International Journal of Linguistics, Literature and Culture
Available online at https://sloap.org/journals/index.php/ijllc/
Vol. 10, No. 1, January 2024, pages: 1-7
ISSN: 2455-8028
https://doi.org/10.21744/ijllc.v10n1.2398

Diphthongal Phones Found in the Balinese Language in Tabanan Regency: The Influencing Factors

Dewa Ayu Dyah Pertiwi Putri [a]
I Nyoman Suparwa [b]
Anak Agung Putu Putra [c]

Article history:

Submitted: 27 October 2023
Revised: 09 November 2023
Accepted: 18 December 2023

Keywords:

acoustic phonetics;
Balinese language;
diphthongal phones;
phonetics;
Tabanan Regency;

Abstract

The study aimed to investigate the diphthongal phones in the Balinese Language, particularly in Tabanan Regency. Phonological rules related to changes of vowel phones into diphthongal phones were uncovered and have explained factors that induce the changes. Data of this research were in the form of utterances produced by female informants in 10 sub-districts in Tabanan Regency. The data were collected through two kinds of methods, which were the interview method and the observation method. In analyzing the data, the researcher used an extra lingual matching method to analyze factors that induce the changes from vowel phones into diphthongal phones. Based on the result, these changes were induced by both linguistic and nonlinguistic factors. The linguistic factors were acoustic factors, namely frequency and duration, and phonological factors, namely diphthongization and vowel shift. Meanwhile, the nonlinguistic factor was the geographical elevation in which the participants lived.

Corresponding author:
Dewa Ayu Dyah Pertiwi Putri,
English Literature Study Program, Warmadewa University, Denpasar, Indonesia.
Email address: dewaayudyahpertiwiputri@gmail.com

[a] Warmadewa University, Denpasar, Indonesia
[b] Udayana University, Denpasar, Indonesia
[c] Udayana University, Denpasar, Indonesia

1 Introduction

In phonology, sounds could be defined in two forms, namely the abstract forms known as phonemes and real forms known as phones. In other words, a phone is the form of realization of phonemes that could be heard by humans. Therefore, the quality of the phone could be different from its phoneme. This is also acknowledged by Ladefoged & Johnson (2014), considering that the quality of a certain phone in a particular language (ex. [a] in Indonesian) would not accurately the same as the quality of that same phone in other languages (ex. [a] in Japanese. This is because the quality of a phone uttered by someone is greatly influenced by some linguistic factors, such as the characteristics and condition of the speaker's speech organs, the intervention of other sounds around the phone, or even non-linguistic factors, especially the geographical factors which are proven to have an indirect but significant impact on the quality of phones (Everett, 2013; Putri, 2017). In Putri (2017), it was proven that people who live in the highlands tend to produce vowel sounds of shorter duration compared to those who live in the lowlands. This phenomenon is caused by low atmospheric pressure and low oxygen levels at high altitudes, which results in low air pressure and low oxygen levels in the lungs. Low air pressure and oxygen levels in the lung prevent highland people from producing loud sounds. Based on this, it could be said that linguistic and non-linguistic factors do have a significant influence on the quality of sound output, especially vowel sounds. This is because vowel sounds are sonorant. The flexibility of vowel sounds in terms of duration often gives rise to unusual vowel phone variants. Variations in vowel phone quality are usually based on the process of relaxing, strengthening, raising, and lowering the sound. Based on the uniqueness of vowel sounds, vowel sounds were used as the subject of this study. To detail the analysis, acoustic phonetics was used to analyze problems so that the range of observations could be deepened to the internal level of sound (Yeung et al., 2013; Moriarty, 2020; Meakins et al., 2016).

The position of the tongue and lip shapes in uttering a phone would affect the acoustic characteristics of the phone produced. For example, the phoneme /o/ which is pronounced with a certain height, back of the tongue, and roundness of the lips could be realized as the phoneme [o], even as the phoneme [ɔ] if the height of the tongue is changed during pronunciation. Tabanan Regency is one of the districts in Bali whose people empirically have a unique way of pronouncing vowels. The vowel phonemes in Tabanan Regency are often uttered not as single phones, but as diphthongal phones. For example, when people pronounce the word {kotek} [kɔtɛʔ], the pronunciation of the phoneme /e/ is not [ɛ], but [ɛ^{a}]. The pronunciation of these diphthongal phones is done unintentionally or could be said as a unique accent. Even though the phone variants are considered marginal sounds, they are still part of the vowel phones in Tabanan Regency that are significant to study. This far, the inventory of phones in the Balinese language is merely limited to consonant and vowel sounds, although the presence of diphthongal sounds in Tabanan Regency is quite obvious (Klatt, 1979; Best & Strange, 1992; Flege et al., 2003).

