Likewise, studies of orthographic variation have generally focused on broader sociolinguistic processes without specifically examining how marked phonological features are represented in writing. As a result, the interaction between phonological markedness, orthographic variation, and digital communication remains underexplored, especially in the case of Bimanese.

This study seeks to address this gap by investigating the orthographic representation of the Bimanese ingressive plosives /b̥/ and /d̥/ in contemporary digital communication. Specifically, the study aims to:

1. identify the range of orthographic variants used to represent /b̥/ and /d̥/;
2. analyze the patterns of approximation and simplification underlying these variants; and
3. explain the sociolinguistic and technological factors contributing to their emergence and circulation.

By integrating perspectives from phonological markedness theory, acoustic phonetics, orthography, and digital sociolinguistics, this study contributes to a broader understanding of how minority language communities negotiate between phonological fidelity and communicative efficiency in contemporary writing practices.

## 2. RESEARCH METHOD

This study employs a qualitative-dominant mixed-method design combining corpus-based analysis and digital ethnography.

### 1 Data Sources

The study uses:

1. *Kamus Mbojo–Indonesia Edisi Ketiga* (2023) as the official orthographic reference;
2. screenshots of WhatsApp group interactions among Bimanese speakers.

### 2 Data Collection

Data were collected through purposive sampling. Messages containing representations of /b̥/ and /d̥/ were identified and documented through screenshots. Only naturally occurring interactions were included to preserve authenticity.

### 3 Data Coding

The collected forms were categorized as follows:

Category	Representation
Standard	b̥, d̥
Cluster substitution	pb, td
Simplification	b, t

### 4 Data Analysis

The data were analyzed through:

- frequency analysis,
- pattern analysis, and
- sociolinguistic interpretation.

The analysis focused on identifying systematic orthographic strategies and explaining their relationship to phonological markedness, language contact, and technological constraints.

### 5 Ethical Considerations

All participants were anonymized, and the study focused exclusively on linguistic patterns rather than individual identities.

## 3. FINDINGS AND DISCUSSION

This section presents the findings concerning the orthographic representation of the ingressive bilabial plosive /b/ and the ingressive dental–epicopose plosive /ḍ/ in contemporary Bimanese digital communication. The analysis demonstrates that orthographic variation is systematic, socially distributed, and linguistically motivated rather than random or accidental. Four major representation patterns were identified: **standard representation (b, ḍ), cluster substitution (pb, tḍ), and simplification (b, t)**.

The discussion integrates phonological theory, acoustic phonetics, orthographic studies, and sociolinguistics to explain how these patterns emerge and circulate within the speech community.

### 1. General Patterns of Orthographic Variation

The collected WhatsApp data reveal that the officially standardized graphemes **b** and **ḍ** are used far less frequently than alternative forms. Most participants preferred either consonant clusters (**pb, tḍ**) or simplified forms (**b, t**) when representing the ingressive plosives.

The findings indicate that orthographic variation occurs along a continuum:

#### Standard Form Approximation Simplification

b	pb	b
ḍ	tḍ	t

This continuum suggests progressive reduction of phonological complexity. At one end, the standardized graphemes preserve phonological specificity; at the other, simplified forms reduce marked features entirely. The intermediate cluster forms attempt to preserve complexity through expansion into more familiar orthographic sequences.

Importantly, these patterns were not isolated occurrences. Multiple participants consistently used the same substitution strategies across different interactions, indicating that the variation represents a socially shared writing convention rather than individual inconsistency.

This finding supports Sebba’s (2007) argument that orthographic variation is often systematic and community-based rather than random deviation from a standard norm.

### 2. Cluster Substitution as Phonological Approximation

One of the most prominent findings is the widespread use of **pb** and **tḍ** as substitutes for /b/ and /ḍ/. From a phonological perspective, these forms can be interpreted as instances of phonological approximation, in which speakers attempt to represent a marked sound using a sequence of more familiar phonological elements.

The use of **pb** appears to reflect an effort to preserve the perceptual “heaviness” or articulatory complexity associated with /b/. Instead of reducing the sound directly to /b/, speakers expand it into a consonant cluster. Similarly, **tḍ** appears to function as an orthographic approximation of /ḍ/, preserving some sense of articulatory distinctiveness absent in ordinary /d/ or /t/.

This process aligns with Hock and Joseph’s (2009) explanation that marked sounds are often decomposed into sequences of unmarked segments during adaptation. In orthographic terms,

cluster substitution allows writers to visually signal that the target sound differs from ordinary plosives, even if the representation does not correspond exactly to phonological structure.

However, cluster substitution also introduces significant phonological consequences. The original phoneme /b/ is a single consonantal unit, yet the representation pb creates the appearance of a consonant sequence. Similarly, td introduces an artificial cluster absent from the original phonological structure. As Kenstowicz (1994) notes, such orthographic expansions may influence how speakers conceptualize phonological organization, potentially altering syllable interpretation and phonotactic perception.

The findings therefore suggest that cluster substitution represents a compromise strategy: it attempts to preserve markedness while simultaneously adapting the sound into a more typable and visually familiar orthographic structure.

### 3. Simplification and Feature Reduction

In addition to cluster substitution, many participants used the simplified forms b and t. Unlike approximation, simplification removes the distinctive features associated with ingressive articulation and replaces them with more common consonants.

From the perspective of markedness theory, this process is expected. Marked sounds are more vulnerable to reduction because they involve greater articulatory and perceptual complexity (Trubetzkoy, 1969). Simplification therefore reflects a tendency toward phonological economy and ease of representation.

The replacement of /b/ with b effectively neutralizes the distinction between ingressive and ordinary bilabial plosives. Likewise, the replacement of /ḍ/ with t removes the distinctive articulatory characteristics of the ingressive dental–epikopos sound. These substitutions demonstrate what Hyman (2008) describes as phonemic neutralization, where contrasts between phonemes collapse under particular linguistic conditions.

