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Prosody Analysis of Acoustic Language Phonetic Research on Minang Kabau

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Abstract. *Prosody in the Minang Kabau language in this study was studied with 5 words, to find formants, frequency, intensity. They are /saruang/, /urang, /goreang/, /putiah/, /karajo/. The results show that the dominance of the predominant vowel is very high in these words. The words were also studied with frequency, intonation and duration to find the sound contour statistically. The results of the study are displayed through diagrams tables and explanations to understand the characteristics of sound, improve language learning ability. The earlier formant diagram shows the position of the tongue, with F3 representing the rear position, F2 representing the middle, and F1 representing the peak of the vowel (Predominant). The research method is the use of the Praat instrument to discuss the recorded and analyzed sounds. Minang Kabau, also known as Minang, has some phonetic peculiarities that distinguish it from other languages. Its broad vowel system, which comprises seven or eight vowels depending on dialectal variety, is one unique feature. Among these vowels are five monophthongs (/i, e, a, o, u/) and two or three diphthongs (/ai, au/, and maybe /oi/). Apart from this, there are vowel length distinctions in Minang Kabau, with both long and short vowels conceivable. In addition, the language has a consonant phoneme inventory that includes voiceless stops (/p, t, k/) and voiced stops (/b, d, g/), as well as a variety of other consonants.*

Key Words: *Prosody Analysis, Minang Kabau Language, instrument praat, vowel system*.

Abstrak. Prosodi dalam bahasa Minang Kabau dalam penelitian ini dikaji dengan 5 kata, untuk menemukan formant, frekuensi, intensitas. Kata-kata tersebut adalah /saruang/, /urang, /goreang/, /putiah/, /karajo/. Hasilnya menunjukkan bahwa dominasi vokal dominan sangat tinggi pada kata-kata tersebut. Kata-kata tersebut juga diteliti frekuensi, intonasi, dan durasinya untuk menemukan kontur suara secara statistik. Hasil penelitian ditampilkan melalui tabel diagram dan penjelasan untuk memahami karakteristik suara.Diagram formant sebelumnya menunjukkan posisi lidah, dengan F3 mewakili posisi belakang, F2 mewakili tengah, dan F1 mewakili puncak vokal (Predominan). Metode penelitian ini menggunakan instrumen Praat untuk mendiskusikan bunyi-bunyi yang telah direkam dan dianalisis. Bahasa Minang Kabau, yang juga dikenal sebagai bahasa Minang, memiliki beberapa keunikan fonetik yang membedakannya dengan bahasa-bahasa lain. Sistem vokal yang luas, yang terdiri dari tujuh atau delapan vokal tergantung pada variasi dialek, merupakan salah satu ciri khasnya. Di antara vokal-vokal tersebut terdapat lima monoftong (/i, e, a, o, u /) dan dua atau tiga diftong (/ai, au /, dan mungkin /oi /). Selain itu, ada perbedaan panjang vokal dalam bahasa Minang Kabau, dengan vokal panjang dan pendek. Selain itu, bahasa ini memiliki inventaris fonem konsonan yang mencakup hentian tak bersuara (/p, t, k/) dan hentian bersuara (/b, d, g/), serta berbagai konsonan lainnya.

Kata Kunci: Prosidi analisis, bahasa Minang Kabau, Instrumen Praat**, sistem vowel**

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INTRODUCTION

Suprasegmental prosodic features play a crucial role in human communication. These features, also known as suprasegmentals, include stress, intonation, pitch, timbre, and rhythm. While segmental features determine the individual sounds of a language, suprasegmental features help convey meaning and add nuance to spoken language. The suprasegmental prosodic will explore the various aspects of features and their importance in language communication. One of the most important aspects of language is stress, which refers to the prominence given to specific syllables within words or to specific words within a phrase.