In several previous studies that discussed the inventory of Balinese vowel sounds, the phenomenon of diphthongal phone had never been discussed. In Pastika (2005), it was stated that the Balinese Language has six vowel phonemes, namely /i/, /e/, /ə/, /a/, /u/, and /o/, which realize ten allophones, namely [i], [ɪ], [e], [ɛ], [ə], [a], [u], [ʊ], [o], and [ɔ]. The development of quantity at the allophone level was caused by the relaxation of four vowel phonemes, namely /i/, /e/, /u/, and /o/, which respectively become [ɪ], [ɛ], [ʊ], and [ɔ]. According to Dhanawaty (2002), the Balinese language in Tabanan Regency has the same phoneme inventory as the standard variety of Balinese, namely the high front phoneme /i/ has two forms of phones, namely [i] and [ɪ]; The back high phoneme /u/ has two forms of phones, namely [u] and [ʊ]; The front middle phoneme /e/ has three forms of phones, namely [e], [ɛ], and [ə]; The back middle phoneme /o/ has two forms of phones, namely [o] and [ɔ]; The front low phoneme /a/ has two phones, namely [a] and [ɔ]; and the center middle phoneme /ə/ has a phone, namely [ə].

Suparwa (2006), investigated the sound patterns of the Balinese Melayu Loloan Language, stating that the Balinese Melayu Loloan Language has 6 vowel phonemes, namely /a/, /i/, /u/, /ə/, /e/, dn /o/ and 18 consonant phonemes, namely /p/ /t/, /c/, /k/, /b/, /d/, /j/, /g/, /s/, /h/, /l/, / r/, /m/, /n/, /ɲ/, /ŋ/, /y/, and /w/. The twenty-four phonemes develop into 32 phones, which have a complete distribution, except /c/, /j/, /ɲ/, /y/, and /w/ which could merely appear at the beginning and middle of the morpheme.

Diphthongal phones are the realization of vowel phonemes that undergo a sudden change in format to produce a sound like a diphthong (Ladefoged & Johnson, 2014). Even though there was not any difference in terms of height quality between diphthongs and diphthongal sounds, diphthongal sounds could not yet be categorized as diphthongs. This is caused by the difference in duration proportions between the first and second phones in diphthongs and diphthongal phones. In diphthongs, the duration of the first and second phones is relatively the same, whereas in diphthongs the duration of the first phone is much longer than the second phone. Thus, this study aims to determine the factors that influence the emergence of diphthongal sounds in the Balinese Language Tabanan Regency.

2 Materials and Methods

This study was designed with a descriptive qualitative approach to provide a descriptive presentation of the results of acoustic calculations presented through images (Arikunto, 2006). A descriptive presentation was expected to maximize space in explaining the causes and effects of the problems raised. In general, the study used field methods which were conducted in twenty villages in ten sub-districts in Tabanan Regency, namely Angseri Village and Apuan Village in Baturiti District, Pandak Gede Village and Beraban Village in Kediri District, Lumbang Village and Kerambitan Village in Kerambitan District, Payangan Village and Marga Village in Marga District, Tajen Village and Penebel Village in Penebel District, Belimbing Village and Sanda Village in Pupuan District, Selemadeg Village and Bajera Village in Selemadeg District, Mambang Village and Bantas Village in Selemadeg Timur District, Antosari Village and Bengkel Sari Village in Selemadeg Barat District, and Boongan Village and Gubug Village in Tabanan District. Tabanan Regency was chosen based on the emergence of the diphthongal phone phenomenon. Apart from the phenomenon, Tabanan Regency was chosen because it was the second largest district in Bali Province after Buleleng (Situs Resmi Pemerintah Kabupaten Tabanan, n.d.). This situation was expected to provide a more diverse linguistic phenomenon because a wider area was considered to be able to prevent society from having dialects that are too homogeneous.