Acoustically, this reduction is significant because implosive-like consonants possess distinctive cues such as short VOT, elevated f0, and characteristic amplitude patterns (Roux et al., 2023). Simplification obscures these distinctions entirely, reducing phonological specificity in written representation.

Nevertheless, the persistence of simplified forms indicates that communicative efficiency often outweighs phonological precision in everyday writing. In digital communication contexts, the functional goal of rapid interaction may take precedence over adherence to orthographic standards.

### 4. Orthographic Variation as a Reflection of Markedness

The observed variation strongly supports the claim that ingressive plosives constitute marked phonological structures within Bimanese orthography. Marked sounds are cross-linguistically more susceptible to adaptation, simplification, and replacement because they are both articulatorily complex and typologically uncommon (Jakobson, 1968).

The continuum identified in this study:

b̥	→	pb	→	b
ḍ̥	→	td	→	t

illustrates progressive reduction of markedness. The standardized graphemes preserve the full phonological identity of the sounds, cluster substitutions partially preserve complexity, and simplified forms eliminate markedness entirely.

This pattern demonstrates that orthographic adaptation is not random but hierarchically organized according to degrees of phonological complexity. The findings therefore provide empirical support for markedness theory in the context of orthographic representation.

### 5. Sociolinguistic Influence and Indonesian Orthographic Dominance

The findings also reveal the strong influence of Indonesian orthographic conventions on Bimanese writing practices. Since Indonesian does not contain ingressive plosives, its writing system provides no direct model for representing sounds such as /b/ and /d̪/. Consequently, Bimanese speakers appear to adapt these sounds using orthographic resources already familiar from Indonesian literacy practices.

This phenomenon aligns with Clyne's (2003) concept of orthographic interference, whereby dominant languages shape the representation of minority languages. Indonesian functions as the primary language of education, administration, and literacy for most Bimanese speakers. As a result, Indonesian orthographic conventions strongly influence how speakers conceptualize acceptable written forms.

The widespread use of b and t reflects this influence particularly clearly because these graphemes correspond directly to familiar Indonesian consonants. Similarly, the use of pb and td may reflect attempts to reconcile Bimanese phonology with Indonesian-based orthographic intuition.

Importantly, several participants observed in this study are themselves educated individuals or local scholars. This finding demonstrates that orthographic variation cannot simply be attributed to lack of education or unfamiliarity with linguistic concepts. Rather, it reflects broader sociolinguistic dynamics in which practical usage norms compete with institutional standardization.

### 6. Digital Communication and Vernacular Orthography

Digital communication environments play a crucial role in shaping the observed orthographic practices. WhatsApp interactions are characterized by informality, rapid exchange, and minimal editorial monitoring. Such contexts encourage orthographic flexibility and reduce pressure to conform to standardized writing conventions (Crystal, 2006).

One major factor contributing to variation is technological accessibility. Standard smartphone and computer keyboards do not readily support specialized characters such as b̪ and d̪. Producing these symbols often requires additional keyboard settings, copying and pasting, or external character insertion tools. As a result, users naturally gravitate toward more accessible alternatives.

This technological limitation contributes to the emergence of what Sebba (2012) terms vernacular orthography—informal writing systems shaped by usability and community practice rather than institutional prescription. In the Bimanese context, forms such as pb, td, b, and t function effectively as community-recognized alternatives, even when they diverge from official standards.

The findings therefore demonstrate that orthographic standardization must be understood not only as a linguistic issue but also as a technological and social one. The success of standardized forms depends partly on their accessibility within everyday communication environments.

### 7. Implications for Orthography and Language Planning

The findings of this study have broader implications for orthographic planning in minority languages. The existence of standardized graphemes alone does not guarantee successful implementation. Orthographic systems must also be practical, typable, and socially accepted. The persistence of non-standard representations suggests a gap between institutional language planning and community language practice. This gap highlights the importance of considering:

- technological accessibility,

- digital literacy practices, and
- community-based orthographic norms

in orthographic standardization efforts.

Furthermore, the findings suggest that language planning should incorporate strategies for increasing public awareness of standardized forms and improving technological support for specialized characters.

#### 4. CONCLUSION

This study demonstrates that the representation of ingressive plosives in Bimanese is characterized by systematic orthographic variation rather than random error. The forms pb, td, b, and t represent adaptive strategies shaped by phonological complexity, sociolinguistic influence, and technological constraints.

The findings reveal a significant gap between official orthographic standardization and actual language practice. They further suggest that successful language planning requires not only phonological accuracy but also usability, accessibility, and community acceptance.

More broadly, this study highlights the dynamic interaction between phonology, orthography, sociolinguistics, and digital communication in shaping contemporary minority language writing practices.

#### 5. SUGGESTIONS

This study focused on the orthographic representation of the ingressive plosives **b** and **d** in Bimanese digital communication. Future research may expand this work by investigating speakers' attitudes toward the standardized orthography and the factors influencing the use of alternative forms such as pb, td, b, and t. Such studies could provide deeper insight into the social acceptance of the official writing system.

Future researchers are also encouraged to conduct acoustic and phonetic analyses of Bimanese ingressive plosives to provide empirical evidence regarding their articulatory and acoustic characteristics. Additionally, comparative studies involving different age groups or digital platforms may reveal how orthographic variation is distributed across generations and communication contexts.

Finally, research on the effectiveness of language planning and orthographic dissemination efforts would be valuable in evaluating the implementation of the standardized forms **b** and **d** among Bimanese speakers. These studies could contribute to the preservation and development of Bimanese orthography in the digital era.

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