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The Behaviour of Liquid Consonants in the Tambirat Malay Dialect: An Optimality-Theoretic Account

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Abstract

Given its diverse population, Sarawak exhibits a remarkable degree of linguistic variation. Among its varieties is the Tambirat Malay dialect, a unique and understudied subdialect spoken in Kampung Tambirat, Samarahan. This study is an attempt to model the phonological behaviour of liquid consonants in this dialect, an aspect that has been overlooked by prior research. This study uses primary data collected from native speakers through interviews and the citation method with the Swadesh 200-word list as the primary instrument. Offering insights from the constraint-based approach, this study reveals that the rhotic [ɣ] is completely excluded in syllable codas, and to avoid this, deletion is employed as a repair strategy. The lateral [l], on the other hand, is allowed in a coda only when the preceding vowel is [e]. This restriction arises from the dialect's general avoidance of coda [l], and as a resolution, it is typically substituted by the high vowel [j]; however, since this substitution will yield the diphthong [ej], which is marked and ill-formed, this process is blocked by the constraint NO-[ej]. The analysis shows that ALIGN-RHOTIC must be highly ranked, but NO-[ej] must dominate ALIGN-LATERAL to eliminate candidates with the diphthong [ej]. IDENT-IO[+lateral] and MAX-IO[+rhotic], on the other hand, must be ranked low to ensure that the candidates with *ɣ*-deletion and *l*-substitution emerge as the optimal outputs. Ultimately, the following partial constraint ranking is developed: ALIGN-RHOTIC, DEP-IO, MAX-IO[–

rhotic], IDENT-IO[–lateral], NO-[ej] >> ALIGN-LATERAL >> MAX-IO[+rhotic], IDENT-IO[+lateral]. Beyond its theoretical significance, this study is crucial for the documentation of Sarawak's subdialects, many of which are gradually undergoing extinction due to language shift and urbanization.

Keywords: Constraints, Laterals, Liquid Consonants, Optimality Theory, Rhotics, Sarawak Malay Dialect, Tambirat Malay Dialect

1. Introduction

Liquid consonants are distinctive both phonetically and phonologically. Phonetically, they are difficult to categorize as they lack well-defined phonetic properties. According to Ballard and Starks (2005, p. 1), liquid consonants "demonstrate greater phonetic variability" compared to other classes of consonants. On these grounds, some linguists adopt a broader definition, classifying them as non-nasal sonorant consonants (Dickey, 1997, cited in Ballard & Starks, 2005). Phonologically, liquids are grouped together by their systematic behaviour regardless of their phonetic properties. For instance, /ɣ/ is sometimes considered a liquid consonant because of its phonological similarity to /r/, although phonetically it belongs to a category of obstruent, more specifically, fricatives (Asmah, 2008a). This argument is supported by Lass (1984), who claims that trills, fricatives, and approximants can be considered liquids, given their liquid-like distribution and behaviour.

The distinctive characteristics of liquid consonants have been widely acknowledged in the literature. This is reflected in their remarkable phonetic and phonological features across languages as evidenced in, for instance, Zobarlar's (2022) analysis of liquid consonants in standard Turkish, and Vergara's (2024) acoustic analysis of compensatory lengthening in relation to liquid loss in Cartagena.

2. Problem Statement

Past studies such as Zaharani (2006) and Zaharani (2014) attempted to account for the different distributions of liquid consonants across dialects in Malaysia using the framework of Optimality Theory. These findings, however, are limited to the primary dialect of each state, and for Sarawak, only the Kuching variety was examined. This is unsatisfactory since previous studies have revealed that the behaviours of liquid consonants in other regional dialects in Sarawak are significantly different from that in Kuching. For instance, Shahidi, Samad Kechot & Sharhaniza Othman (2016) reported that the lateral in the Sadong dialect is substituted by

[j], a pattern that is also observed in Kedah. Similarly, Azureen Hamid, Sharifah Raihan Syed Jaafar & Tajul Aripin Kassin. (2016) reported the same behaviour of the lateral in the Saribas dialect. Given these observations, it is reasonable to hypothesize that other dialects in Sarawak should have unique and distinct patterns of liquid consonant behaviour.

Additionally, research on Sarawak dialects within the framework of Optimality Theory remains limited. Optimality Theory as a theoretical framework should be able to capture phonological phenomena adequately and provide the typological motivation for different phonological behaviours cross-linguistically (McCarthy, 2002). However, there are only a handful of studies on Sarawak dialects that apply this framework, such as Sharifah Raihan (2013a), which focused on nasal substitution, and Sharifah Raihan (2013b), which investigated vowel raising. Therefore, further research on Sarawak dialects adopting this framework is necessary. Such an effort will be beneficial not only for theoretical development but also for the documentation of Sarawak dialects.

Given the size and diverse population of Sarawak, it makes sense to assume that the subdialects spoken in this state should exhibit complex phonological patterns, warranting an optimality-theoretic analysis similar to the approach adopted by Zaharani (2006) for the dialects of each state in Malaysia. Such an effort is essential to satisfactorily capture the full range of phonological phenomena, particularly those concerning liquid consonants that are present in this state. The present study will not only address the critical gap in this particular domain but also contribute to the wider application of Optimality Theory in understanding the Malay dialects. In this study, I will demonstrate another unique phonological pattern of liquid consonants using data from the Tambirat Malay dialect, which remains understudied, thereby contributing to Malaysian dialectology. This study also contributes to the optimality-theoretic enterprise: I will argue that Optimality Theory can effectively model the unique behaviour of liquid consonants in this dialect by demonstrating an interplay between markedness and faithfulness constraints, which govern the behaviour and distribution of these consonants. This is different from the traditional rule-based approach, which describes phonological phenomena through a series of rules to derive the output. As a constraint-based approach, Optimality Theory captures an important generalization: how the universal markedness constraints are enforced in certain dialects to motivate phonological changes. Beyond its theoretical significance, this study is crucial for the documentation of Sarawak's subdialects, many of which are gradually undergoing extinction due to language shift and urbanization (e.g., Dayang Nazirah et al., 2024; Norazuna, 2021).