The data in this study were utterances from female informants who were randomly selected. Female informants were chosen because of the natural characteristics of women's voices which are higher and tend to be longer in duration than men's voices (Mulyani, 2015). A higher sound with a longer duration allows the process of measuring the acoustic features of the sound to be easier and more detailed. To maintain accuracy, the researchers focus on instrumental phonetics which prioritizes the use of valid instruments, namely electronic recording equipment, Audacity software, Adobe Audition software, and PRAAT software. The support from advanced instruments in capturing and measuring the acoustic features of sound makes the results obtained more reliable.

In collecting the data, this study used two types of methods, namely the *Cakap* Method (interview) and the *Simak* Method (observation) (Sudaryanto, 2015). The methods were supported by the *Pancing* Technique (triggering) to stimulate the informants to utter the expected accent (Sudaryanto, 2015). In analyzing the data, the Extralingual Matching Method was used because this study was intended to compare language with other non-linguistic aspects, namely acoustic aspects and geographical aspects (Sudaryanto, 2015).

3 Results and Discussions

The factors that cause changes in the pronunciation of vowel phones into diphthongal phones in Tabanan Regency were explained based on linguistic and non-linguistic factors. The linguistic factors included acoustic and phonological factors, while the non-linguistic factor was a geographical factor. These factors are explained in detail as follows.

Acoustic factor (linguistic factor)

Acoustic factor is one of the factors that most easily influence changes in language sounds. According to Sugiyono (2003), acoustic components such as duration, frequency, formants, and intensity of sounds influence each other. In the phenomenon of vowel phonemes being pronounced into diphthongal phones, frequency and duration have a significant influence. It is caused by the concept that a higher frequency provides a shorter sound cycle. Thus, the resulting sound waves would be denser (Sugiyono, 2007). On the other hand, the frequency of vowel sounds is composed of repeating frequencies called formants. it means that the higher the frequency, the higher the formant, the lower the tongue position while uttering the sound. The lower tongue position has a tendency to produce different sounds or even unusual sounds, such as a diphthongal phone. The explanation above can be proven through the following image.

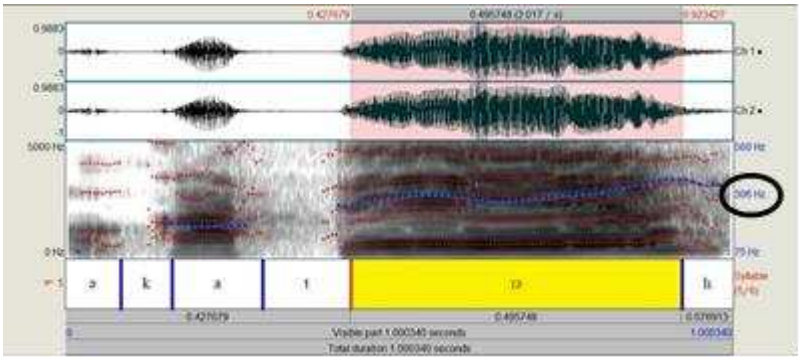

Figure 1. Frequency and formant spectrograms of the diphthongal phone

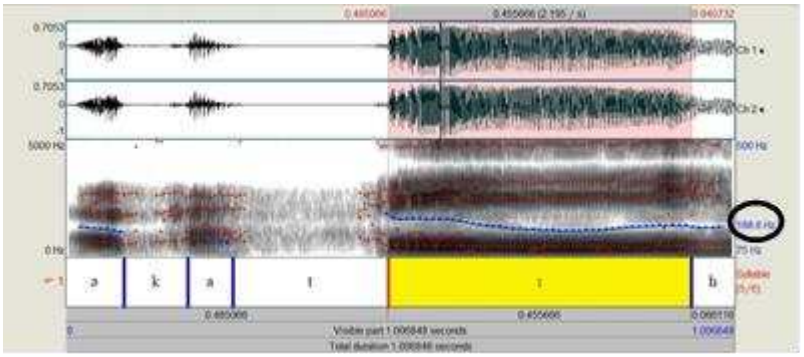

Figure 2. Frequency and formant spectrograms of the vowel phone

Based on the two pictures above, it could be observed that the frequency value (black circle) for the diphthongal phone [ɪə] in Figure 1 is higher, namely 306 Hz compared to the frequency value for the vowel phone [ɪ] in Figure 2, which is merely 188.6 Hz. As mentioned above, the higher the frequency would provide a higher formant and cause lower tongue position. Thus, the speech in Figure 1 which has a higher frequency, inversely has a lower height quality on the formant diagram. Sound with lower height quality would have a tendency to turn into a diphthongal sound (Wongso et al., 2017; Sudipa et al., 2023; Bratayadnya, 2016).