This emphasis aids in distinguishing distinct words that may share portions. For example, in American English, the words "record" and "record" can have different meanings depending on whether the stress is on the first or second syllable. According to Ladd's (2008:12) studies, stress plays an important role in expressing contrast and in word recognition This highlights the significance of stress in transmitting meaning through language.

Intonation is a critical suprasegmental feature that includes pitch fluctuations in speech. It objectively transmits information about the speaker's attitude, feelings, and intentions. A rising intonation at the end of a sentence, for example, denotes a question, whereas a falling intonation denotes a declaration. As Ladd (2008:78) points out, "speakers can convey a wide range of social meanings by taking advantage of the relationship between pitch movement and pragmatic interpretation In other words.’’Pitch and tone are two interrelated suprasegmental speech qualities. Tone is the use of pitch to discriminate between distinct words or their meanings, whereas pitch refers to the high or low frequency of the voice generated by the vocal cords. Another essential suprasegmental trait is rhythm, which refers to the timing and length of sounds in speech. It has an impact on the overall flow and melody of a language.. Dauer (1983:112) claims that rhythm has a role in facilitating language processing and can affect the perception and production of speech.

Suprasegmental prosodic qualities contribute to social and cultural dimensions of communication in addition to communicating message and assisting language comprehension. Innation patterns, for example, might transmit information about the speaker's regional origin, social rank, and emotional state. "The variations in intonation patterns among different dialects and cultures demonstrate how suprasegmentals contribute to the rich tapestry of human communication," assert

Beckman and These cultural differences emphasize the importance of researching suprasegmental prosodic elements in language research and cross-cultural communication. (Venditti, (2015:159), Ladd, D. R. (2008:78), Lu, L. (2012), Dauer, R. M. (1983))

Stress, intonation, pitch, tone, and rhythm are important suprasegmental prosodic elements in human communication. They contribute to the social and cultural aspects of language use by helping to convey meaning, distinguish between word meanings, express emotions and intents, and contribute to the social and cultural aspects of language usage. awareness and strengthening communication across different languages and cultures requires an awareness of these aspects. Linguists and language learners can improve their capacity to communicate successfully in varied circumstances by paying attention to suprasegmentals.

Phonetics is the foundation for comprehending and describing speech sounds. Phoneticians study the articulatory, acoustic, and auditory elements of human vocalization in order to identify and analyze sounds in various languages. This knowledge is invaluable in the study of phonology, the linguistic discipline concerned with the sound patterns of a language. Phonetics is used by phonologists to detect and compare sounds in different languages, to create sound inventories, and to study sound change and evolution. (Ladefoged, P., & Johnson, K. (2014), Crystal, D. (2014), Cutler, A., & Bunnell, H. (2019), Gussenhoven, C., & Chen, A. (2018))

Phonetics and prosody are important sciences in linguistics because they help us comprehend the physical qualities, production, and structure of speech sounds. Phonetics serves as a foundation for researchers to find cross-linguistic trends, provide language training, and build speech technologies. Prosody, on the other hand, contributes to a comprehension of suprasegmental characteristics of language.

Liu Xu (2017) states Praat provides a diverse set of features and capabilities that enable researchers to investigate various elements of speech, including suprasegmental prosodic qualities.Praat's capacity to assess pitch, which is an important component of prosody, is one of its key qualities. Praat allows researchers to extract and alter pitch contours, allowing them to examine tonal patterns and variations in speech. Praat has contributed critical insights into the analysis of pitch in tones of many languages, assisting scholars in understanding the fundamental principles of tonal systems.