3. Literature Review

One important study on liquid consonants is Ballard and Starks (2005), in which they presented a comprehensive review of this category and the evidence for grouping them as a natural class. Ballard and Starks (2005) suggested that liquid consonants are a category without a clear phonetic variable. For this reason, these consonants are not defined in terms of phonetic features that they share, but rather in terms of the phonetic features that they lack. In addition, Ballard and Starks (2005) provided typological evidence for the distinct categorization of liquid consonants. According to them, "the high frequency of liquids in the database would suggest that liquids are a category of sonorant consonants distinct from nasals and glides. Their status as a distinct category is further confirmed by the fact that they occur as the sole type of sonorant consonant in some languages (e.g., Rotokas)" (Ballard and Starks, 2005, p. 3). Another piece of evidence comes from English phonology, the phonotactic constraint of which allows /l/ and /r/ as the second consonant in a complex onset—e.g., *plant* [plɑːnt], *prey* [preɪ]—but prohibits a nasal and any other obstruent—e.g., **pneumonia* [njuːˈməʊnɪə] and **psoriasis* [səˈrʌɪəsɪs]—in the same position.

The complex nature of liquid consonants across languages is further exemplified in a study by Adriana Santa Tinggom, Nor Hashimah Jalaluddin & Junaini Kasdan (2021), who presented a geolinguistic analysis of the distribution of the word *kapal* in Malay Siamese dialect in Satun, Thailand. Conducted in five villages (viz. Cha Lung, Chebilang, Bankhuan, Tan Yong Poo, and Tammalang), the study focused on the factors that influence the distribution of this lexical item in Satun. The data were collected from 240 informants and transcribed and keyed into ArcGIS software to generate a choropleth map. Adriana Santa et al. (2021) demonstrated that there are variants of this lexical item, such as [kɑpɑ], [kɑpɛ], and [kɑpɑj]. Although the geolinguistic analysis by Adriana Santa et al. (2021) may not seem directly relevant to the present study, the choice of the lexical item (*kapal*) provides useful insights into the various realizations of the lateral consonant, which is a type of liquid consonant, and the phonological processes it undergoes in Satun. The fact that in some dialects in Satun *kapal* is pronounced as [kɑpɛ], [kɑpɑ], and [kɑpɑj] further illustrates the unique behaviour of liquid consonants in various dialects, especially in Southeast Asia. Additionally, Adriana Santa et al. (2021) offered a rather unclear rule-based analysis of the lateral consonant. The analysis did not seem to capture any concrete generalization of the consonant's behaviour. According to Andriana Santa et al. (2021), there is a variant in which /l/ is realized as [j], and there is also a variant in which /al/ coalesces into [ɛ]—this is a clear indicator that there is some restriction in effect that prevents /l/ from surfacing in the output. Had a constraint-based approach been adopted, this generalization would have been apparent.

The distinct behaviour of liquid consonants is found in other Austronesian languages as well. For instance, Galang (2019) observed palatalization of liquid consonants in Using, a Javanese dialect spoken in Banyuwangi. The data were collected from interviews with the local people. Galang (2019) noted that palatalization occurs when a liquid segment follows specific stem patterns. In the first place, the palatalization occurs when the vowel that precedes the liquid consonant has the feature [+tense]. In the second place, the same process occurs when the vowel that precedes the consonant has the feature [+tense +high]. Galang (2019) referred to these segments as triggers, while the liquid consonants that undergo a change in features were referred to as targets. While Galang (2019) brought forward valuable insights into the behaviour of liquid consonants in this dialect, the theoretical foundation adopted is rather imprecise. It is unclear which model of distinctive features Galang (2019) used and what kind of rule-based framework was adopted in the analysis. Galang (2019) also seemed to only vaguely describe the phenomenon without capturing and modelling the generalization. As previously mentioned, Galang (2019) identified two triggers for palatalization, making the analysis uneconomical and inelegant. Since the vowels /u, e/ and /i/ all share the feature [+tense –low], there is no need for such a complex distinction—a single rule would have been sufficient and theoretically more preferable.

While analyses of other languages provide valuable insights in this respect, it is equally important to examine the phonological aspect of the Malay language, especially since the Tambirat dialect belongs to the family of Malay language. Zaharani (2005) is an important work on Malay phonology and morphology, offering an optimality-theoretic analysis that details the interaction between morphology and phonology in standard Malay. This study revisited earlier works by Yunus (1980), Farid (1980), and Teoh (1994), addressing the limitations in their analyses. Zaharani (2005) claimed that his analysis was superior because it met three levels of adequacy: observational, descriptive, and explanatory. Additionally, Zaharani's (2005) phoneme inventory was more minimal than that of Yunus (1980), Farid (1980), or Teoh (1994), due to his exclusion of [j], [w], and [ʔ] as phonemes (note the phonetic transcription). Zaharani (2005) also disagreed with Teoh (1994), who claimed that the Malay syllable structure is C(VC), insisting that since the onset is sometimes optional, the correct structure should be (C)V(C). While Zaharani (2005) presented an elegant description of Malay phonology, specifically the phonology–morphology interface, the lack of authentic and empirical data weakens the reliability of the findings. According to Zaharani (2005), the data were collected from three sources: previous studies (Yunus, 1980; Farid, 1980; Teoh, 1994), his own observations, and his intuition as a native speaker. As a result, some of his descriptions are questionable. For instance, Zaharani (2005) argued that a root-final /r/ surfaces as a geminate when the suffix /-an/ is attached; therefore, *pasaran* would be pronounced [pa.sar.ran.]. To my knowledge, this pronunciation is not attested or, at best, marginal.