On the other hand, the duration of the utterance also plays a role in whether diphthongal production is audible or not. Longer speech durations allow longer sound waves with more detailed fluctuations of frequency. This situation causes the diphthongal sound to become more audible. This is why diphthongal sounds are more often found in language accents in the lowlands, considering that the duration of speech in lowland communities tends to be longer than in highland communities (Putri, 2017).

Phonological factor (linguistic factor)

Phonological processes are symptoms experienced by language sounds naturally as a result of adjustments to the speech organs when producing sound segments in an utterance. Phonological processes are classified into four types, namely (1) assimilation, (2) syllable structure processes, (3) weakening and strengthening, and (4) neutralization (Schane, 1992). Based on the pattern of changes in vowel phones into diphthongal phones, it could be stated that the phenomenon is a syllable structure process, namely diphthongization and vowel quality changes.

Diphthongization is the splitting of a vowel segment into two new vowel segments or adding a semivowel with the same characteristics as the main vowel sound (Schane, 1992). The diphthongal phones found in Tabanan Regency were a derivative of the lax vowel sounds which are stressed. In the language spoken in the highlands, the diphthongal phones appear on the front syllable of words because the stress is placed on the front syllable. By comparing the characteristics of the main phone and the additional phone which is composed the diphthongal phone, it could be observed that the additional phone must be a lower phone than the main phone in the formant diagram. For example, [ɪ] becomes [ɪə], [ʊ] becomes [ʊɔ], [ɛ] becomes [ɛa], [ɔ] becomes [ɔa], and [ə] becomes [əa].

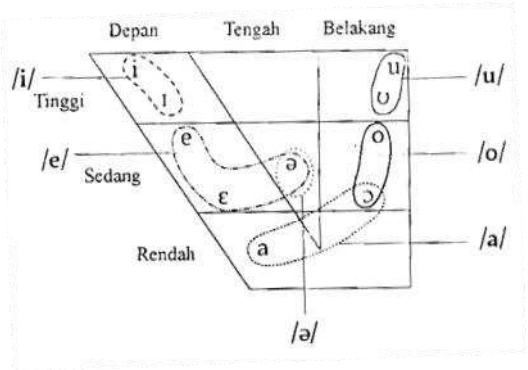

Figure 3. Formant diagram (Dhanawaty, 2002)

This proves that the existence of the diphthongal phones is not a coincidence, but has a rule in its appearance. The rules include (1) the diphthongal phone formed by phone A and phone B must be located between phone A and phone B in the formant diagram, (2) phone B as an additional phone must come from the phone which has a middle or lower position than the main phone A in the formant diagram, and (3) the change from phone A to the diphthongal phone AB has a direction towards the middle or downwards in diagram format. Based on these rules, it could be observed that a sound could move, change, or interact with other sounds that still have close characteristics, for example, [ɪ] which has a position close to [ə] could change to [ɪə], or [ʊ] which is located close to [ɔ] could change to [ʊɔ]. This kind of movement or change is also known as a vocal quality change.

The most commonly known phenomenon of changes in vowel quality is the Great Vowel Shift phenomenon which occurs in English (Schane, 1992). This phenomenon shows that there is a gradual change in the quality of vowels in English, namely a vowel sound that was previously categorized as a low sound slowly changes to a medium one, a vowel sound that was previously a medium sound slowly changes to a high one, and a vowel sound that was previously categorized as a high vowel slowly changes. turns low. This is further evidence that vowel sounds are sounds that are very flexible to change.