Duration is another key aspect of suprasegmental prosody that can be explored with Praat. Praat's precise timing capabilities allow researchers to quantify and compare the duration of various speech components such as vowels, consonants, and syllables. Intonation, or the melodic and rhythmic patterns of speech, is also an important component of suprasegmental prosody. Praat provides researchers with the tools they need to investigate and visualize intonation patterns, allowing them to better understand sentence-level prosody. Praat, in addition to these qualities, has a number of other functions that make it an invaluable tool for prosody study. It includes formant analysis tools, allowing researchers to analyze vowel quality and articulation. Praat also allows for the creation of spectrograms, which visually represent the acoustic structure of a sound. (Ten Bosch et al. (2015), Niebuhr et al. (2013), Liu Xu (2017), Bruggen et al. (2016), Dziubalska-Kólak and Klessa's (2013))

The sound-determining factors in the praat analysis for the Minang Kabau language are as follows:

1. Fundamental Frequency (F0):

   One of the most important acoustic features of speech is the fundamental frequency (F0). Praat allows for the extraction and study of F0, allowing researchers to investigate voice pitch and its changes between speakers and languages. Researchers can analyze prosody, intonation patterns, vocal features, and emotional emotions in speech by examining F0 contours (De Jong: 2011).

2. Spectrogram Analysis:

   A spectrogram is a graphical depiction of a sound signal's time-varying spectral information. Praat creates spectrograms by applying the Fast Fourier Transform (FFT) to the sound waveform. Researchers can visualize speech elements such as formant frequencies, consonant and vowel differences, and coarticulatory effects by analyzing spectrograms. This analysis aids in the comprehension of phonetic features, the identification of speech abnormalities, and the investigation of phonological patterns. (Ladefoged and Johnson:2015)

3. Formants :

   Formants represent the resonant frequencies of the vocal tract during speech production. Praat's formant analysis allows researchers to identify and measure the first three or four formants in different speech sounds. By examining formants, researchers gain insights into vowel quality, vowel space distribution, and coarticulatory effects. Moreover, formant analysis helps in cross-linguistic

comparisons, dialectal studies, and studying the impact of varying speaking styles (Hazan & Simpson:2015), (Sluijter & van Heuven:2012)

Minang Kabau, commonly known as Minang, has various phonetic features that set it apart from other languages. One distinguishing trait is its extensive vowel system, which includes seven or eight vowels depending on dialectal diversity. There are five monophthongs (/i, e, a, o, u/) and two or three diphthongs (/ai, au/, and maybe /oi/) among these vowels. Apart from these, Minang Kabau has vowel length distinctions, with both long and short vowels possible. Additionally, the language contains a consonant phoneme inventory that includes voiceless stops (/p, t, k/) and voiced stops (/b, d, g/), as well as various additional consonants.

Praat, a strong instrument for analyzing speech sounds, was used by researchers to undertake phonetic research on Minang Kabau. Praat includes a number of features that allow for the accurate examination of acoustic properties, such as spectrogram display and measuring capabilities. Linguists can examine and quantify various phonetic phenomena in the language using these attributes.

Asman, A. (2020) did one study that used Praat in Minang Kabau phonetics research. The researchers looked at vowel duration in Minang Kabau speech, specifically in stressed and unstressed positions. They investigated vowel duration patterns using Praat's spectrogram visualization and discovered that stressed vowels in the language have longer durations than unstressed vowels.

Yanti, F. (2019) did another important study, using Praat to explore vowel formants in Minang Kabau. They concentrated on the monophthongs /i, e, a, o, u/ and diphthongs /ai, au/ formant frequencies. They got precise measurements of the formant frequencies for each vowel using Praat's formant measurement functionalities, providing useful insights into the acoustic features of the vowels.

Another study conducted by Hasni, S (2018) focused on the prosodic features of Minang Kabau speech using Praat. The author analyzed aspects such as voice quality, intensity, and speech rate to explore the prosodic characteristics of the language. Praat's capabilities enabled Fadly to obtain accurate measurements and conduct detailed analyses of these prosodic features.

This study will go over the consonant and vowel diagrams in the Minang Kabau language in order to understand the articulatory function, and then identify

four examples of Minang Kabau words in order to find formants, frequency and intensity and . Praat's research offers an estimation of the recorded sound's measurement.