Studies that specifically address Sarawak dialects were conducted by Madzhi (1989) and Asmah (2008a). Madzhi (1989) described the phonology of the Sarawak dialect, particularly the variant spoken in Kuching. This includes suprasegmental properties, phoneme distribution, segment clusters, syllables, and consonants and vowels of the Sarawak dialect. Madzhi (1989) showed that the vowel /a/ is retained in word-final positions. However, in other Sarawak dialects such as the Betong dialect, this vowel in the same position is normally realized as [ɔ]. In addition, Madzhi (1989) stated that the Kuching dialect has only one diphthong, namely [oj], which is in line with Asmah (2008a), who also stated that [oj] is the only falling diphthong in Sarawak; in this dialect, the diphthongs /au/ and /ai/ found in standard Malay are realized as [o] and [e], respectively. Both Madzhi (1989) and Asmah (2008a) are useful and substantial studies; however, the absence of a formal theoretical framework makes these studies lack explanatory adequacy, that is, they lack predictive power.

A more specific account of Sarawak dialects was carried out by Norazuna Norahim, Salbia Hassan & Dayang Nurlisa Abang Zainal Abidin (2022). This study was a preliminary comparative survey of the phonological features of Sarawak subdialects, which included phoneme inventories, phoneme distributions, diphthongs, and segment clusters; these are the same features used by Asmah (2008a). The data for the survey were partly derived from the authors themselves, and some were collected from past studies. The comparative analysis included the dialects of Kuching, Tambirat, Kabong, and Debak. Norazuna et al. (2022) identify two clusters: the cluster in Kuching and the other spoken by the coastal Malays in western Sarawak. The former covered varieties in Kuching, the Sarawak River basin, Sematan, Santubong, and Bako. The latter, on the other hand, is more heterogeneous in that it shares similar features, such as the eight-vowel system and the absence of word-final /ɣ/. While the study by Norazuna et al. (2022) is certainly important as the first step toward further investigation of Sarawak dialects, it could have benefited more from primary data rather than secondary data from previous studies. Primary data would have been more recent and authentic, serving as a more reliable basis for further analyses.

4. Methodology

The approach adopted in this study is descriptive qualitative, focusing on a ‘micro’ characteristic of language (Salbia, 2016), which, in this case, is the phonological behaviour of liquid consonants. Following Salbia (2016), the present study relied on primary data collected from three informants, all of whom are mature native speakers of this dialect. The selection of these informants was based on the criteria outlined by Asmah (2008b): they must be 40 to 60 years old, in good health with well-functioning articulatory organs, native speakers with good intuition and knowledge of their culture and social class.

According to the headman, Kampung Tambirat has an estimated population of 3,000. For the purpose of this study, however, the population was confined to the residents of Kampung Tambirat Lot, which has approximately 200 people. The snowball sampling method was employed, wherein the headman recommended additional informants for data collection. Having chosen the informants, data collection was conducted using the procedure in Figure 1.

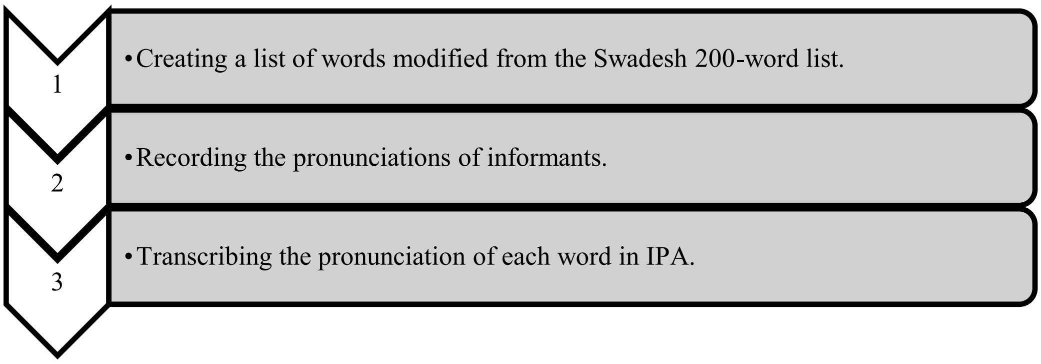

Figure 1. Data Collection Procedure

The first step involved selecting lexical items to be used for the data collection, most of which were adapted from the Swadesh 200-word list.[1] The Swadesh list was developed by Morris Swadesh as a compilation of basic vocabulary terms for historical and comparative linguistics, known for its stability and universality. Employing this list is essential as it helps lay the foundation for future comparison with other dialects that exhibit distinct liquid consonant behaviours. Only items containing liquid consonants in the coda were selected from the Swadesh 200-word list. I also added some items not originally in the Swadesh list, such as *pil* (“pill”) and *bil* (“bill”). After the modification, 13 lexical items were included in the list.

[1] Downloadable from https://people.umass.edu/ellenw/Swadish%20List.pdf.

The second step involved asking the informants to pronounce these items and recording the pronunciation, a process known as the citation method (Salbia, 2016). As a native speaker of this dialect, I was involved in the elicitation process, directly interacting with the informants and using my own intuition to partially verify the data.

The third step involved transcribing the pronunciation of each lexical item using the phonetic transcription. The transcription method was based on the International Phonetic Alphabet as provided by the International Phonetic Association. The phonetic transcription was crucial for two reasons:

1. Phonemic transcription would not have been possible since it is purely abstraction.
2. Optimality Theory is a surface-driven theory, meaning that the objective is to determine why a particular surface output is well-formed, rather than deriving a surface form from underlying representations through a series of interacting rules.

In the transcription process, the behaviour of a liquid consonant was observed when it functions as an onset and a coda. Similar to any other Malay dialect, a liquid consonant never constitutes a syllable peak.

5. Theoretical Framework

The theoretical framework adopted in this paper is Optimality Theory (McCarthy & Prince, 1993; Prince & Smolensky, 1993). This framework is a development of Generative Phonology by Chomsky and Halle (1968), but unlike the traditional rule-based generative approach, Optimality Theory is constraint-based. The central assumption in Optimality Theory is that the Universal Grammar consists of a set of violable constraints, which differs from the classical rule-based approach, in which Universal Grammar is defined as inviolable principles and rule schemata (or "parameters") (Kager, 1999). There are two families of constraints in this framework: the markedness constraints and the faithfulness constraints.