Geographical factor (non-linguistic factor)

In contrast to linguistic factors which have a wide opportunity to influence changes in sound quality, non-linguistic factors, which in fact are elements outside of language, could apparently also trigger changes in sound quality, although indirectly. As previously explained, the non-linguistic factor that is significant is the geographical altitude on which a person lives could have a significant impact on the quality of the speech sounds produced by that person (Everett, 2013; Putri, 2017).

The influence of the geographical altitude of an area on the quality of speech sounds is actually facilitated by the pressure and oxygen levels in the atmosphere which could influence the pressure and oxygen levels in the lungs of people living in that area (Everett, 2013; Putri, 2017). Therefore, the low atmospheric pressure and oxygen levels in the highlands result in low air pressure and oxygen levels in the lungs of highland people (Everett, 2013). Low air pressure and oxygen levels in the lungs cause people in the highlands to have short breaths. This condition prevents them from producing long sounds (Putri, 2017). On the other hand, high atmospheric pressure and oxygen levels in the lowlands enable high pressure and oxygen levels in the lungs of lowland people. This causes lowland people to produce speech sounds that are longer in duration (Putri, 2017). These conditions could have a significant influence on the quality of sound production, one of which is the diphthongal type.

This study found two types of diphthongal phones which were differentiated based on geographic altitude in Tabanan Regency. The two diphthongal phones are highland diphthongal phones and lowland diphthongal phones. Highland diphthongal phones appear in highland areas such as Pupuan and Baturiti Districts, while lowland diphthongal phones appear in lower lands, such as Kediri and Selemadeg Timur Districts. The short duration of sound by highland people causes stress and tends to fall on the initial syllable of the word (Safar & de Vos, 2022; Wilson et al., 2014; Callan et al., 2004). Thus, it makes sense that the diphthongal phones in the highlands is formed at the beginning of the word and is not followed by other lower sounds. The highland diphthongal phones are simply

composed by a phone plus the repetitions of that phone with a slight degradation of height quality, for example [a] becomes [aạ], [i] becomes [iị], and [u] becomes [uụ].

On the other hand, the long breathing of lowland people allows them to utter words with a fairly long duration, even rhythmically. This causes the stress to fall on the final syllable of the word. With the support of a long breath, lowland people could produce long and low sounds and even could emerge another sound in the end whose quality is in the middle or below the original sound, for example [ɪ] becomes [ɪə], [ə] becomes [əa], and [ʊ] becomes [ʊɔ]. This process causes the emergence of lowland diphthongal phones.

4 Conclusion

The emergence of diphthongal phones was influenced by two types of factors, namely linguistic and non-linguistic. Linguistic factors consist of acoustic factors, namely the frequency and duration of sounds, and phonological factors, namely diphthongization and vowel quality changes. On the other hand, the non-linguistic factor that influences is the geographical altitude on which language speakers live. The altitude difference caused the Balinese diphthongal phones in Tabanan Regency could be divided into two, namely the highland diphthongal font and the lowland diphthongal font. The highland diphthongal phone has a tense main phone and is limited to the vowel [a, i, and u]. The highland diphthongal phones appear in closed front syllables. The highland diphthongal phones are [aạ], [iị], and [uụ]. Highland diphthongal phones do not have another phone as their additional phones, but merely repeat the main phones with a lower pitch quality. On the other hand, lowland diphthongal phones have other phones as their additional phones which are located more middle or lower than the main phones in the formant diagram.

Conflict of interest statement
The authors declared that they have no competing interests.

Statement of authorship
The authors have a responsibility for the conception and design of the study. The authors have approved the final article.

Acknowledgments
The researchers would like to express their gratitude to the reviewers for their valuable comments on the earlier version of this paper.

References

Arikunto, S. (2006). Metode penelitian kualitatif. *Jakarta: Bumi Aksara*, *168*.

Best, C. T., & Strange, W. (1992). Effects of phonological and phonetic factors on cross-language perception of approximants. *Journal of phonetics*, *20*(3), 305-330. https://doi.org/10.1016/S0095-4470(19)30637-0

Bratayadnya, P. A. (2016). Verb "clean using water" in Balinese. *International Research Journal of Management, IT and Social Sciences*, *3*(3), 1-6.