METHODOLOGY OF RESEARCH

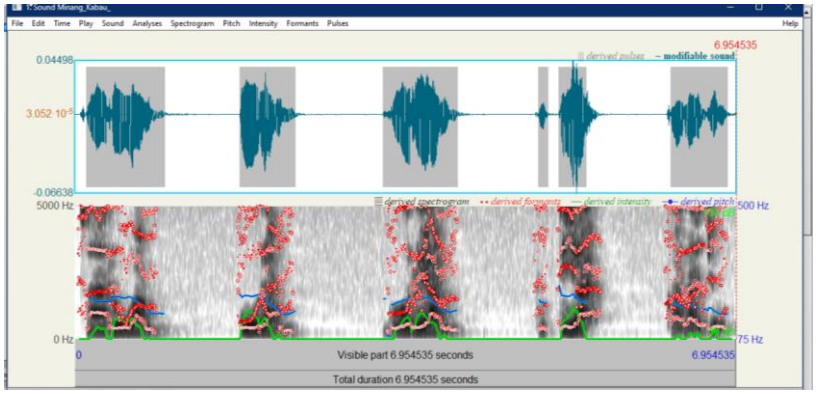
This is an experimental study that leads to an instrumental method. It also employs the PRAAT tool, which is a tool for evaluating language sounds in a language using an instrumental approach. The instrumental approach is essentially a research method that necessitates the use of precise measuring devices. This method is also known as Experimental Phonetics in linguistics, and it is focused to acoustic phonetic analysis. Praat type 6.1.40 software was employed as the measuring instrument in this study.

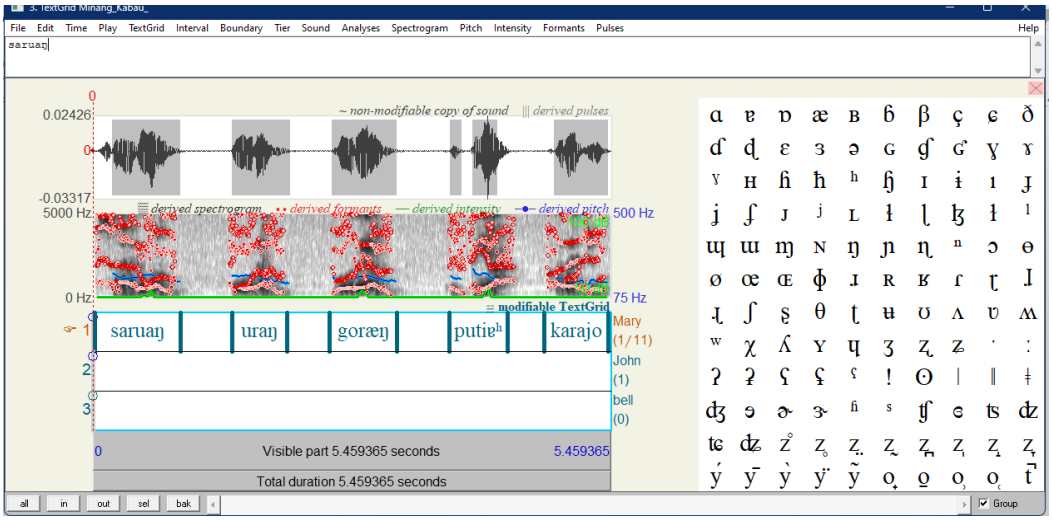
The IPO (Instituut voor Perceptie Onderzoek) technique was used for the study and description of the auditory components. Speech production trials, speech acoustic analysis, and speech perception testing are among the steps in the IPO strategy (Hayward, 2013).

The process of making a sound represented by an acoustic wave is the focus of speech production experiments. The depiction of spectrogram and waveform waves, as well as the computation of the value of each acoustic component in the form of duration (s), fundamental frequency-f0 (Hz), and strength (dB), are all part of the acoustic analysis of speech. Researchers investigated five Minang Kabau words: /Saruang/ sarong, /urang/ person, /goreang/ fried, /putiah/ white, and /karajo/ work.