Markedness constraints require that some output meet some criterion of structural or well-formedness (Kager, 1999). For example, *CODA requires that a well-formed structure not have a coda. Therefore, any output that has a coda violates this markedness constraint. Faithfulness constraints, on the other hand, require that some output be faithful to the input. For example, if the input is /al/ and the output is [la], the latter is said to be unfaithful and thus violates some faithfulness constraint. In this case, Optimality Theory assumes that [la] violates LINEARITY-IO, a constraint that militates against metathesis. The structure of grammar in Optimality Theory may be represented in the following schema:

GEN (in_i) = {cand 1, cand 2 ... }

EVAL ({cand 1, cand 2, ...}) → $cand_k$ (the output, given in_i)

The Optimality Theory grammar pairs input /in_i/ with output [$cand_k$]. GEN is a function that generates all possible output candidates, essentially infinite, for a given input. EVAL then evaluates every candidate with a language-specific constraint ranking and selects the most harmonic candidates.

6. Results and Discussion

To effectively model the behaviour of liquid consonants in this dialect, we need to observe the data and identify a generalization from it. Table 1 shows the data collected from the informants.

Table 1. Liquid Consonants in Phonological Environments

No.	Lexical Items	Underlying Forms	Surface Forms
1	besar	/bəsaɣ/	[be.sa.]
2	keluar	/kəluaɣ/	[kə.lu.a.]
3	kotor	/kotoɣ/	[kɔ.tɔ.]
4	telur	/təloɣ/	[tə.lɔ.]
5	alir	/aleɣ/	[a.lɛ.]
6	pasir	/paseɣ/	[pa.sɛ.]
7	betul	/bətol/	[bə.toj.]
8	tebal	/təbal/	[tə.baj.]
9	botol	/botol/	[bo.toj.]
10	katil	/katel/	[ka.tel.]
11	wakil	/wakel/	[wa.kel.]
12	pil	/pel/	[pel.]
13	bil	/bel/	[bel.]

As shown in Table 1, there were 13 lexical items, all of which involved liquid consonants with different behaviours in different phonological environments. To model this, a regular pattern needed to be identified. In the first place, the distribution of liquid consonants was notably limited in syllable codas; for example, in (1) to (9), there was not a single instance of [ɣ] or [l] appearing in coda positions. This suggests that there is a constraint that prohibits a liquid consonant in the coda position and that this dialect must employ a repair strategy to prevent the coda liquid from surfacing in the output. It is clear from Table 1 that two repair strategies were employed:

1. In (1) to (6), the rhotic consonants were deleted.
2. In (7) to (9), the laterals were substituted with high front vowels.[2]

Items (10) to (13), however, contradict this pattern. The laterals in those items surfaced in the output and were not substituted with high front vowels as observed in items (7) to (9). To account for this, we need to assume that there is some constraint that overrides the prohibition against the coda laterals in (7) to (9). In this case, I propose that there is a constraint that blocks the diphthong [ej], causing the candidates with the laterals in codas to emerge in the output forms. This assumption is justified since the diphthong [ej] is absent not only in Sarawak dialects, but in other Malay dialects as well. In other words, the candidates with laterals in the codas are considered more harmonic than those with the diphthongs. The behaviour of liquid consonants in the Tambirat Malay dialect is summarized in Table 2.

Table 2. The Behaviour of Liquid Consonants in Tambirat Malay Dialect

ɣ-deletion		*l*-substitution		*l*-retention	
Underlying Forms	**Surface Forms**	**Underlying Forms**	**Surface Forms**	**Underlying Forms**	**Surface Forms**
/bəsaɣ/	[bə.sa.]	/bətol/	[bə.toj.]	/katel/	[ka.tel.]
/kəluaɣ/	[kə.lu.a.]	/təbal/	[tə.baj.]	/wakel/	[wa.kel.]
/kotoɣ/	[ko.to.]	/botol/	[bo.toj.]	/pel/	[pel.]
/təloɣ/	[tə.lɔ.]			/bel/	[bel.]
/aleɣ/	[a.lɛ.]				
/paseɣ/	[pa.sɛ.]				

Now that we have established our generalization, we can model it within the framework of Optimality Theory. As previously mentioned, the central assumption in this research is that the distribution of liquid consonants must be restricted by some kind of constraint. In the earlier analyses, the constraint that militates against a segment in a coda is referred to as the coda condition or simply CODACOND. McCarthy and Prince (1993, 1994), for instance, propose the following formulation for CODACOND in Axininca Campa:

[1] CODACOND

A coda consonant is a nasal homorganic to a following stop or affricate

[2] Following Durand (1987), Roca (1997), Zaharani (2000; 2006; 2014), etc., I posit that there are no such things as glides in this dialect if by "glides" we mean non-syllabic high vowels.

This constraint, however, has been reinterpreted and reanalysed as an alignment constraint. The alignment constraint requires that a particular consonant must always be aligned to the left edge of a syllable, that is, the onset (Itô & Mester, 1994).

[2] CODACOND: Align-Left (C, σ)

The formulation in [2] simply states that a consonant must be aligned to the left-most edge of a syllable. However, this constraint can be further specified. Building upon formulation [2], I formulate the coda condition in this dialect as an alignment constraint as in [3]:

[3] ALIGN-LIQUID
Align-Left (ɣ&l, σ)

However, as observed in Table 1, each of these consonants had its own distinct behaviour. For example, the realization of the rhotic consonant in syllable codas is entirely prohibited, whereas the lateral is permissible only when preceded by [e]. For this reason, each of them should be controlled by its own constraint. In the spirit of Zaharani (2006; 2014), I will distinguish between ALIGN-RHOTIC and ALIGN-LATERAL. The former prohibits a rhotic consonant in a syllable coda, while the latter prohibits a lateral in the same position.