Callan, D. E., Jones, J. A., Callan, A. M., & Akahane-Yamada, R. (2004). Phonetic perceptual identification by native-and second-language speakers differentially activates brain regions involved with acoustic phonetic processing and those involved with articulatory–auditory/orosensory internal models. *NeuroImage*, *22*(3), 1182-1194. https://doi.org/10.1016/j.neuroimage.2004.03.006

Dhanawaty, N. M. (2002). *Variasi dialektikal bahasa Bali di daerah transmigrasi Lampung Tengah* (Doctoral dissertation, Universitas Gadjah Mada).

Everett, C. (2013). Evidence for direct geographic influences on linguistic sounds: The case of ejectives. *PloS one*, *8*(6), e65275.

Flege, J. E., Schirru, C., & MacKay, I. R. (2003). Interaction between the native and second language phonetic subsystems. *Speech communication*, *40*(4), 467-491. https://doi.org/10.1016/S0167-6393(02)00128-0

Klatt, D. H. (1979). Speech perception: A model of acoustic–phonetic analysis and lexical access. *Journal of phonetics*, *7*(3), 279-312. https://doi.org/10.1016/S0095-4470(19)31059-9

Ladefoged, P., & Johnson, K. (2014). *A course in phonetics*. Cengage learning.

Meakins, F., Jones, C., & Algy, C. (2016). Bilingualism, language shift and the corresponding expansion of spatial cognitive systems. *Language Sciences*, *54*, 1-13. https://doi.org/10.1016/j.langsci.2015.06.002

Moriarty, E. (2020). "Sign to me, not the children": Ideologies of language contamination at a deaf tourist site in Bali. *Language & Communication*, *74*, 195-203. https://doi.org/10.1016/j.langcom.2020.06.002

Mulyani, E. (2015). Penentuan Frekuensi Fundamental Dan Formant Suara Manusia Dewasa Berdasarkan Perbedaan Suku Dan Gender Menggunakan Software Praat. *Komunikasi Fisika Indonesia*, *12*(10), 679-685.

Pastika, I. W. (2005). *Fonologi bahasa Bali: sebuah pendekatan generatif transformasi*. Pustaka Larasan.

Putri, D. A. D. P. (2017). *Pengaruh Ketinggian Geografis terhadap Panjang Bunyi Vokal dalam Bahasa Bali.* Artikel Ilmiah Seminar Nasional Bahasa Ibu. Universitas Udayana.

Safar, J., & de Vos, C. (2022). Pragmatic competence without a language model: Other-Initiated Repair in Balinese homesign. *Journal of Pragmatics*, *202*, 105-125. https://doi.org/10.1016/j.pragma.2022.10.017

Schane, S. A. (1992). Fonologi Generatif: Terjemahan Kentjanawati Gunawan. *Jakarta: Summer Institute of Linguistics-Indonesia*.

Sudaryanto, S. (2015). Metode dan aneka teknik analisis bahasa. *Yogyakarta: Appti*.

Sudipa, I. N., Putra, A. A. P., Sudipa, M. H. D., & Nala, M. B. A. (2023). Pragmatic studies on Balinese speech act verbs. *Linguistics and Culture Review*, *7*(1), 95-106.

Sugiyono, S. (2003). *Pedoman penelitian bahasa lisan: fonetik*. Pusat Bahasa Departemen Pendidikan Nasional.

Sugiyono, S. (2007). Struktur Melodik Bahasa Indonesia.

Suparwa, I. N. (2006). *Pola Bunyi Bahasa Melayu Loloan Bali: Kajian Fonologi Leksikal dan Posleksikal.* Disertasi. Universitas Udayana.

Wilson, C., Davidson, L., & Martin, S. (2014). Effects of acoustic–phonetic detail on cross-language speech production. *Journal of Memory and Language*, *77*, 1-24. https://doi.org/10.1016/j.jml.2014.08.001

Wongso, R., Luwinda, F. A., Trisnajaya, B. C., & Rusli, O. (2017). News article text classification in Indonesian language. *Procedia Computer Science*, *116*, 137-143. https://doi.org/10.1016/j.procs.2017.10.039

Yeung, H. H., Chen, K. H., & Werker, J. F. (2013). When does native language input affect phonetic perception? The precocious case of lexical tone. *Journal of memory and language*, *68*(2), 123-139. https://doi.org/10.1016/j.jml.2012.09.004