FINDING AND DISCUSSION

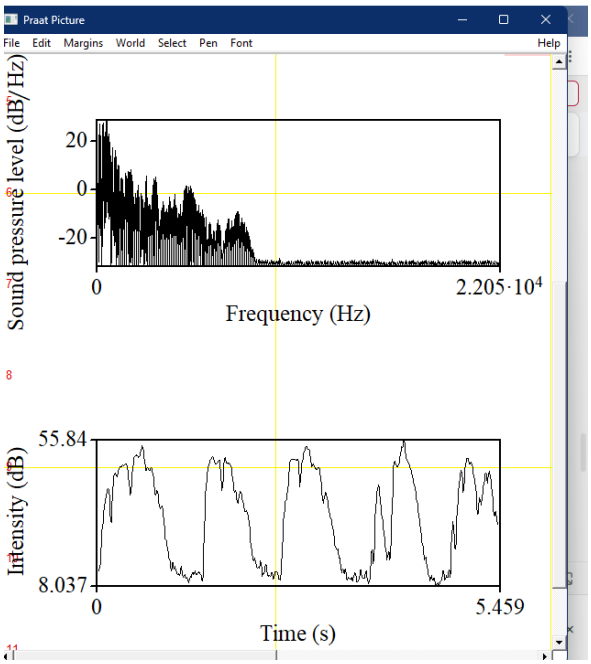
Prosody analysis is a study of language sounds that focuses on intonation, frequency, and Forman, which is a frequency point with a reflection on the curved wall of a spectrogram produced by a vocal sound. This definition is supported by Hawthorne, K., & Fischer, S. (2020) who defines Forman as an acoustic resonance or reflection of a sound produced by human language sounds.

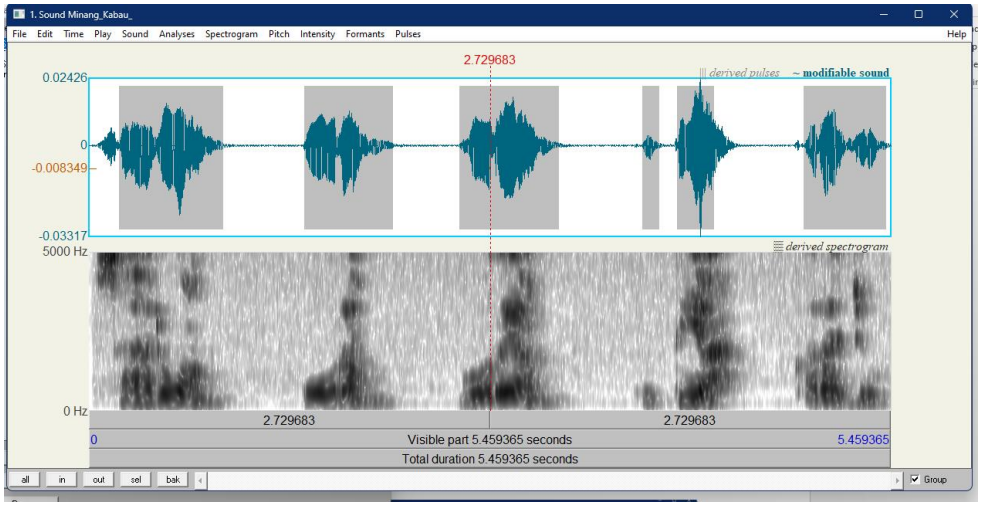




The formant level in the five words /saruang/, /urang/, /Putiah/, and /karajo/ may be seen in the two figures of praat analysis. All five words have a strong pronominal -pronomina. For example, the word /saruang/ has a pronominal with /sa/, /ru/, and /ang/, while the word /urang/ has a pronominal with /urang/ since it contains vowels and diphthongs. Finally, the term putiah has a pronominal with /pu/ /ti/ ah/ and the word goreang has a pronominal with /go/ /re/ /ang/. That is because the vowel sequence followed by ae is regarded as the same as the vowel sequence /uy/, pressure level.