[4] ALIGN-RHOTIC
Align-Left (ɣ, σ)

[5] ALIGN-LATERAL
Align-Left (l, σ)

In the formulation, [4] requires that the rhotic consonant appear only at the leftmost edge of a syllable; in other words, [ɣ] should always constitute an onset. [5] requires that lateral also appear exclusively at the leftmost edge of a syllable, which means that [l] always constitutes an onset as well.

As shown in Table 1, [ɣ] is never permitted in the coda position. In Optimality Theory, this restriction is said to be a result of constraint ranking, in which case the constraint that militates against a coda [ɣ], that is, ALIGN-RHOTIC, should be undominated or at least highly ranked, for in this dialect [ɣ] is never found in the coda position. To satisfy this constraint, the optimal candidate must employ a repair strategy to prevent [ɣ] from surfacing in the output. Within this framework, satisfying a constraint must come at the expense of violating another constraint. In this case, the violated constraint is one that militates against deletion since this dialect satisfies ALIGN-RHOTIC by deleting [ɣ]. This constraint is the faithfulness constraint MAX-IO.

[6] MAX-IO

Input segments must have a correspondent in the output ("No deletion")

Since the coda condition is satisfied at the expense of segment deletion, ALIGN-RHOTIC must be ranked higher than MAX-IO in the constraint hierarchy. This can be modelled using a tableau shown in [7].

[7] ALIGN-RHOTIC Satisfaction: ALIGN-RHOTIC >> MAX-IO

Input: /bəsaɣ/	ALIGN-RHOTIC	MAX-IO
a. bə.saɣ.	*!	
b. ☞ bə.sa.		*

Candidate [7a] fails to observe ALIGN-RHOTIC, which is highly ranked. Therefore, it incurs a fatal violation and must be eliminated. Candidate [7b], by contrast, satisfies ALIGN-RHOTIC at the cost of sacrificing its faithfulness to the input; that is, it deletes the rhotic consonant, thereby violating MAX-IO. Candidate [7b], however, should not be eliminated; since MAX-IO is the lowest-ranking constraint, [7b] does not incur a fatal violation, and this candidate still emerges as the optimal candidate.

In Optimality Theory, GEN produces an infinite set of output candidates, all of which undergo the same evaluation as the optimal candidate. It will be impractical, however, to consider all of these candidates. Therefore, we will take into account candidates that are plausible enough for evaluation, in which case we may consider alternative strategies to satisfy ALIGN-RHOTIC. One plausible strategy involves vowel epenthesis; a process widely attested in standard Malay and other Malay dialects. The common vowel epenthesis in Malay is the schwa insertion; the schwa can be inserted right after the rhotic consonant, yielding the candidate [bə.sa.ɣə.]. This process causes a new syllable to be created, allowing [ɣ] to be syllabified as an onset rather than a coda. Another strategy involves segment substitution. The rhotic consonant may be substituted with a non-syllabic high vowel, yielding [bə.saj.]. The substitution process is found in virtually all dialects and languages. This process is also attested in the data presented in Table 1. Both processes, deletion and substitution, are violations of faithfulness constraints, namely DEP-IO and IDENT-IO, respectively.

[8] DEP-IO
Output segments must have a correspondent in the input ("No epenthesis")

[9] IDENT-IO
The output corresponding to the input specified as [F] must be [F] ("No substitution")

Since this dialect does not employ epenthesis or substitution as a repair strategy, it is essential that any candidate with epenthesis or substitution be eliminated. Therefore, neither [bə.sa.ɣə.] nor [bə.saj.] can be the optimal candidate. To ensure that these candidates are eliminated during the evaluation process, DEP-IO and IDENT-IO must be ranked higher than MAX-IO, which is only minimally violated the well-formed output, [bə.sa.ɣ.] (see Table 1). DEP-IO, IDENT-IO, and ALIGN-RHOTIC are in the same ranking since all of them are violated by ill-formed candidates and there is no evidence to justify ranking them apart. These candidates can now be evaluated in a tableau as in [10]:

[10] ALIGN-RHOTIC Satisfaction: ALIGN-RHOTIC, DEP-IO, IDENT-IO >> MAX-IO

Input: /bəsaɣ/	ALIGN-RHOTIC	DEP-IO	IDENT-IO	MAX-IO
a. bə.saɣ.	*!			
b. ☞ bə.sa.				*
c. bə.sa.ɣə		*!		
d. bə.saj.			*!	

As demonstrated in [10], candidate [10c] satisfies ALIGN-RHOTIC at the expense of fatally violating DEP-IO. Candidate [10d] also successfully satisfies ALIGN-RHOTIC, but it does not survive IDENT-IO. Both of these candidates have to be eliminated because they violate higher-ranking constraints. It should be noted that the established constraint has a predictive power and hence fulfills the requirement for explanatory adequacy: This constraint ranking will also work for /kəluaɣ/, /kotoɣ/, /təloɣ/, /aleɣ/, and /paseɣ/. For instance, with /kəluaɣ/, the optimal candidate will be [kə.lu.a.] because it incurs the lowest-ranking constraint, MAX-IO. Other plausible candidates such as [kə.lu.a.ɣə], [kə.lu.a.ɣə] and the faithful candidate, [kə.lu.aɣ.], will be eliminated by higher ranking constraints, namely ALIGN-RHOTIC, DEP-IO and IDENT-IO.

Now that we have addressed the *ɣ*-deletion, we can now turn to *l*-substitution. Let us assume that GEN generates candidates that have the same specifications as those of (10) for the input /bətol/. We then have four plausible candidates: [bə.tol.], [bə.to.], [bə.to.lə.], and [bə.toj.]. The motivation for *l*-substitution is the same as that of *ɣ*-deletion: both processes occur because of the need to satisfy the coda condition that no liquid consonant can constitute a syllable coda. However, as mentioned earlier, it is best to distinguish between ALIGN-RHOTIC and ALIGN-LATERAL. In this case, since we are dealing with [l], the relevant constraint is ALIGN-LATERAL.