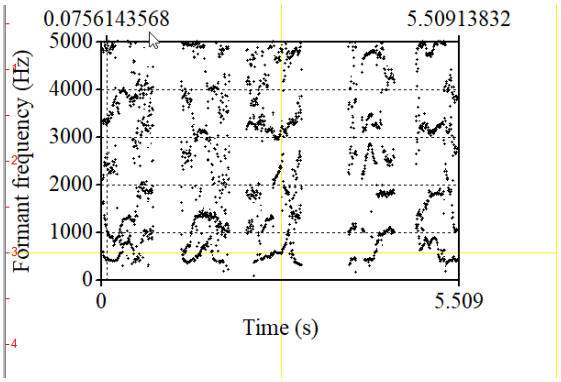
The schwa phoneme in the sequence /i/ /u/ /e/ is a gliding phoneme, as are /aw/ and /ay/. The pitch color is blue in the image, the intensity is green, and the formant is red. We can determine the height of the pronominal by analyzing the spectrogram, intensity, and sound pressure level.





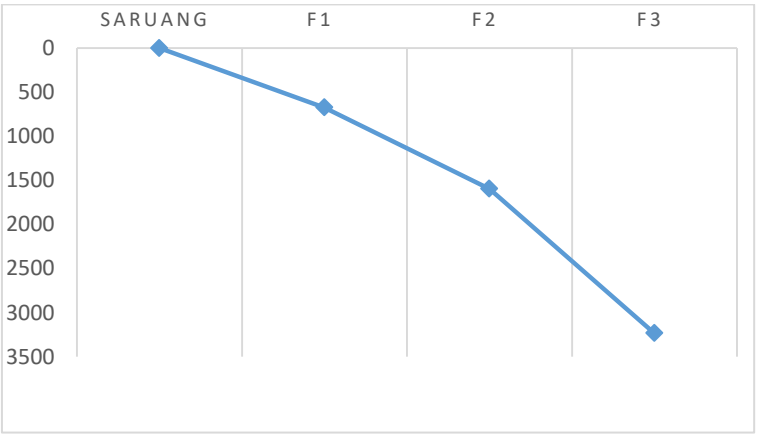
Praat analysis uses statistical data to determine the placement of the tongue, whereas articulatory phonetics uses tables to describe the position of vowels and consonants, which can then be explained by praat. Formant studies can help us better comprehend the structure and characteristics of sounds. When uttering vowel sounds, the initial formant (F1) is positioned in the closed position of the mouth.The more open the tongue posture, the higher the F1 frequency. Meanwhile, when uttering vowel sounds, the frequency (F2) is connected to the horizontal position of the tongue. The higher the frequency (F2), the closer the tongue is to the front teeth. For example, while pron The third formant (F3) can provide additional information regarding the position of the tongue when pronouncing vowels, particularly complex vowels, however F3 is not always detectable. For dominating letters, formant analysis is essential to provide meaningful value estimations. Vowel placement is determined

by formant analysis in presets. The graphic below depicts the dominant vowels in Minang Kabau words using vowel formants and vowel color contours.

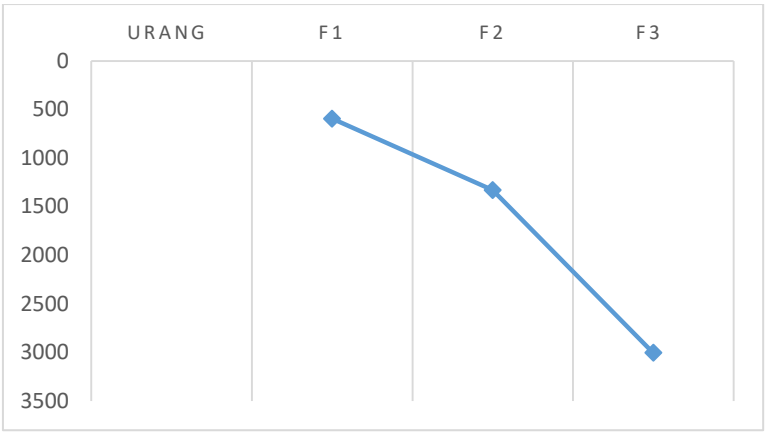


To clarify, it is explained word by word so that the formant function's validity can be evaluated.

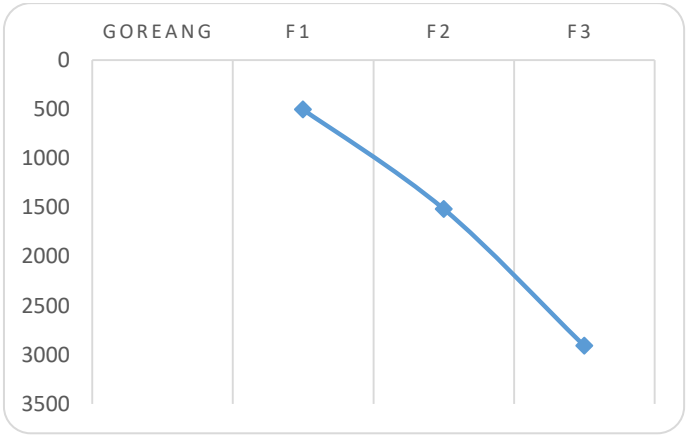
Saruang	Formants
F1	673
F2	1596
F3	3233



Urang	Formants
F1	594
F2	1329
F3	3006

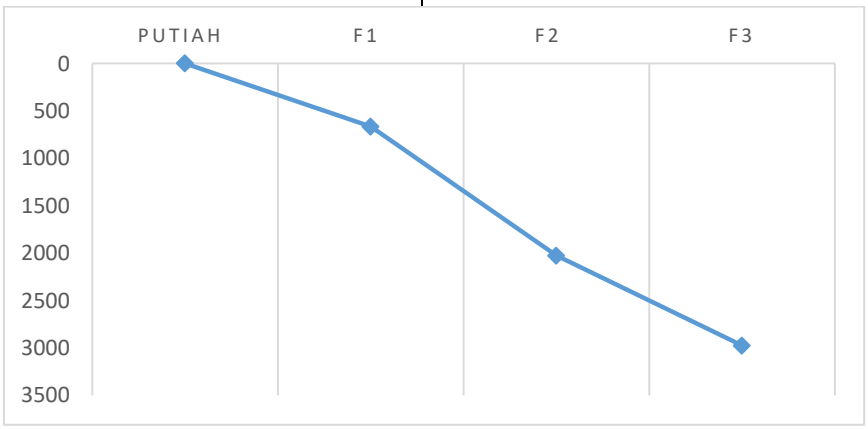


Goreang	Formants
F1	505
F2	1516
F3	2910

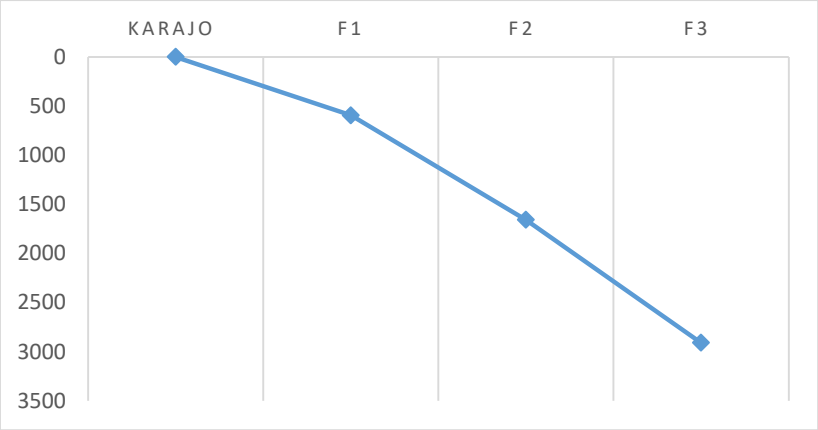


The function of the above formant diagram is to show the position of the tongue, where F3 is the back position, F2 is the middle, and F1 is the peak of the vowel (Predominant).

Putiah	Formants
F1	666
F2	2027
F3	2975



Karajo	Formants
F1	594
F2	1658
F3	2910



The frequency of a sound wave is measured by the number of cycles per second. It is objectively tied to the pitch of a sound and cannot be judged subjectively. A spectrogram, which depicts the distribution across time, can be used to visualize the frequency distribution. Furthermore, duration is a parameter that indicates the amount of time a sound is heard and corresponds to how quickly a person speaks. In practice, a waveform display can be used to measure duration. In contrast,intensity relates to the strength, volume, and clarity of communication. Data about the five supplied terms will be displayed below to provide further insight.

Saruang	Urang	Goreang	Putiah	Karajo
Frquency 177 Hz	Frequency 175 Hz	Frequency 163 Hz	Frequency 187 Hz	Frequency 167 Hz
Intensity 54 dB	Intensity 51 dB	Intensity 50 dB	Intensity 48 dB	Intensity 47 dB
Duration 0.726047 s	Duration 9763144 s	Duration 0847938 s	Duration 1.49324 s	Duration 0621475 s

The frequency of pronunciation for the word "putiah" is 187 Hz, while the frequency for "goreang" is 163 Hz. The word "saruang" has the most intense pronunciation at 54 dB, while "karajo" has the least at 47 dB. Furthermore, the word "Putiah" has the longest duration of 1.49324 seconds.