This dialect employs substitution as a repair strategy in order to satisfy ALIGN-LATERAL. This process is a violation of IDENT-IO, which must therefore be ranked low in the hierarchy so that [bə.toj.] emerges as the optimal candidate. Other candidates, [bə.tol.], [bə.to.], and [bə.to.lə.], are unattested and thus should be eliminated. The candidate [bə.tol.], which is faithful but ill-formed, violates the markedness constraint ALIGN-LATERAL; therefore, this constraint must be ranked higher than IDENT-IO. The candidate with a segment deletion, [bə.to.], violates MAX-IO; therefore, this constraint must also be ranked higher than IDENT-IO. Finally, the candidate with epenthesis, [bə.to.lə.], violates DEP-IO; therefore, this constraint must also be ranked higher than IDENT-IO. Ultimately, we may establish a partial constraint ranking as follows: ALIGN-LATERAL, MAX-IO, DEP-IO >> IDENT-IO. We can apply our constraint ranking in a tableau as shown in [11]:

[11] ALIGN-LATERAL Satisfaction: ALIGN-LATERAL, MAX-IO, DEP-IO >> IDENT-IO

Input: /bətol/	ALIGN-LATERAL	MAX-IO	DEP-IO	IDENT-IO
a. bə.tol.	*!			
b. bə.to.		*!		
c. bə.to.lə			*!	
d. ☞ bə.toj.				*

As shown in [11], the current constraint ranking correctly predicts the optimal candidate for the case of *l*-substitution. Candidate [11d] emerges as the optimal candidate because it violates the lowest-ranking constraint, IDENT-IO, and satisfies others. Other candidates fail to observe the higher-ranking constraints, resulting in their elimination: [11a] violates the markedness constraint ALIGN-LATERAL; [11b] violates the faithfulness constraint MAX-IO; and [11c] violates another faithfulness constraint DEP-IO. This constraint ranking will work for other data with *l*-substitution: /təbal/ and /botol/. If we test this constraint ranking for /təbal/, for instance, and assume that GEN produces [tə.baj.], [tə.bal.], [tə.ba.lə.], and [tə.ba.] as candidates, the optimal and most harmonic candidate will be [tə.baj.]—it violates the lowest-ranking constraint, namely IDENT-IO, while other candidates will be eliminated because they violate the higher-ranking constraints: ALIGN-LATERAL, MAX-IO, and DEP-IO.

However, the current constraint ranking is not yet satisfactory because it only predicts the correct output for the case of *l*-substitution. We need a constraint ranking that is explanatorily adequate and can capture the optimal generalization and predict the correct output not only for *l*-substitution but also for *ɣ*-deletion discussed earlier. This requires merging the constraint rankings in [10] and [11]. To merge these two, we need to consider both higher-ranked constraints and the lower-ranked constraints in each case. In both [10] and [11], ALIGN-RHOTIC, ALIGN-LATERAL, and DEP-IO are consistently ranked higher. MAX-IO and IDENT-IO, on the other hand, occupy lower rankings, with one of them being lower-ranked in the respective case. At this stage, let us assume that MAX-IO and IDENT-IO occupy the same ranking, so that we have the following constraint ranking: ALIGN-RHOTIC, ALIGN-LATERAL, DEP-IO >> MAX-IO, IDENT-IO. We can now try to apply this constraint ranking to analyse *l*-substitution and *ɣ*-deletion.

[12] ALIGN-RHOTIC Satisfaction: ALIGN-RHOTIC, ALIGN-LATERAL, DEP-IO >> MAX-IO, IDENT-IO

Input: / bəsaɣ/	ALIGN-RHOTIC	ALIGN-LATERAL	DEP-IO	MAX-IO	IDENT-IO
a. bə.saɣ.	*!				
b. ☞ bə.sa.				*	
c. bə.sa.ɣə			*!		
d. ☜ bə.saj.					*

[13] ALIGN-LATERAL Satisfaction: ALIGN-RHOTIC, ALIGN-LATERAL, DEP-IO >> MAX-IO, IDENT-IO

Input: / bətol/	ALIGN-RHOTIC	ALIGN-LATERAL	DEP-IO	MAX-IO	IDENT-IO
a. bə.tol.		*!			
b. ☜ bə.to.				*	
c. bə.to.lə			*!		
d. ☞ bə.toj.					*

As observed in [12] and [13], the constraint ranking is still not satisfactory; it fails to predict the correct output for the set of candidates given in each tableau. In [12], both [12b] and [12d] emerge as the optimal candidates, which is wrong since only the latter is correct (cf. Table 1). In [13], both [13b] and [13d] emerge as the optimal candidate, which is also wrong because only the former is correct.

The current constraint ranking, therefore, needs to be modified. As is evident from the data, each of the liquid consonants has its own strategy to satisfy the coda condition. The rhotic is deleted, whereas the lateral is substituted with a non-syllabic high vowel. These two phonological processes involve the violation of two different constraints: MAX-IO and IDENT-IO, respectively. In this case, I propose that these constraints should be specified for the feature. Since MAX-IO involves specifically a deletion of /ɣ/, and IDENT-IO involves specifically a substitution of /l/, it is reasonable to distinguish between two types of MAX and two types of IDENT constraints.

For simplicity, I will use MAX-IO[+rhotic] and MAX-IO[–rhotic] for rhotic and non-rhotic consonants; and IDENT-IO[+lateral] and IDENT-IO[–lateral] for lateral and non-lateral consonants. Since the correct outputs, [bə.sa.] and [bə.toj.], violate MAX-IO[+rhotic] and IDENT-IO[+lateral], respectively, these constraints will be ranked the lowest. They will be dominated by ALIGN-RHOTIC, ALIGN-LATERAL, DEP-IO, MAX-IO[–rhotic], and IDENT-IO[–lateral]. Therefore, we can assume the following partial constraint ranking: ALIGN-RHOTIC, ALIGN-LATERAL, DEP-IO, MAX-IO[–rhotic], IDENT-IO[–lateral] >> MAX-IO[+rhotic], IDENT-IO[+lateral]. Using the same candidate set in [12] and [13], the current constraint ranking now correctly predicts the correct output candidates. This evaluation can be modelled in a tableau as in [14]. For convenience, the same tableau will be used for both inputs.