Praat analysis aids in articulatory pronunciation analysis in the following ways:

Vocal Diagram	Front	Central	Rear
High	I		u
Middle	e		
Bottom		a	o

Consonant Diagram	Labial	Alveolar	Palatal	Velar	Glotal
Sizzling /tb/ /b/	/P/ /b/	/t/ /d/		/k/ /g/	?
Sliding /tb/ /b/			/c/ /j/		
Resistance sound /tb/					h
Nasal /b/	/m/	/n/	ɲ	ŋ	
Lateral /b/		/l/			
Vibration /b/		/r/			
Semi vocal /b/	/w/		/y/		/ə/

Diagram Diphthong	Rear	Bottom
High	/iə/	/uy/ /uæ/
Center	/eæ/	
Bottom	/ay/	/aw/

CONCLUSION

Minang Kabau has a lot of formant structures. It may be decoded using five common Minang words: /saruang/, /goreang/, /putiah/, /urang/, and /karajo/. All five words end in the pronominal -pronomina. Because it comprises vowels and diphthongs, the word /saruang/ has a pronominal with /sa/, /ru/, and /ang/, but the term /urang/ has a pronominal with /urang/. Finally, putiah has a pronominal with /pu/ /ti/ ah/, and goreang has a pronominal with /go/ /re/ /ang/. This is due to the fact that the vowel sequence followed by ae is considered the same as the vowel sequence /uy/, pressure level. Duration analysis in Minang Kabau can help analyze differences in rhythm and tempo of the language, as well as detect sounds that are statistically too fast. When evaluating the voice contour of the Minang Kabau language, it is vital to consider the many dialects as well as the language's particular voice characteristics. Voice contour analysis can aid in understanding the voice and linguistic features of Minang Kabau. The formant diagram in the analysis depicts the vowel highs and lows.

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