[14] ALIGN-RHOTIC and ALIGN-LATERAL Satisfaction: ALIGN-RHOTIC, ALIGN-LATERAL, DEP-IO, MAX-IO[–rhotic], IDENT-IO[–lateral] >> MAX-IO[+rhotic], IDENT-IO[+lateral]

Input 1: / bəsaɣ/ Input 2: /bətol/	ALIGN-RHOTIC	ALIGN-LATERAL	DEP-IO	MAX-IO [–rhotic]	IDENT-IO [–lateral]	MAX-IO [+rhotic]	IDENT-IO [+lateral]
a. bə.saɣ.	*!						
b. ☞ bə.sa.						*	
c. bə.sa.ɣə			*!				
d. bə.saj.					*!		
e. bə.tol.		*!					
f. bə.to.				*!			
g. bə.to.lə			*!				
h. ☞ bə.toj.							*

The evaluation in [14] shows that the current constraint ranking predicts the right outputs for both inputs. For input 1, candidate [14b] wins because it minimally violates the MAX-IO[+rhotic]; other candidates are eliminated earlier because they fail to observe the higher-ranked constraints, namely ALIGN-RHOTIC, DEP-IO, MAX-IO[–rhotic], and IDENT-IO[–lateral]. For input 2, candidate [14h] emerges as the winner, incurring a minimal violation of the lowest-ranked constraint, IDENT-IO [+lateral], whereas its competitors fail to survive other higher-ranked constraints, namely ALIGN-LATERAL, DEP-IO, MAX-IO[–rhotic], and IDENT-IO[–lateral].

Although the current constraint ranking manages to capture both *ɣ*-deletion and *l*-substitution, there is another issue to take into account. As we can see in Table 1, [l] is permitted in a syllable coda when it is preceded by a close-mid front unrounded vowel [e],[3] which is a departure from the examples we discussed earlier. Since ALIGN-LATERAL is highly ranked in the current constraint ranking, all candidates with a lateral in the coda—including attested candidates such as items 10 to 13 in Table 1—will erroneously be eliminated. The failure of the current constraint ranking in choosing the right candidate is demonstrated in [15], with the correct candidate failing to emerge as a winner designated by the symbol '☺'.

[3] Note that I use /e/ in the underlying forms as well. In the spirit of Zaharani (2006), I reject the assumption that the surface [e] derives from /i/ in underlying representations.

[15] ALIGN-LATERAL Violation: ALIGN-RHOTIC, ALIGN-LATERAL, DEP-IO, MAX-IO[–rhotic], IDENT-IO[–lateral] >> MAX-IO[+rhotic], IDENT-IO[+lateral].

Input: /katel/	ALIGN-RHOTIC	ALIGN-LATERAL	DEP-IO	MAX-IO [–rhotic]	IDENT-IO [–lateral]	MAX-IO [+rhotic]	IDENT-IO [+lateral]
a. ☺ ka.tel.		*!					
b. ka.te.				*!			
c. ka.te.lə.			*!				
d. ☞ ka.tej.							*

As shown in [15], the constraint ranking fails to select the correct candidate as the winner: candidate [15a] does not survive the evaluation because it violates the highly ranked constraint, namely ALIGN-LATERAL. The winner in the evaluation is [15d], which incurs a minimal violation of IDENT-IO[+lateral]. This result does not align with the data in Table 1, since the correct candidate should be [15a].

Therefore, the current constraint ranking needs to be revised. Since there are attested instances violating ALIGN-LATERAL, this constraint must be dominated and cannot be put in the same ranking as ALIGN-RHOTIC, which completely prohibits candidates with [ɣ] in the coda. There must be another constraint, ranked higher than ALIGN-LATERAL, that eliminates incorrect candidates such as [ka.tej.] in [15].

In this case, I posit that this dialect does not permit the diphthong [ej] in the surface forms. This is reasonable since this diphthong is not found in Sarawak dialects, as suggested by Madzhi (1989) and Asmah (2008a). Similarly, this diphthong is absent in standard Malay. Za'ba (1964), Abdullah (1974), Asmah (1975), and Yunus (1980) unanimously assert that Malay has only three diphthongs, namely [aj], [aw], and [oj]. Therefore, it is reasonable to propose that there is a markedness constraint that prohibits the presence of [ej] in this dialect. I will refer to this constraint as NO-[ej], formulated in [16]:

[16] NO-[ej]
The diphthong [ej] is prohibited

This formulation aligns with the principles of Optimality Theory, which allows formulations of new constraints but with typological consequences; in other words, the universal grammar needs to be considered when positing a new constraint. In this case, there is clear evidence that the diphthong [ej] is not attested in the Sarawak dialects and standard Malay. Repair strategies to avoid the diphthong [ej] are also found in other languages, such as Brazilian Portuguese (Araujo & Vieira, 2021). The formulation of constraint in [16] is, therefore, reasonable and justified. The constraint will eliminate any candidate that contains the diphthong [ej], which is considered as ill-formed in this dialect. Serving as some sort of a filter, it blocks the phonological process that changes a lateral into a non-syllabic high vowel when the preceding vowel is the close-mid front unrounded vowel. That is to say, this dialect favours the surface forms with a lateral in the coda over those with [ej]. Therefore, NO-[ej] must dominate ALIGN-LATERAL, ensuring that [ka.tej.] is eliminated before it even violates the lowest-ranked constraint, IDENT-IO[+lateral]. The correct output, [ka.tel.], violates ALIGN-LATERAL to avoid the violation of NO-[ej]. That is to say, [ka.tel.] satisfies NO-[ej] at the expense of violating ALIGN-LATERAL. Hence, the final constraint ranking is as follows: ALIGN-RHOTIC, DEP-IO, MAX-IO[–rhotic], IDENT-IO[–lateral] >> NO-[ej] >> ALIGN-LATERAL >> MAX-IO[+rhotic], IDENT-IO[+lateral]. This constraint interaction is demonstrated in [17]; for convenience, constraints that are not ranked apart are placed in the same column.

As shown in [17], the established constraint ranking successfully selects the correct output for each candidate set. For input 1, the optimal candidate is [17b] because it violates the lowest-ranked constraint, MAX-IO[+rhotic]. Other candidates have been eliminated earlier because they fail to observe ALIGN-RHOTIC, DEP-IO, and IDENT-IO[–lateral]. For input 2, the optimal candidate is [17h] because it violates only IDENT-IO[+lateral], which is ranked lower. Other candidates have been eliminated because they fail to satisfy higher-ranked constraints: ALIGN-LATERAL, MAX-IO[–rhotic], and DEP-IO. For input 3, the optimal candidate is the one that violates ALIGN-LATERAL, which is [17i]. Note that [17l] does not emerge as the optimal candidate, although it violates the lowest-ranked constraint. This is because it has been eliminated earlier due to a fatal violation of NO-[ej], which is a higher-ranked markedness constraint.

[17] ALIGN-RHOTIC, DEP-IO, MAX-IO[–rhotic], IDENT-IO[–lateral], NO-[ej] >> ALIGN-LATERAL >> MAX-IO[+rhotic], IDENT-IO[+lateral]

Input 1: / bəsaɣ/ Input 2: /bətol/ Input 3: /katel/	ALIGN-RHOTIC, DEP-IO, MAX-IO[–rhotic], IDENT-IO[–lateral], NO-[ej]	ALIGN-LATERAL	MAX-IO[+rhotic], IDENT-IO[+lateral]
a. bə.saɣ.	*! ALIGN-RHOTIC		
b ☞ bə.sa.			*MAX-IO[+rhotic]
c. bə.sa.ɣə	*! DEP-IO		
d. bə.saj.	*! IDENT-IO[–lateral]		
e. bə.tol.		*!	
f. bə.to.	*! MAX-IO[–rhotic]		
g. bə.to.lə	*! DEP-IO		
h. ☞ bə.toj.			*IDENT-IO[+lateral]
i. ☞ ka.tel.		*	
j. ka.te.	*! MAX-IO[–rhotic]		
k. ka.te.lə.	*! DEP-IO		
l. ka.tej.	*! NO-[ej]		*IDENT-IO[+lateral]

It should be noted that the alignment constraints that prevent the presence of liquid consonants in syllable codas in this dialect must be highly ranked, justifying further evidence of the markedness nature of coda liquids. This result is similar to Zaharani's (2014), which shows that the coda liquids are marked and ranked highly in most dialects in Malaysia. Interestingly, Zaharani (2014) shows that the Sarawak dialect is an anomaly in that it allows the presence of liquid consonants in syllable codas. He proposes the following constraint ranking for the behaviour of liquid consonants in the Sarawak dialect: DEP-IO >> MAX-IO >> IDENT-IO [consonant] >> IDENT-IO [sonorant] >> UNIFORMITI-IO >> ALIGN-RHOTIC >> ALIGN-LATERAL. The analysis presented in this paper deviates from Zaharani (2014) in this respect. In the Tambirat dialect, the alignment constraints are generally ranked highly because the presence of a coda liquid is ill-formed. In order to avoid these marked structures, this dialect employs rhotic deletion and lateral substitution as repair strategies. Therefore, the constraints that militate against these processes must be ranked lower. However, that there is a case in which the lateral [l] is permitted in the coda position. This happens when there is another marked structure that should be avoided, which is the diphthong [ej]. Therefore, in this dialect, the constraint NO-[ej] should be prioritized and ranked higher than the constraint that prevents the coda [l].

7. Conclusion

This optimality-theoretic analysis has shown that liquid consonants have a restricted distribution in the syllable coda. The rhotic [ɣ] is entirely banned in this position, whereas the lateral [l] can occupy a coda only when preceded by the close-mid front unrounded vowel [e]. Their unique behaviour arises from the interaction of markedness constraints, particularly ALIGN-RHOTIC and ALIGN-LATERAL, with faithfulness constraints. ALIGN-RHOTIC prohibits the presence of [ɣ] in the syllable coda, while ALIGN-LATERAL restricts the presence of [l] in the same position. To comply with these constraints, this dialect employs two primary repair strategies: *ɣ*-deletion (MAX-IO violation) and *l*-substitution (DEP-IO violation). There is, however, a phonological context in which the lateral is allowed in the coda position: when the lateral is preceded by [e]. In this situation, the lateral is retained to avoid forming the marked and ill-formed diphthong [ej]. Ultimately, the following partial constraint ranking has been developed: ALIGN-RHOTIC, DEP-IO, MAX-IO[–rhotic], IDENT-IO[–lateral], NO-[ej] >> ALIGN-LATERAL >> MAX-IO[+rhotic], IDENT-IO[+lateral].

This study has shown that the theoretical foundation adopted in this paper successfully captures the important generalization: phonological changes that occur are triggered by the avoidance of marked structures, which can be modelled succinctly by means of constraint ranking, eschewing the need for rule derivation, which was the tradition of the generative framework. This study also addresses the gap in the literature: the Tambirat Malay dialect has been largely overlooked in the domain of dialectology. Only recently has it attracted scholarly attention (e.g., Norazuna et al., 2022; Nur Sayani Shahira, 2020). Given the unique behaviour of liquid consonants, future studies that focus on both phonetic and phonological aspects of these segments might be useful and expanded to other various subdialects in Malaysia as well as Austronesian languages. Large-scale studies might provide deeper insight into the nature of liquid consonants and how it affects the language development and cross-linguistic investigation.

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